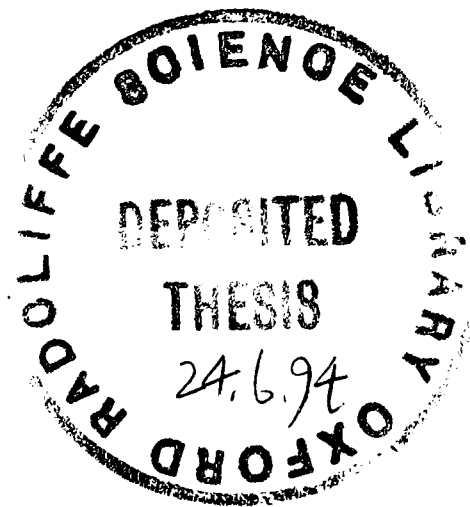


Managing Intervention For The Sustainable Development
of the Natural Forest:
An East African Perspective

by

John Edward Hall

A Thesis Submitted to the University of Oxford
for the
Degree of Doctor of Philosophy



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This study develops and tests a method of intervention designed to incorporate the concept of sustainable development into management strategies for the natural tropical forest, in the particular case of forest exploitation by small-scale local sawmilling enterprises. Sustainable development is defined as a development process that satisfies jointly the goals of the biological, social and economic spheres of forest management. A review of orthodox management strategies suggested that they focus on maximizing benefits in only one or two of these spheres, and are inadequate to address the requirements of truly sustainable development. The stakeholder concept, adapted from modern corporate management theory, was identified as one model with the potential to satisfy the requirements of sustainable development. A management strategy based on stakeholder theory, termed the Integrated Management Approach (IMA), was developed for the case of locally-developed sawmilling enterprises dependent on the natural forest.

The IMA is an iterative process based on the following steps: (1) the definition of criteria and the collection of information to describe the system as it was intended to operate (i.e., the Technical Limit of the operation) and as the enterprise is found at the time of initial intervention (i.e., the Benchmark Situation of the enterprise); (2) development of Negotiation Aims, based on the information collected, according to which the enterprise can progress towards the Technical Limits necessary for sustainable development; (3) identification of stakeholders and (4) their stakes in the enterprise; (5) assessment of stakeholder satisfaction, and negotiation from that basis towards the Negotiation Aims; (6) monitoring and iteration as necessary.

Three East African sawmill enterprises were used as case studies to develop and test the IMA. The case studies exhibit many of the social, economic and biological conditions which have hindered successful implementation of traditional management systems to the natural tropical forest. The outcomes of the IMA process for each case study were compared in terms of the rating accorded criteria for each sphere and across spheres, and of the participation and satisfaction of stakeholders. In general, all parameters increased with successive iterations of the IMA, although a major change of attitude by one of the key stakeholders in the final iteration for one enterprise reversed many of the gains previously made, thereby demonstrating one of the limitations of the strategy.

The results of this study suggest that the IMA has considerable potential to progress the objective of sustainable development for the case of local sawmilling enterprises operating under frontier conditions. They also suggest that the IMA should be applicable more generally, in facilitating sustainable development for a variety of enterprises based on natural resource use.

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Abbreviations used in this study

AAC	Annual Allowable Cut
APN	Amelioration des Peuplements Naturels of Cote d'Ivoire
cm	centimetre
DBH	Diameter Breast Height
FAO	Food and Agriculture Organization of the United Nations
FINNIDA	Finnish International Development Agency
IMA	Integrated Management Approach
ITTO	International Tropical Timber Organization
IUCN	International Union for Nature Conservation
Km	kilometre
Ksh	Kenya Shilling
m ³	cubic metre
masl	metres above sea level - a measure of altitude
MMUS	Modified Malayan Uniform System
NFAP	National Forest Action Plan
NTCS	Nithi Timber Cooperative Society
RIF	Regeneration Improvement Felling
SAP	Stakeholder Action Plan
SEALPA	South East Asia Lumber Producers Assoc.
TFAP	Tropical Forests Action Plan
Tsh	Tanzania Shilling
TWICO	Tanzania Wood Industries Corporation
UNEP	United Nations Environment Programme
US	United States of America
WB	World Bank
WRI	World Resources Institute
WWF	World Wide Fund for Nature

Forward



*One impulse from a vernal wood
Can teach man more of evil and of good
Than all the sages ever could.*

Wordsworth - 'Tables Turned'

Chapter 1

Introduction

1.0 The Challenge of Natural Tropical Forest Management

Management of the natural tropical forest for the sustained production of forest products is possible in theory and yet, apart from a few exceptions, there are essentially no examples of successful management of the natural tropical forest in practice (Leslie, 1977, 1987; Wyatt-Smith, 1987; Dawkins, 1988; Poore, 1989; Westoby, 1989; Whitmore, 1990). The trends in the rate of depletion and degradation of the natural tropical forest indicate that traditional management strategies for this resource are not keeping pace with the demands made of it (Grainger, 1987; Palmer and Synnott, 1991; Sayer and Whitmore, 1991).

For the purpose of this study, the ideal objective of natural forest management is that the forest be utilized in such a way that it provides a yield of goods and services over time in a manner that does not destroy or radically alter the composition or structure of the natural forest as a whole (Poore, 1989). Such levels of utilization of the forest resource would occur over time and would not compromise the ability of the forest ecosystem to meet the needs of the people in the future (Wyatt-Smith, 1987). To achieve this level of management, it is becoming increasingly recognized that forest management activities will have to encompass the concept of *sustainable development* (Pearce, Markandya and Barbier, 1989).

In order to maintain the social and economic benefits derived from the forest by both the indigenous and the broader communities, the forest ecosystem itself must be maintained. A management regime that would maintain the natural tropical forest so that its benefits could be available on a continued basis would be of inestimable benefit to mankind. These forests, and the ecosystems which are interrelated with them, provide important flows of economically valuable services which are particularly vital in countries with large rural populations (Ascher and Healy, 1990). In practice, however, the forest manager finds that there are certain factors that limit the applicability of classical forest planning and management methods which, theoretically, would lead to a continued output of forest values from the natural tropical forest. The challenge which faces forest managers in achieving this goal is how *forest management*

theory for the natural tropical forest can be successfully linked to the *practice* of natural tropical forest exploitation.

It has only been recently acknowledged by significant authorities that the gross modification of natural tropical forests on a global scale is beyond our current abilities to curtail (Ascher and Healy, 1990; Synnott, 1991). What has not been fully recognized as requiring the attention of the forest management fraternity is that, following in the wake of the initial or "primary" front of natural tropical forest exploitation and conversion, there remains an area of "secondary" forest in various degrees of disturbance. It is in this type of forest that many local people seek to establish and maintain economic activities. Hence, efforts that are aimed at establishing and maintaining a management strategy of the tropical natural forest must be increasingly directed to these situations where the activities within the forest are initiated by indigenous people.

This study is concerned with the management of intervention in natural tropical forest utilization systems. The work will describe the various theoretical approaches to management of the natural tropical forest and outline the shortcomings of their applicability in field conditions. A method of resource utilization management, termed the Integrated Management Approach (IMA), is then developed. This is based on an understanding of local decision-making processes and of the shortcomings of classical management and evaluation methods. The IMA links forest management theory with actual forest exploitation as it operates in practice.

The study shows how the IMA was successfully applied to three case studies in natural tropical forest exploitation in East Africa. Before describing the case studies it is important to review the problems which face the natural tropical forest and its management, and to outline why orthodox solutions have not, in the main, worked.

1.1 The Natural Tropical Forest - A Source of Many Benefits

The natural tropical forest is a source of a multitude of benefits to mankind. McNeely (1988) has classified these benefits into two broad groups: direct and indirect.

Direct benefits include products which are obtained from the forest and have utility value. Examples include timber and other construction materials, fuelwood, foodstuffs, such as honey, fruit, nuts, mushrooms, meat from forest dwelling animals, medicinal

plants, resins, gums, rattan, dyes and other chemical compounds. Myers (1983) provides an exhaustive catalogue of possible products. Also of critical economic value is the land base itself as a source of new agricultural land from forest conversion. Natural tropical forest has been and can be expected to continue to be exploited by people for its direct benefits.

Indirect benefits of the forest are primarily related to the operation of the natural tropical forest as an ecosystem. These include functions such as stabilizing local hydrological cycles, protecting soils, contributing to the stability of climate, conserving the system for production of renewable harvestable resources (direct benefits) and protecting genetic resources. Aesthetic benefits, support of tourism and recreation, as well as provision of a natural facility for research, education and monitoring purposes, come under the classification of indirect benefits (McNeely, 1988).

It is during the exploitation of the forest for its direct benefits that the ecosystem may be changed to such an extent that, in some cases, the potential for obtaining direct benefits from that area in the future is reduced or eliminated. Because of the interdependence of direct and indirect benefits, the latter are invariably diminished or lost as a result of the ecosystem being disturbed. It is therefore necessary to examine the actual process whereby the ecosystem is disturbed and attempt to link forest management to that process. This will provide the information needed by the forest manager to maintain or increase the production of direct benefits while maintaining the integrity of the productive ecosystem for its indirect benefits.

Globally, natural tropical forest ecosystems have declined, from about 5 billion hectares in pre-agricultural times to the present area of 4 billion hectares. Forests and woodlands presently cover two-fifths of the earth's land, which is an area three and a half times as large as that devoted to agriculture (Olson, 1975, from Repetto and Gillis, 1988; Dembner, 1991). In the period between 1950 and 1983 the natural tropical forest was estimated to have been depleted (i.e., cleared and converted to other uses) at an estimated rate of 11.5 million hectares per year; 7.5 and 3.8 million hectares of closed and open forests, respectively. More recent estimates put the annual rate of deforestation at between 15 and 16 million hectares and this rate is accelerating in most developing countries (Repetto, 1990; Myers, 1989; Sayer and Whitmore, 1991).

Man's impact on the natural tropical forest is not limited to activities which lead to the total conversion of the forested lands to other uses. There are many forest areas which are being reduced in quality. Melillo et al. (1985) has estimated that an area of over 4

million hectares of virgin tropical forest is being converted annually to "secondary forest" through selective harvesting. Under prevailing practices, secondary forest can result from logging activities where most of the mature stems of those few species with commercial value are removed (usually 10-20% of standing volume), but another 30-50% of the trees are destroyed or damaged during the logging process. This impact affects the existing ecological processes. For example, regeneration in the secondary forest may be affected by the disturbance in the ecosystem such that the regeneration of commercially valuable species may not be favoured while other less valuable species may flourish (or vice versa). These changes may not necessarily be viewed as negative as such a determination depends on the management objectives and the view point of the analyst. The problems arise, however, when the suite of forest values are diminished beyond the expectations of the managers (Guppy, 1984).

1.2 Global Deforestation in the Local Context

It is important to appreciate how the statistics describing the rates of deforestation relate to questions of natural tropical forest management. Laarman (1990) indicates that when global rates of deforestation are applied to the total area of the forest, useful judgments on the significance of the impact of these changes remain elusive. How should these global rates of change be applied to the question of forest management? Some areas within the total global forest area (including the natural tropical forest) remain intact and do not appear to be under threat of encroachment. There is also the possibility that substitutes for natural tropical forest may be developed through technology or that cheaper substitutes may come to be preferred to the direct benefits of the natural tropical forest in the future. Global estimates are, therefore, of little practical use in the local context.

When deforestation figures are viewed on a regional or sub-regional basis, however, the impact of the rates of depletion and degradation become clearer. For example, in Africa, it has been estimated that, for the period between 1950 and 1983, the area of forested land declined by 24%. On a country basis, there are some extreme cases where the rate of forest cover loss, as a percentage of 1980 figures, threatens the virtual disappearance of the commercially viable natural tropical forest by the early years of the next century. For example, Ivory Coast experiences 5.9% deforestation per year, Paraguay 4.6% and Nepal 3.9% (Repetto and Gillis, 1988). However, national figures can be misleading, and the significance of the deforestation process and its impact on

the welfare of the local people are best assessed and defined at the local level (Laarman, 1990).

1.3. The Natural Forest as a Basis for Economic Activity

The natural tropical forest constitutes one of the more important and widespread resources used for economic development in the rural sector of most developing countries (Arnold, 1985a,b). In theory these forests can be managed as a renewable resource (Leslie, 1987; Wyatt-Smith, 1987; Dawkins, 1988). It is because of these two characteristics, resource provision and potential renewability, that the sustained management of the forest is central to both sustained development strategies and conservation aims (Gregersen, 1990; Arnold, 1985a,b; FAO, 1985; WRI, 1985; IUCN/UNEP/WWF, 1980). Despite this realization and its theoretical possibility, the level of successfully sustained management of the natural tropical forest is limited to a few examples which constitute only a very small percentage of the present and projected area of exploited natural tropical forest (Schmidt, 1987).

Examples of successful sustained management of the natural tropical forest for timber include some areas in Malaysia, north-eastern Australia and Uganda (FAO 1989a,b; ITTO, 1989, 1990; Poore, 1989). These examples share a number of common features. Firstly, they are restricted to areas where control of the natural tropical forest resource has been established and is being maintained. Secondly, activities in the forest are based on specific management objectives, and methods to accomplish these objectives are being followed over time. In these examples, the forest is managed for the sustained production of timber in concert with the maintenance of the forest ecosystem itself.

Grainger (1987) has estimated that, for a period which extends well into the next century, the expected production from existing areas of managed natural tropical forest is not expected to meet the projected rates of demand for tropical timber. The outlook for timber from tropical forest plantations to become a possible substitute for natural tropical forest timber does not appear favourable. Tropical forest plantations presently represent only about 0.5% of the world's tropical woody vegetation and will be unable to meet the forecasted demand for tropical timber (WRI, 1985). Also, many valuable hardwood species which are in demand from the natural tropical forest are not part of plantation programs. Therefore, until this situation changes, the natural tropical forest is expected to continue to be the major source of tropical timber, and remain under pressure (Wyatt-Smith, 1988).

If it is possible to manage the natural tropical forest on a sustained basis and there are obvious social advantages in doing so, the challenge becomes one of *integration*, at the local level, of the system of exploitation with the systems of sustained yield management, in order to reduce the negative impacts of use on the natural tropical forest, and ensure the continuance of the forest.

1.4 From Sustained Yield Management to Sustainable Development

Sustained Yield Management is the basic concept upon which many forest management regimes are based. The intention of the sustained yield concept is to harness the potential biological renewability of the forest resource.

It is thought that the sustained yield principle was first applied to the forest in Germany during the first half of the 19th century (Gane, 1969; Walker, 1990). As stands of trees within a given forest achieved a certain age or volume they were cut and the area was replanted to start the cycle over again. The key to the sustained yield strategy is to manipulate the actual forest in an effort to achieve the "ideal" or "normal" forest¹ so that it would produce a planned amount of product each period. Sustained yield was planned to meet the needs of the German economy of the time. Domestic production of timber did not meet the national demand. Under sustained yield, forest-based communities could remain stable as timber imports were controlled to meet the fluctuating demands for timber over and above the domestic production. It was assumed that these and all other social and economic factors would remain stable over time and that a stable forest production would fit into this model of management (Clawson and Sedjo, 1984).

In order to achieve continuous production, the forest manager must determine (by volume or area) the amount of forest product that may be harvested annually or periodically from the specified forest area over a stated period of time in accordance with the objectives of management (Wackerman, 1937; Ford-Robertson, 1971). In its most rudimentary form, therefore, a forest managed for sustained yield would be divided into the same number of blocks as the number of years which it took for the

¹ "normal forest" is a classical concept of a forest against which an actual forest may be compared in order to identify its deficiencies. The normal forest is one which has reached and maintains a practical degree of perfection in all its parts for the full and continued satisfaction of the objectives of management, which in sustained yield management means that growing stock, age or size distribution and increment all satisfy the objectives of the management regime over time (adapted from Ford-Robinson, 1971).

trees to reach the harvest age. No blocks would be of the same age (or size class distribution), and one block would be harvested and planted each year.

Much effort has been made in the application of the sustained yield concept to different forest types around the world. This effort has been directed both to the development of the necessary silvicultural systems and management strategies, and to addressing the question of how to interpret the concept itself in various applications. As applied to forestry enterprises, the generally accepted meaning of sustained yield is the continuous production of commercially useful wood products from a given forest property (Ramsdell, 1937; Buck, 1937; Leslie, 1977). It is this definition that has been incorporated as a major element in the management strategies of public forests in most economically developed nations (Clawson and Sedjo, 1984).

The fundamental intent of forest management strategies developed under the concept of sustained yield is to provide for an undiminished flow of goods and services from a given area of forest land, forever. This notion of sustained yield has the appealing promise of stability of output for the benefits of those people dependent on the forest for goods and services and for future generations and, as such, has been a basic forestry concept widely held and widely applied (Clawson and Sedjo, 1984). However, problems associated with sustained yield arise in its application in the forest.

The first is that the geographical area which is to be under sustained yield management must be defined and maintained (Leslie, 1987). This is a fundamental issue which will be reviewed in greater detail later in this chapter. The second problem is that the level of intensity of management must be determined because the output of the forest is not determined solely by the annual growth of the forest, but also by input levels of labour, capital and management expertise (Leslie, 1977; Clawson and Sedjo, 1984). The third problem is based on the objective of even-flow of forest product. If met as a strict objective, even-flow would affect the price of timber as management costs fluctuate to meet production needs from a resource which is subject to unpredictable effects such as damage by insects or fire (Walker, 1990). The fourth problem centres on the actual demands of the transformation of an unbalanced forest towards a normal forest (Woodbury, 1937). Finally, the forest manager who employs the concept of sustained yield is faced with the dilemma of whether or not the harvest can be adjusted to meet current market demands (Clawson and Sedjo, 1984; Walker, 1990).

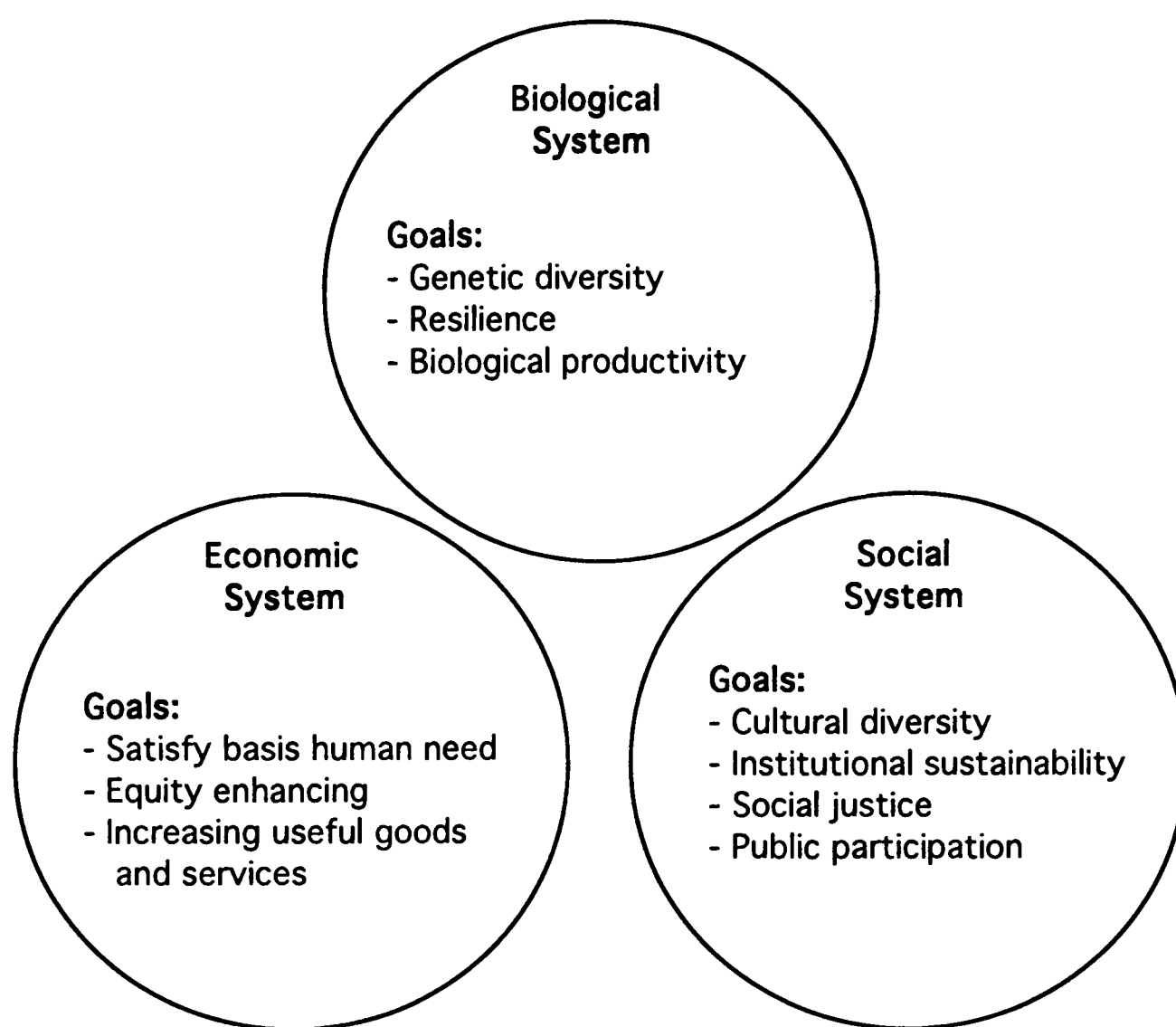
These problems are the source of criticisms of the sustained yield concept. The basic criticism of sustained yield made by Walker (1990) is that it is a *biological* model and a

philosophy of forest management that is based on few, if any, *economic* considerations. Also, as Leslie (1977) indicates, the theory of sustained yield would require that large areas of land and large amounts of realizable capital be locked up for long periods of time and that the use of the land be controlled. This may be beyond the *political* will as well as the capacity of many governments in developing countries (Romm, 1986). Thus, important *social* aspects of resource management are not incorporated into the traditional sustained yield concept. The necessary requisites for the successful implementation of sustained yield are therefore unlikely to be met in many situations. The reason for this is that the social and economic aspects of resource use are largely ignored.

Therefore, if the fundamental basis of sustained yield management is confined to the manipulation of the biological aspects of the forest and does not give adequate consideration to the economic and social aspects of the resource use, then its appropriateness in the developing world is questionable. Indeed, its application in North America, where governments have enshrined sustained yield as an objective of forest management in law and where it has been practiced since the beginning of the century, has been the source of much debate for many years (Marquis, 1937; Baskerville, 1990; Walker, 1990).

The need for integration of conservation and resource use has recently been formalized by Barbier (1987, 1990). He views the three aspects of resource use as three spheres: Biological, Social and Economic, with each sphere having its own set of goals. Classical management strategies concentrate on maximizing the goal set for a particular sphere. For example, traditional conservation efforts would be a means of maximizing the goal of biological productivity in the Biological sphere which is independent of the goals of the other spheres. An enterprise operating under managerial capitalism would be an example of maximizing the goal of short-term financial returns of the Economic sphere independently of other spheres. An example of the maximization of the Social sphere goals is traditional welfare support given in order to maintain the social structure. Figure 1.1 shows the three spheres as separate systems with distinct goals.

Figure 1.1: The three systems in resource use (from Barbier, 1987).



The shortcomings of the traditional sustained yield approach for the underpinning of economic development can thus be addressed through a broader approach which requires that the biological aspects of resource use *interact* with the social and economic aspects of resource use. This type of thinking is the basis for the concept of ***Sustainable Development*** (Barbier, 1987).

The recognition of the need to integrate the three spheres of biological, economic and social activity can be traced back to post-World War II development. After World War II, until the late 1970s, the alleviation of poverty was thought to be achievable through industrial development and increased income growth (Westoby, 1962). Early in this period it was theorized that the "trickle down" effect would eventually increase the income of the poor either directly or through governments enjoying an increase in income from industrial development (Westoby, 1962; Ascher and Healy, 1990). By the 1970s, specific objectives for income distribution were being addressed to fine tune the development strategy of income growth. These included emphasis on appropriate technology, export promotion, physical capital, human capital, food self-sufficiency, basic needs and high technology as a means to achieve income growth. In the 1970s

efforts were also made to provide for a more equitable distribution of income as a parallel goal to development (MacNamara, 1973; Cherney, 1974; Ascher and Healy, 1990).

The World Conservation Strategy (1980) recognized that the basis for much economic development was the direct and indirect benefits of the environment, and that in order to conserve there was a need to develop. Environmental and resource concerns were not seen as necessary constraints on development, but as sources of development (IUCN/UNEP/WWF, 1980). In 1987, the World Commission on Environment and Development asserted that environmental protection and economic growth were compatible, even mutually supporting, objectives.

Thus, a concept of sustainable development emerged, viewing development as meeting the needs of the present generation without sacrificing the resources of future generations. Accordingly, Ascher and Healy (1990) have defined sustainable development as a process of development that achieves the following goals:

- a) high per capita consumption sustainable for an indefinite period, which implies, among other things, an optimal rate of use of natural resources over time;
- b) distributional equity;
- c) environmental protection, including protection of biological diversity and the continued functioning of complex natural systems; and
- d) participation of all sectors of society in decision-making.

The concept of sustainable development inextricably links conservation and development. The integration of the three spheres of resource use can be geometrically represented (Figure 1.2).

Figure 1.2: Venn diagram showing the three aspects of the system of resource use as three spheres, each having their own goal sets, and their interrelationships describing sustainable development (adapted from Barbier, 1987).

Biological Sphere Goals

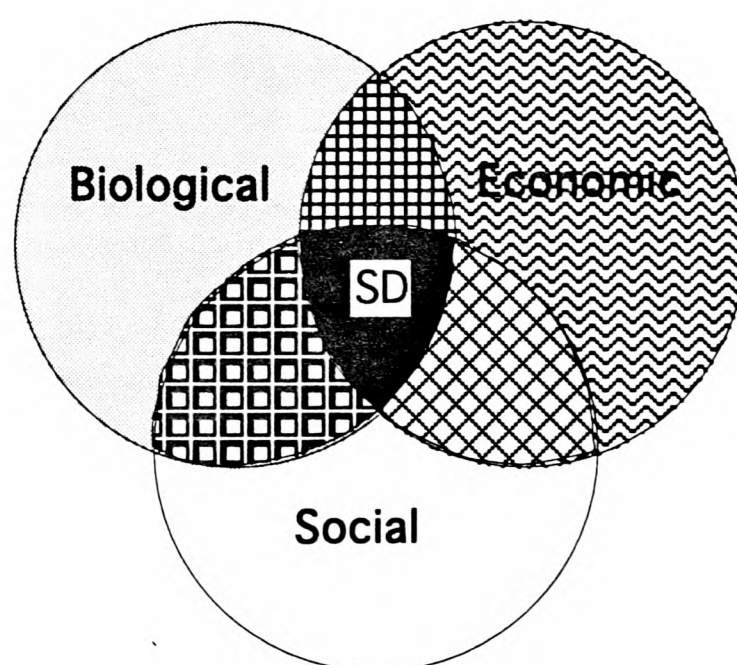
- genetic diversity
- environmental resilience
- biological productivity

eg. Traditional Conservation Area

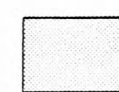
Economic Sphere Goals

- increase satisfaction of basic needs
- Maximize financial returns
- Supply goods and services

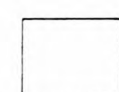
eg. Managerial capitalism



Traditional Development



Traditional Conservation



Traditional Welfare Aid



Environmental Economics



Marxist Economics



Public Forestry

Social Sphere Goals

- cultural diversity
- social justice/participation
- institutional stability
- enhance equity

eg. Traditional Welfare Support

SD = Sustained Development = Integration of Spheres

The general goals for each sphere that must be optimally integrated in order that the total system can achieve the goal of sustainable development are listed. The activities described by the three spheres are rarely found integrated and optimized. Where activities within each sphere of the system of resource use (Figure 1.2) have been undertaken independently of the other spheres, each can be represented as a separate function. For each sphere the following functions may be assigned:

Economic Sphere: $f\{E\}$, where E is traditional exploitation; maximizing the financial returns of the economic activity.

Biological Sphere: $f\{B\}$, where B is traditional forest management; maximizing the biological productivity of a forest area.

Social Sphere: $f\{S\}$, where S is decision-making based on social interest; maximizing the equity of benefit distribution.

To now, the goals of at most two spheres have been integrated. For example, Barbier (1987) suggests that Marxist economics is one case where the integration of the goals of the Economic and Social spheres has been attempted. An example of the integration of the Biological and Social spheres is traditional Public Forestry, and Environmental Economics is an example of the integration of the Biological and Economic spheres. The special character of sustainable development is described by the intersection of all three spheres. The ideal of sustainable development is described through the simultaneous optimization and integration of all three goal sets of each sphere. To achieve sustainable development, all three spheres must be integrated and optimized:

Sustainable Development = $\int (E \times B \times S)$, where negotiation is the integrating factor.

This theoretical framework of sustainable development underlies the present study. Arnold (1985a,b), Barbier (1987) and Vanclay (1990) have indicated that there is an urgent need to link this theoretical work to practice and therein lies the purpose of this study. However, it is important to review the problems that are associated with the Biological, Social and Economic spheres of the forest resource before framing the hypothesis of this study and outlining the methodology to test it. In the following section, the root causes for the failure of traditional development efforts to achieve sustainable development are outlined to provide the background to the discussion to possible solutions in the remaining sections of this chapter.

1.5 Practical Problems of Development:

Separating the Causes from the Agents of Deforestation

"When assessing the blame for the degradation and depletion of the tropical forest cover, careful analysts distinguish causes from effects, determinants from agents. Causes and determinants include skewed political power and failures of institutions. On the other hand, effects and agents are those enterprises and persons observed to be instruments in the conversion process: ranchers and farmers, loggers, road builders, miners, soldiers, shifting cultivators, firewood gatherers and charcoal makers and so on." (Laarman, 1988). For the purpose of this study, these definitions of causes and agents will be used.

Laarman's statement underlines the important fact that *causes* are distinct from *agents* in the deforestation issue. To date, most attempts at solving the tropical forest dilemma have not adequately recognized this distinction. By separating causes and agents in the deforestation issue, long-term and short-term problems which hamper the management of the natural tropical forest can be separated, identified and analysed. This distinction between causes and agents is crucial and warrants further exploration with respect to natural tropical forest management.

1.5.1 The Assumption of Intervention: Political Will

As defined above, the causes of the tropical deforestation problem are rooted in the political forum and are associated with the long-term time-frame.

The economic development, resource policy and resource management literature commonly states the need for a change in the political will of the governments of the tropical timber producing nations in order to improve the level of administration and, in turn, improve natural tropical forest management. Westoby (1962) was a key exponent of this position. Optimism was high in Westoby's 1962 paper in which he elaborated a strategy based on a nation using the potential, immediate economic benefits which could be obtained by that nation through liquidation of part of its natural tropical forest resource. The benefits derived from the exploitation of the forest resource, such as foreign exchange from the export of forest products and building materials for local use, could be used by the nation to improve its infrastructure and industry. This transfer of the forest capital into nation building activities could bring the nation to the point of "take-off" into self-sustaining growth (Burns, 1986).

Westoby acknowledged that the choice in forestry-based development was between an approach to the mobilization of the forest resources, which was controlled and based on sound planning, or an uncontrolled, haphazard approach based on inadequate planning. It was to be the responsibility of the government to orchestrate the action of all concerned (government, industry and public) to maximize the immense contribution which the natural tropical forest resource could make to the development process and thereby the national population.

Twenty-five years later, Westoby (1987) reviewed the record and charged that the governments of the lesser developed nations had lacked the willingness and ability to turn the potentially valuable process of forest-based development into reality. He cited a variety of problems obstructing the success of forest-based development. Most importantly though, the record indicated that profits from logging were all too often not repatriated, or if they were, they were used on prestige projects without development content or diverted to additional consumption by the relatively well-off members of society, leaving little on which to base national development.

1.5.2 Political Will: the Reality

In a perfect world, governments would accept their role as the representatives of the people and, in that capacity, take an active interest in the arguments of qualified forest managers for long-term management of their natural tropical forest. However, in reality, politicians are more sensitive to the short-term time horizon (Stroup and Baden, 1983). There are at least three considerations which make it unlikely that the political forum alone will provide what is needed for an improved level of natural tropical forest management in the short-term. These considerations are outlined below.

First, a nation's political forum is considered sacrosanct and it generally follows that there is a reluctance on the part of any nation to be seen to cause unsolicited interference in another nation's activities (Ascher and Healy, 1990). Conversely, there is great resentment on the part of some nations if they perceive that others are adversely interfering in their domestic affairs.

Second, the decision time-frame in the political forum is short when compared with the time-frame used in natural tropical forest management systems. Political decisions are tempered by the self-interest of those in power to stay in power (Stroup and Baden,

1983). Political decision-makers have a maximum time horizon up to the next election, perhaps five years at most. The time horizon associated with the rotation age of the natural tropical forest is considerably longer, in the vicinity of eighty years. Therefore, when a political decision-maker is faced with a choice between (a) adopting forest management practices which require an immediate cost for benefits which are expected to be received beyond the political time-frame, and (b) gaining forest benefits now and having the cost for those benefits deferred to some time beyond the political time-frame, the choice is all too often the latter.

The third reason why the political forum alone cannot provide a solution is that unilateral political decisions that increase the level of management so that a nation's forest resource can be maintained imply added costs to producers (Luckert and Haley, 1989). This leads to an associated increase in the price of that country's forest products in the international market. An example of this is reported by Kumar (1986). In 1974 there was an attempt by some producer nations (Malaysia, Indonesia, the Philippines and Papua New Guinea) to band together in order to bargain for better prices from the importers (most notably the Japanese) of their products. The exporting nations formed a group called the South East Asian Lumber Producers Association (SEALPA) with the aim of bargaining with the Japanese. The reaction of Japan was to diversify its wood supply sources to include other suppliers such as other Pacific nations and Brazil, thus defeating the intentions of SEALPA (Kumar, 1986). The members of SEALPA were unsuccessful in having much effect on the pricing of export timber from their countries because the Japanese were able to find alternate suppliers and the bargaining position of the SEALPA nations was reduced because they urgently needed income from timber exports to service their balance of payment deficits.

Therefore, to have a significant impact at the level of forest management in a given tropical country, change at the national political level has to occur quickly and simultaneously in each tropical country. Otherwise some countries, by not conforming to a unified change, could take short-term advantage of the shift created by the changes in global supply and demand of tropical forest products. The potential for this short-term competitive advantage in the international market-place is not lost on those politicians eager to capitalize on the potential earnings. This scenario of rapid simultaneous change of all tropical governments is quite unlikely. Political change is frustrated by the lack of unity in tropical forest product producer nations and the short-term time-frame and volatility of most national political agendas. Vanclay (1990) outlined an example from Australia of the difficulty of a group of state governments in reaching agreement on the content and intent of a national policy. It was found that at

the national level it was difficult for a number of political bodies (i.e., state governments) to agree on a policy that could be both meaningful at the national level and acceptable at the state level (New South Wales Forest Products Association, 1990).

The causes of low levels of resource management can thus be traced to the political forum. There appears to be a number of inherent deficiencies in the political process that frustrate the implementation of management strategies linked to the principles of sustainable development in the natural tropical forest. It is necessary to examine the role of those agents presently operating in the natural forest to determine the possibility for effecting a change in the development patterns of the natural forest.

The achievement of effective change in top-down management strategies from within the political forum is therefore part of the long-term time-frame and requires negotiation and cooperation at the highest level to determine which policies would be effective and meaningful to all parties involved. On the other hand, the activities of those individuals or enterprises that are the instruments the conversion of the natural tropical forest are often undertaken in such a manner that the opportunity for sustainable development of the natural tropical forest is precluded under existing resource management strategies.

1.5.3 The Role of Agents

The immediate hurdle to the incorporation of the concept of sustainable development into the management of the natural tropical forest is due to the effects of those individuals and enterprises observed to be the instruments of the natural tropical forest exploitation and conversion processes.

These effects can be personified as, for example, loggers, cultivators, charcoal makers, and ranchers. They seek direct benefits from the natural tropical forest through economic activity. The exploitation of the forest by these groups is, in terms of stated policy, to be managed by the state for the benefit of the people for both the short and long-term.

In theory, the state is to retain the long-term benefits of the natural tropical forest for the people by assigning social values to the indirect benefits of the natural tropical forest and ensuring that these values are recognized in the process of exploitation of the forest (Poore, 1989). The social value of the resource includes the cost society bears as a result

of the loss of the forest and the indirect benefits it provides (Sinden and Worrell, 1979). Social values should therefore be reflected in the price of these direct benefits which are obtained through the sacrifice of these indirect benefits (McNeely, 1988; Barbier, 1990).

To achieve these theoretical goals, the state must have effective control over the natural tropical forest resource. To achieve the necessary level of control over the resource so that this theory of management can be successfully practiced would require that resources be allocated to that task (McNeely, 1990). Such resources are scarce. Romm (1986) suggested that the reason for low levels of effective state control over the natural tropical forest is that there is little political interest in management and, therefore, expenditures for forest management are considered a low priority in state budgets. Consequently, control over the natural tropical forest to the level where the state could ensure that social values are included in the price of the direct benefits obtained by the exploiters is seldom achieved.

For individuals operating in areas of natural tropical forest where there are social controls, those controls can be expected to have a cost. These costs will be passed on to the direct exploiters in some way. Enterprises and individuals exploiting the forest through economic activities for maximum direct benefits would therefore be expected to prefer operating in areas which are under little or no social control rather than in areas which are under social control. This will minimize the cost of the resource and maximize the net benefits received by the individual from their activities.

The absence of social controls over the natural tropical forest has further implications for the management of the forest, most notably that activity in those forests is not aimed at benefiting society as a whole. In these circumstances, decisions which affect present and future options for the use of the forest resource are being made by individuals who are actively converting the natural tropical forest in order to maximize their own immediate benefits. In pursuit of self-interest, and without social control, those agents who are exploiting the natural forest cannot be expected to take into account the social value of the indirect benefits of that resource on their own initiative. In this regard, where there is no social control over the natural tropical forest, there is no means to ensure that the natural tropical forest resource can continue to provide long-term social and economic benefits for the indigenous society and be maintained as part of the natural tropical forest ecosystem.

1.6 Forest Management for Sustainable Development: Looking for Solutions

It is evident from examining the rates of depletion and degradation of the natural tropical forest that the options for present and future uses of the natural tropical forest are being reduced now. Socially responsible management of the natural tropical forest is not being undertaken. The fundamental mandate of the forest manager is therefore not being fulfilled. As a result people are suffering and will continue to do so in the future, because of local scarcities in natural tropical forest resources through the absence of management aimed at maintaining the flow of forest values over the long-term.

1.6.1 Conventional Solutions

Three tools traditionally available to the manager of the forest resource are:

- (a) forest management principles,
- (b) economic valuation, and
- (c) trade regulation.

These three tools are normally exercised within the framework of national, regional or local policies. Such policies may be well-developed and promulgated, and their instigators (usually government authorities) expect them to be effective.

However, the successful application of these traditional forest management tools depends on there being a significant degree of social control over the forest resource so that the policy objectives may be successfully implemented. Respect for this level of social control over national resources is a condition of membership in society and is taken for granted in the developed world. It cannot be taken for granted that in the developing world the necessary level of social control is in place or that there is an ability (or even an interest) in a given developing nation achieving this level of control over its natural tropical forest (Romm, 1986). Therefore, these traditional tools are not universally applicable and cannot be expected to meet the needs of forest managers who find themselves working in the social conditions found in many of the tropical forest nations.

For those circumstances where resources are not under effective social control, there are further problems facing the manager which relate to the issue of exploitation of

common property. Where a resource is considered to be freely accessible², the "rule of capture" can influence the behaviour of the individuals involved in the conversion of that resource for economic benefits (Hardin, 1968). Individuals and entrepreneurs who are exploiting resources considered to be freely accessible attempt to maximize their share of potential benefits from the conversion of that resource. The amount of benefits received by any one individual is based on how much of the resource can be taken or "captured" before someone else takes it. This behaviour can lead to exploitation of a biological resource beyond its capacity to regenerate (Burns, 1986; Stroup and Baden, 1983).

The biological degradation associated with natural tropical forest resource conversion can be compounded where there is an absence of social control over a resource and where individual behaviour motivated by self-interest occurs. The resulting resource exploitation patterns may not be sensitive to ecological requirements for successful regeneration of that ecosystem. As a result it may not be possible to regenerate the original ecosystem.

1.6.2 Frontier Conditions: Management Failure Due to Lack of Societal Controls

The foregoing discussion has shown that control over a resource is essential for the management of that resource. Further, control measures that reflect the local needs and values are necessary in circumstances where the enforcement of regional or national control measures is not feasible.

Lack of social control is, however, the rule in most natural tropical forest countries (Ascher and Healy, 1990).

For the purpose of this thesis, operational conditions in situations where there are few or no social controls over a resource use system may be referred to as *frontier conditions*. Two distinguishing characteristics of the frontier condition are little or no social control over activities and that the implementation of political decisions is ineffective. Further, owing to the difficulties of establishing control over the forest at the frontier, the level of control necessary to ensure socially beneficial forest management decisions is unlikely to be achieved no matter how ambitious a new

² Most resources are subject to some claim. However, the enforcement of any particular claim may not be possible. Under these circumstances the resource is considered to be freely accessible by agents who wish to use it.

programme may be. Therefore, the recognition of the frontier condition is a crucial factor delimiting the type of resource management strategy that can be effectively employed. This thesis is directed to that area of the natural tropical forest resource that exists under frontier conditions, and to the improvement of its management in such circumstances.

The existence of frontier conditions does not imply that control is not achievable in any form. It is necessary, therefore, to explore the question:

What are the means to gain the necessary level of control so that social values may be included in the process of development of the natural tropical forest?

1.7 The Means of Control

Means of control can be classified under three general headings;

- (a) force,
- (b) coercion/manipulation, and
- (c) legitimate negotiation/consensus/cooperation.

With respect to the management of the natural tropical forest, the use of either (a) or (b) to control the behaviour of agents involved in the conversion of the natural tropical forest is unlikely to be successful on a large scale or in the long-term. These methods are only short-term solutions because they are costly to implement and maintain. In order for force and coercion to work these methods would have to be implemented and maintained at a level of intensity over a broad enough area that they could guarantee that uncontrolled conversion activities would not simply be shifted from areas under control to locations which remain uncontrolled and offer the least resistance. The third method, negotiation, can provide a means of controlling behaviour in the existing system for both the short and the long-term, if the method is engaged legitimately.

The task of the forest manager is to ensure that additional values (in this case social values) are included in the existing system of natural tropical forest exploitation, even where modification of existing behaviour is not normally subject to influence from social values. To modify existing behaviour successfully, the forest manager must

negotiate with the agents of forest conversion so that legitimate change in their behaviour can be based on the best available information. This method should achieve results. At the best, in the short-term, it will succeed in incorporating some degree of social value into a particular ongoing system of exploitation and in this way the management of the natural tropical forest will be improved. At the least, the reasons for the failure of incorporating social values will be better known and a solution may be found because the problem is better defined. The negotiation process also provides inputs useful in the longer term in the context of regional and national planning.

For the forest manager to negotiate successfully, a full understanding of the system of forest exploitation is necessary. This understanding is accomplished through effective on-site observation and analysis. In this manner, reliable information about the forest under pressure and the nature of the activities which are creating this pressure and their inter-relationships can be obtained and analysed. Also, to be effective in a legitimate process of negotiation, it is in the best interest of all participants to be armed with the best available information in order to present and defend their interests successfully at the negotiation table.

Thus far it has been shown that the causes of natural tropical deforestation and degradation (i.e., skewed political power and failed institutions) may well be beyond the scope and ability of forest managers to rectify. Without a change in political will, the forest will continue to be under increasing pressure from the activities of forest converters. In the light of this reality, it has been established that the forest manager must investigate instead the effects of deforestation since it is within this domain that the best opportunities for incorporating the concept of sustainable development are to be found. This warrants an examination of those effects.

1.8 Choosing a Target for Control

Natural tropical forest exploitation conversion activities can be classified into four main categories based on their purpose. For this study the conversion activities are broadly grouped under the headings:

- (a) agriculture,
- (b) fodder,
- (c) wood fuel, and
- (d) timber.

Given that the amount of resources available for implementing practices aimed at sustainable development are limited, it is important for the manager to select that category(s) which is most pressing. This will vary with location. To determine which category best warrants the application of limited funds, the ways in which each category is suited or unsuited for management opportunities must be considered. The basic characteristics of each category of natural tropical forest conversion are outlined below to enable their ranking on the basis of their potential for successful incorporation of sustainable development principles.

In agriculture, man benefits from the conversion of the forest by creating land areas for food production. In many places, the production of food is necessary for survival in the short-term. Under these circumstances the sustainable development of forest areas cannot take precedence over immediate human needs. There are two types of conversion of the natural tropical forest to agriculture: shifting cultivation and permanent cultivation. Shifting cultivation can be compatible with the natural tropical forest ecosystem in cases where forest conversion pressure is infrequent, on a small scale, and where the necessary time for recovery of the natural tropical forest is allowed between periods of forest clearance for cultivation (Arnold, 1988). In these cases there is, in theory, no need for continuous forest development investments because the impact on the condition of the natural tropical forest is very low. However, shifting cultivators are mobile and their activities not easily controlled, and where population pressures are great, shifting cultivation practices may not allow the time necessary for the recovery of the forest before re-cultivation of the area. In these cases the shifting cultivation becomes essentially a type of permanent cultivation since the forest ecosystem is suppressed from recovering to its former condition.

The second type of conversion for agricultural purposes is where cultivators convert the natural tropical forest for agriculture on a permanent basis. The forest ecosystem is permanently changed and, in areas where human cultivation pressures have exceeded the area's carrying capacity, it would be unlikely that the area would recover to its original productive state, even if cultivation practices were disbanded (Whitmore, 1990). The opportunity for including sustainable forest management principles in the agriculture category of forest conversion is low.

Where the natural tropical forest is converted in order to support the fodder and grazing needs of domestic animals, the degree of grazing pressure on the forest varies from place to place. Imposing social controls on the grazing of domestic animals is

difficult. In most developing countries, grazing of animals is for food production, which is a high priority for human welfare. Even where the regenerative ability of the vegetation begins to fall, grazing continues. This is because the marginal return of an additional animal is still positive, though declining markedly (Livingstone, 1986). This example is a classic one of resource degradation associated with grazing based on the rule of capture (Hardin, 1968).

The third category, wood fuel collection activities, could provide increased benefits to the local people if the natural tropical forest was managed on a sustained yield basis so that a steady supply of wood fuel was available over time from a particular forest area. There is no existing organization or infrastructure of wood fuel gatherers within which principles for sustained yield management can be incorporated. Most wood fuel gathering in the natural tropical forest is done by individuals for their immediate benefit (Deweese, 1989). The implementation of management principles for sustained yield within the wood fuel gathering activities in the natural tropical forest is therefore frustrated. The wood fuel gathering category of forest conversion also poses obstacles similar to those outlined for agriculture and grazing.

Tropical timber production, the remaining category of forest conversion process, does provide a more practical opportunity to implement management principles which can help to maintain or increase the level of direct and indirect benefits from the natural tropical forest enjoyed by the local population. Timber extraction from the natural tropical forest can be undertaken without permanently destroying the reproductive capacity of that ecosystem (Dawkins, 1958; Willan, 1988; Poore, 1989). In this way timber production is unlike the first three categories where the ecosystem is often converted to a condition beyond its capacity to recovery.

There are difficulties associated with initiatives in natural tropical forest management because of the costs that are associated with them and because they often involve a restriction of current activities in the forest. In all categories outlined above, there would be no immediate increase in net benefits to the individual forest converter and therefore there is no incentive for independent action to include sustainable management principles in individual patterns of behaviour. Given unlimited funds it would be possible to control the activities of individual cultivators and herdsmen in order to incorporate the concept of sustainable development into the management strategies of the natural tropical forest; however, such levels of funding are not forthcoming or practical. In areas where the pressure for agricultural and grazing land

is a matter of the survival of individuals, there may be no practical short-term alternatives to forest conversion.

Timber is only one of many direct benefits obtained from the forest that can be managed on a sustained yield basis. Peters et. al. (1989) and Prance (1990) have described the variety and value of other direct values such as foodstuffs and building materials, although the applicability of their analyses of the sample valuations of non-timber products when compared to timber values on the broader scale is limited. The results do, however, encourage further consideration of the management of the forest for the sustained yield of multiple forest products. Further analysis, however, would have to be balanced with the practical aspects of tropical forest use. Timber is often the most significant asset of the natural forest and one easily realized and valued in terms of money (Oldeman, 1982; Wyatt-Smith, 1987). The value of timber from the natural tropical forest has been valued at US\$ 7.5 billion which is the highest cash value of the direct benefits extracted from the forest (Wyatt-Smith, 1987). Timber from the tropical forests is in demand in both the international and the domestic markets, and according to projections made by Grainger (1987), this demand can be expected to continue well into the next century.

The debate concerning the problems of deforestation versus the potential virtues of sustained yield based on timber from the natural forest would benefit from an important distinction between two main categories of natural forest exploitation for timber. Making this distinction is necessary to provide a framework for the development of strategies for forest-based sustainable development. For the purpose of this study the categories will be called *primary* and *secondary* exploitation. Primary exploitation is undertaken in essentially untouched forests for the purposes of supplying timber to the global market and the needs of local people are of little consequence to this level of operation. In the global timber market there is strong competition for increased shares of the international demand. Producer nations and even regions within nations are pitted against one another in the quest for an increased share of the international market (Kumar, 1986). As the "face" of the primary exploitation moves through the virgin forest, there remains behind remnant forests and degraded forest areas. The changed ecology of the secondary forests does not impair the ability of some species to continue to grow and respond to the ecological effects of the primary exploitation, and there is a forest resource of some sort left behind.

Secondary exploitation is based on the remnant and degraded forest left after primary logging. Secondary exploitation may be characterized by an initial phase of exploitation

similar to primary exploitation, but instead of the timber exploitation being based on economic parameters dictated by the international market, logging choices are made based on the national or regional markets whereby that part of the forest not economically feasible to remove in primary logging becomes economically feasible to remove for the local market. The remnant and degraded forest areas are subjected to the pressures of local people who invariably attempt to settle in areas opened up by logging activity. As the rate of deforestation increases, more areas of secondary forests are created. Population growth in most tropical timber countries is increasing (World Bank, 1987) and the pressure on the secondary forest category will also increase. The control of primary forest exploitation has been the subject of much research and debate (FAO, 1985; World Bank 1987; ITTO, 1990) and yet there does not appear to be any immediate solution to this problem (as discussed in Section 1.7 of this chapter). In fact the pressure from international tropical timber trade may not weaken as results of a recent analysis of the breakdown of the benefits from the tropical timber trade show. It is the governments of the developed countries that import tropical timber that benefit most from the trade through value-added activities and taxes (Laarman, 1990; ITTO, 1990). Therefore, the opportunities for creating and implementing strategies for sustainable development are more likely to be found in the system of secondary forests where all three aspects of sustainable development may be found or in those areas where the forest is exploited by local sawmills.

Timber is a resource upon which value-added activities can be based and therefore timber from the natural tropical forest can be used to help meet rural employment and development objectives (Arnold, 1985). Production lines in the forest sector geared to satisfying basic human needs can generally be implemented in a flexible fashion with respect to scale and transferability of their varying inputs and technology (Palo, 1988a,b). The choice of each alternative can be made according to the particular economic development phase and other specific circumstances prevailing in the area peripheral to the production activity. Only a few other business activities permit such an elastic choice of production alternatives (Westoby, 1962). Forests, therefore, are a flexible resource which provide for alternatives in forward linkages (Palo, 1988a,b). This is an important consideration for developing economies. There are also backward linkages over time between the welfare of the enterprise and the welfare of the resource. The entrepreneur also has an investment of time and money in the conversion process and may have goals and aspirations which extend beyond the existing level of operations.

There are two main techniques for exploitation of the natural tropical forest for timber. The first is based on pitsawing and the second on sawmilling. Pitsawing is a method of timber production based on the sawing of logs at the stump (usually a manual operation). The sawn timber is usually taken from the stump to some collection point by manual labour. Pitsawing presents problems to forest management as this activity shares elements of the first three categories: agriculture, fodder and wood fuel. The degree of control over the forest necessary to regulate pitsawers' activities adequately is not within the practical means of most developing countries. Pitsawing is an extremely flexible and mobile method of producing timber that requires no permanent base of operations. This mobility allows pitsawers to easily shift their work location at short notice suffering little risk or losses. In this way pitsawers can elude authorities and evade controls.

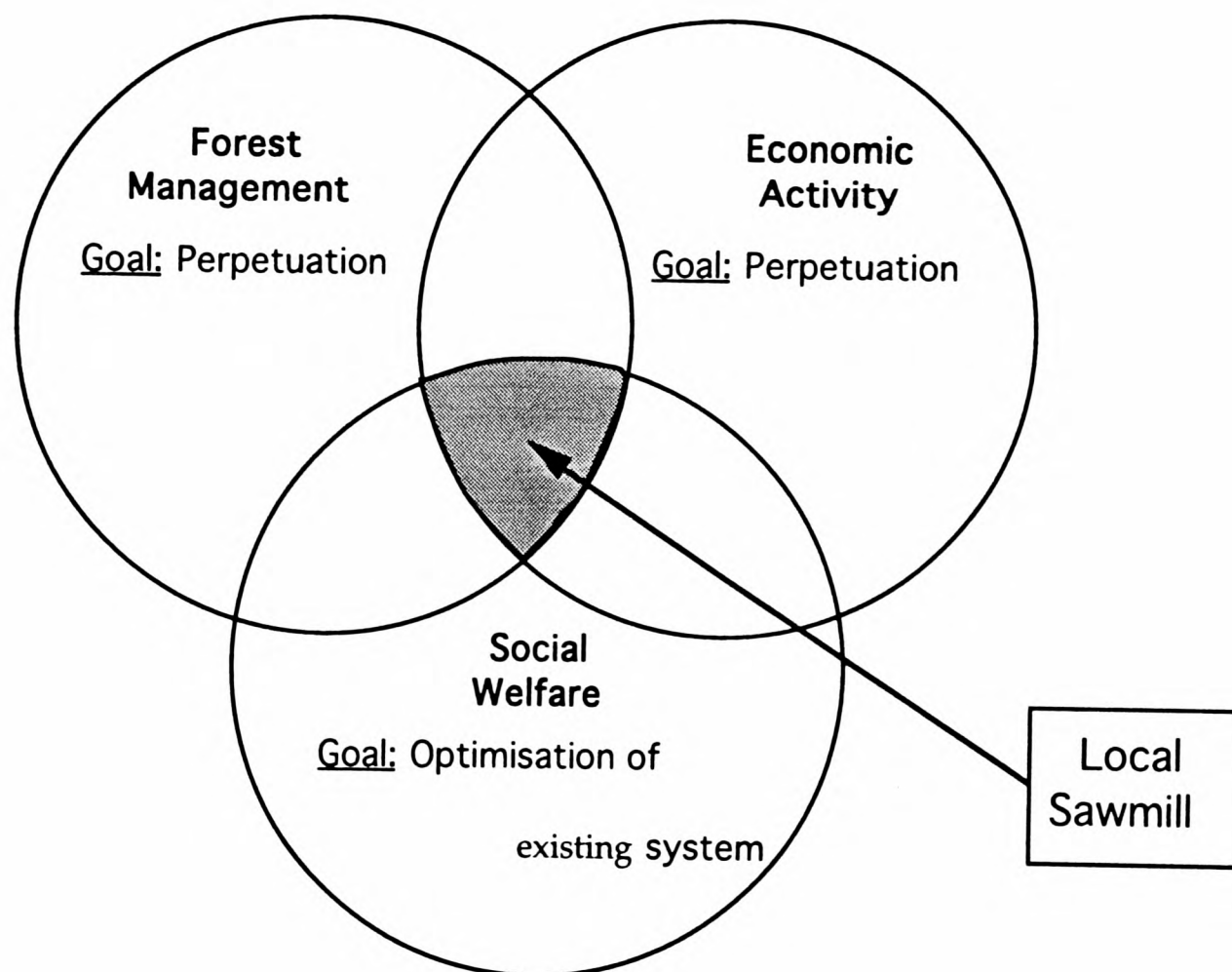
The second method of timber production is based on the sawmill. The activities at the sawmill put an economic value on the forest and the forest manager can assess forest exploitation patterns and projected pressures. With this information the forest manager can develop management strategies in relation to the particular activities of a particular sawmill. Sawmills can be operated either by foreign or local interests. This distinction is important for management purposes. Those tropical timber operations that are controlled by foreign interests are not the focus of the present analysis because they are, by their nature, involved in national and international political spheres. Management via the political arena is, as has been stated earlier in this chapter, simply beyond the capacity or the mandate of the local forest manager to change and the political forum is unlikely to change unilaterally in the short-term. This present work does, however, provide valuable inputs into the political arena by providing information on the timber sector which may be useful for regional or national planning.

1.9 Local Sawmills: A Focus for Sustainable Development

In the forest conversion process described in Section 1.8, the locally developed sawmill is the only activity where the three spheres representing the biological, economic and social aspects of forest utilization merge. Figure 1.3 is an adaptation of Barbier's Venn diagram (Figure 1.2) of the general theory of sustainable development. Each sphere is labeled to specifically reflect the detail of the sphere as it relates to the locally developed sawmill. From Barbier's diagram then, the following substitutions are made; the Social sphere becomes Decision-Makers, the Biological sphere becomes Forest Management, and Economic sphere becomes Economic Activity. The sawmill enterprise is at the

intersection of the three spheres. Therefore, through the analysis of the indigenously developed sawmill enterprise, the problems that must be overcome to achieve sustainable development (with respect to that enterprise) can be identified and strategies for sustainable development can be developed and implemented at the sawmill level.

Figure 1.3: A model of sustainable development based on the indigenous sawmill enterprise showing the sawmill at the intersection of the three spheres of resource use. In this model the intersection of the three spheres of activity that make up the system of forest exploitation is the locally developed sawmill.



The focus of this study is the locally-controlled sawmill enterprise because the locally developed sawmill is at the level of the agent (i.e., the individuals and enterprises) where it may be possible to effect real changes in the ways in which the natural tropical forest is managed as a basis for sustainable development. In addition, the potential stake in the local forest resource, both in the immediate time scale and for the future outlook, is likely to be higher in a locally developed sawmill than in a foreign controlled sawmill. The locally developed sawmill is also more likely to be closely connected with the local people compared with sawmills operated by multinational corporations.

The focus on the locally developed sawmill will be of increasing significance to sustainable development strategies as the process of primary forest exploitation creates access routes and thereby increases the areas of the forest for settlement by expanding populations. This inevitable migration into the newly accessible forest areas will result in new settlements of people seeking better opportunities. The forest resource which the new settlers will look to for their development needs in these circumstances will have been previously exploited by enterprises seeking to supply the international timber market and the remaining forests will be degraded secondary forests and remnant patches of the original forest cover. This secondary forest may be exploited again to supply a more regional market by local entrepreneurs operating under local economic conditions.

Timber conversion activities based on a sawmill establishment require an infrastructure and some form of recognizable organization. This infrastructure includes facilities for harvesting, transporting, primary and secondary processing and marketing and these are included in the analysis.

One theoretical model of the corporation which can be of assistance to the forest manager in implementing control through the negotiation process is the "stakeholder model of the modern corporation" (Evan and Freeman, 1983). This model was developed as a result of observing the evolution of the corporation, from operating under frontier conditions where there was no effective social control, to operating under conditions with many imposed social controls. The model holds that in the initial stages, decisions regarding the activities of the corporation are made solely on the basis of maximizing the benefits to the owners. After a period of time, social controls are imposed on the corporation so that corporate management decisions can no longer be made independently of social values as expressed through social controls such as laws. The management of such a corporation must realign its methods and must now take into consideration the effects that corporate behaviour has on the various groups in society which are involved with the corporation. The corporation has thus evolved into what is termed a stakeholder corporation. The model holds that to be successful, modern management methods must recognize the "stakeholder attributes" of the corporation and ensure that corporate objectives are met in concert with the maintenance of harmony among all those with a stake in the operations of the corporation.

In the following chapters the stakeholder model is developed for natural resource management in developing countries. Three case study sawmills are identified as the focus for the application of the methodology developed for forest management.

Chapter 2

Managing Intervention: Derivation of The Integrated Management Approach

2.0 Introduction

Chapter 1 demonstrated that sustainable development requires a management strategy which successfully integrates and optimizes the three spheres of activity defining the resource system: Economic, Biological and Social (Figure 1.2). In this chapter this concept is developed to a level allowing its practical application to resource utilization problems.

The common aim of orthodox management strategies for biological resource use is to maximize one, or in some cases two, spheres. The essential problem, therefore, of such resource use solutions is that the management strategies employed do not aim at optimizing the integration of all three spheres. As such, by definition, these management strategies will not lead to true sustainable development.

On a global basis, "thinking" people recognize the shortcomings of non-sustainable systems (McNeely, 1988). Non-sustainable resource management systems will eventually fail. Given that all systems are interrelated, non-sustainable biological systems have the potential to affect the quality of life adversely, not only of those immediately dependent on the system, but also of those not directly dependent on the system.

During the last three decades there has been much debate in development circles aimed at determining what is the appropriate mechanism which will lead to sustainable development and avoid system failures (e.g., Westoby, 1962, 1969, 1983, 1987). McNeely (1988) shows there is considerable interest in the international community for conserving biological resources, both to ensure a continuing flow of goods and services for sustainable development, and for "more abstract existence and option values". McNeely (1988) cites two major means for the international community to provide support for such ends: development assistance and international conventions.

Conventional single sphere development assistance is furnished primarily as targeted intervention into existing management systems. Dictionaries define intervention as a circumstance where a decisive role is taken, especially with a view to correction, solution or settlement. In this sense the intent of donor-funded intervention can be described as an attempt to adjust the decision-making process of existing management strategies to achieve sustainable development. In order to achieve this adjustment of the decision-making process governing a resource use system, existing values must be changed and/or new values incorporated into the ongoing system. Therefore the task of intervention is to change the values used by decision-makers. From the examples noted above it is apparent that the current approaches to intervention have not yet led to sustainable development. This is largely due to a failure within the intervention process to recognize the true nature of sustainable development as defined by the three sphere model.

2.1 Connecting Theory With Practice: the IMA

In order to link the theoretical models with practice in the local sawmill operations, a mechanism which will be termed the Integrated Management Approach (IMA) is developed and described for the general sawmill and for the local case study sawmills. The application of the IMA at the local sawmill level requires the collection of data regarding the parameters of the natural forest system and the determination of how to introduce effectively new values into an ongoing system.

2.1.1 A Summary Review of the IMA

For the purposes of reviewing the methodology presented in this study, two flow charts have been developed. The first (Figure 2.1) outlines the process leading to the decision to intervene in the management of the natural tropical forest resource. Here, the intervention action may occur through either traditional intervention methods or the IMA. Traditional intervention methods have been shown to not lead to sustainable development; however, the IMA is applicable where traditional interventions have been applied. The second flow chart (Figure 2.2) shows the process of the IMA itself, and provides a summary of the steps outlined in detail later in this Chapter.

Figure 2.1: Flow chart showing the process leading to intervention.

The Integrated Management Approach

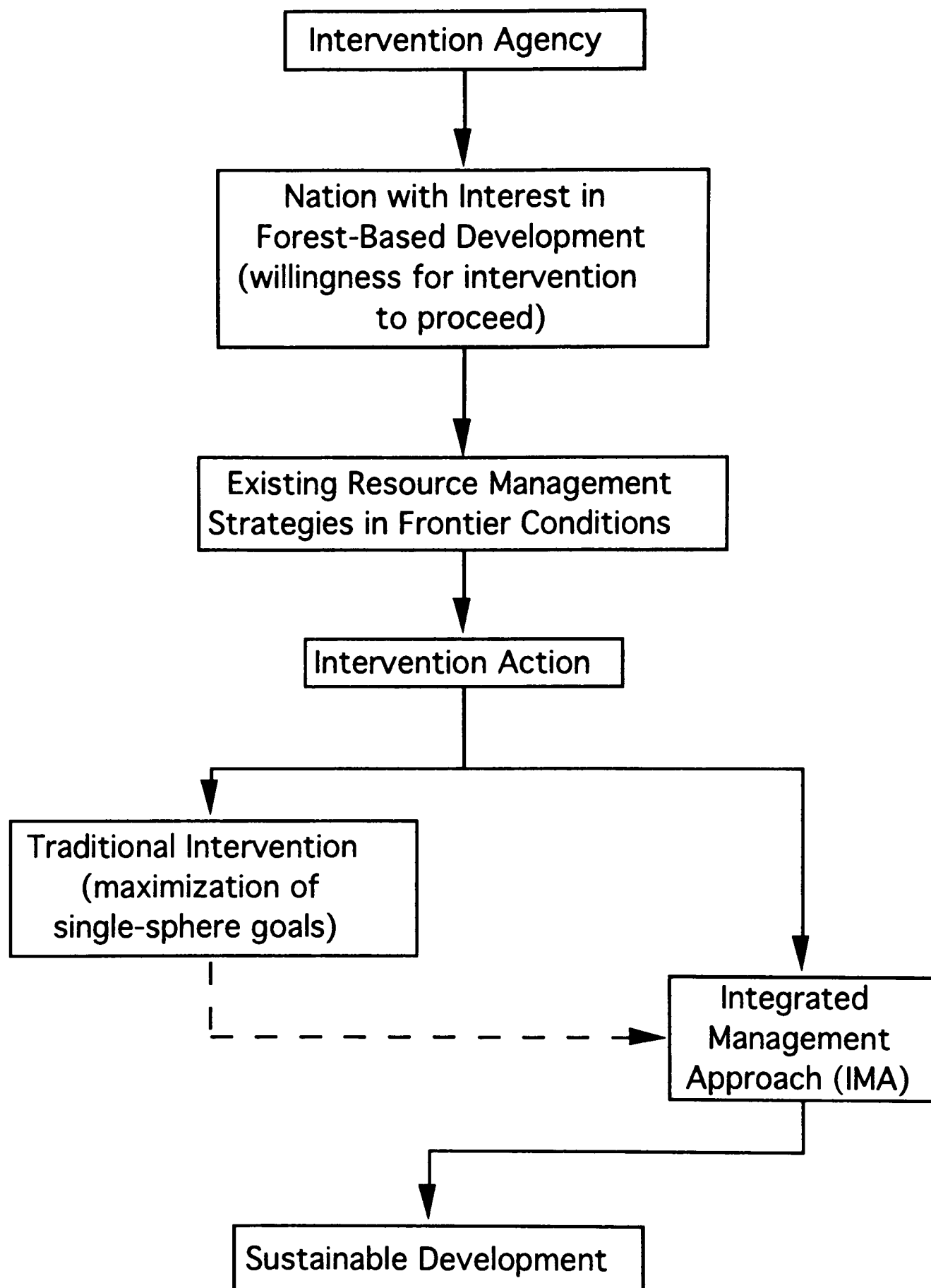
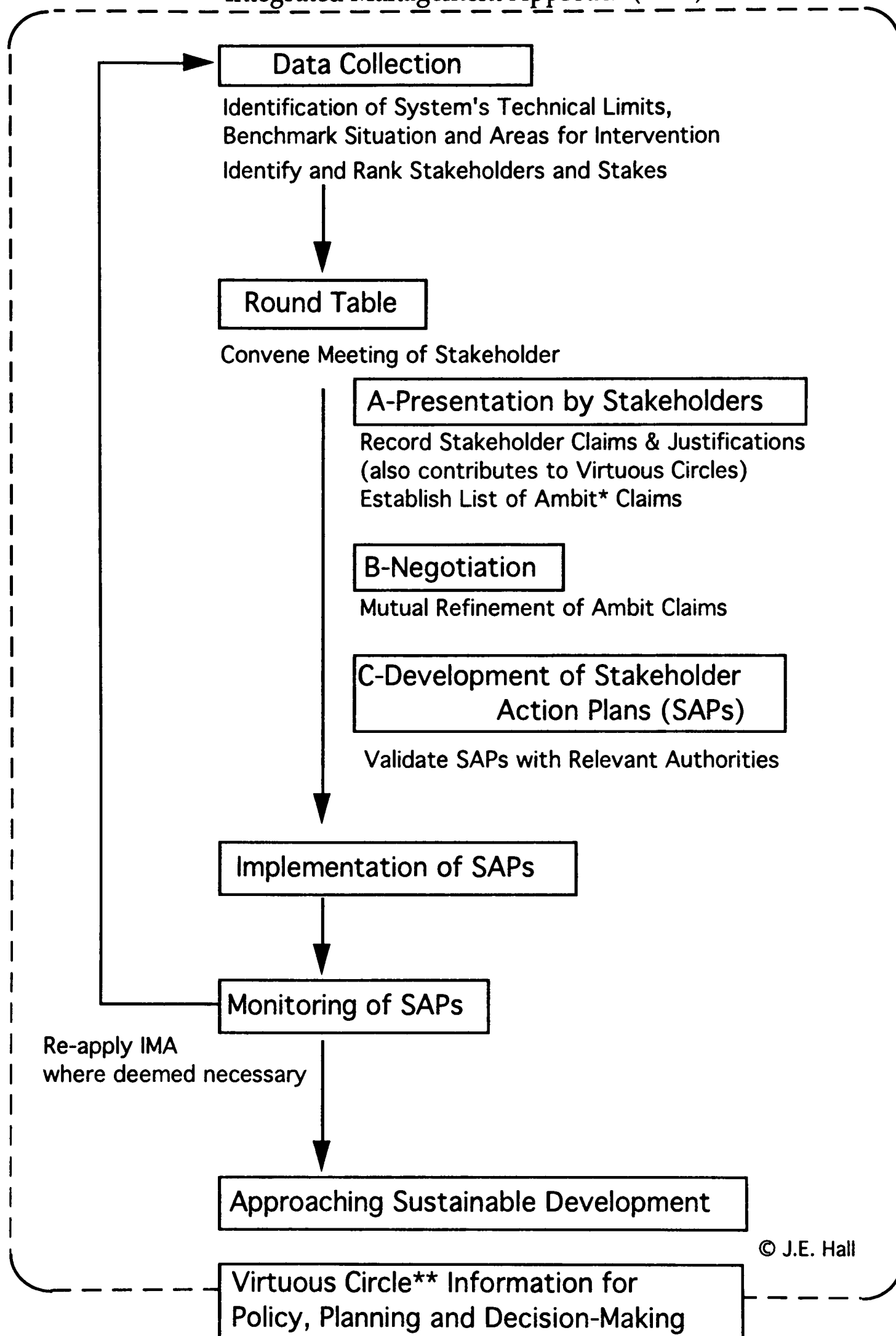


Figure 2.2: Flow chart showing the process of the Integrated Management Approach (IMA).



- * Ambit Claims are defined for the purpose of this study as the list of claims that a stakeholder would like to find fulfilled through that stakeholder's association with a particular
- ** (Ascher & Healy, 1990)

As an introduction, the basic steps of the IMA are summarized here. The first step is to establish the existing parameters of the system of natural forest utilization. This system consists of the sawmill and logging enterprise (the Economic sphere), the natural forest resource base (the Biological sphere) and the community (the Social sphere). Changes to the existing system, that could improve the potential of the system to be sustainable, are identified. The aim is to adjust ongoing behaviour so that the system will more closely incorporate the trade-offs between the three spheres that form the essential components of the concept of sustainable development. The adjustment of ongoing behaviour is achieved through the implementation of the strategies aimed at sustainability of the operation. These strategies are derived through a process of negotiation. This approach can be stated in the following hypothesis.

2.2 Hypothesis

One of the objectives of this study is to test the following hypothesis:

- A. Forest resource outputs can be maximized by focusing on the Biological sphere: forest management.
- B. However, the sustainable development of forest resources can only be achieved by recognizing the additional spheres that are concerned with the economic and social elements of the resource management system.
- C. One solution to achieving sustainable development for natural forests is through extending the stakeholder concept, as adapted from modern corporate management philosophies. By focusing on the indigenously developed sawmill, methods that contribute to the sustainable development of the natural forest system can be determined so that:
 - i) solutions to tropical forest management can be found by integrating social, economic and biological factors,
 - ii) sawmilling technology and forest management techniques are relatively minor concerns in achieving sustainable development based on the exploitation of the natural forest for timber; however, they prove to be an acceptable target for intervention for sustainable development, and

- iii) the major factor in precluding the achievement of any successful form of forest management is a political one.

It is important to emphasize that the aim of this study is not to propose new silvicultural techniques *per se*, nor is it to solve the problem of deforestation that is largely attributable to the change in land use from forest cover to agriculture and grazing, "a process over which foresters alone have little control" (Synnott, 1989; from Poore, 1989). Rather, its primary aim is to devise a mechanism by which the natural tropical forest can be sustainably utilized within the existing social and economic framework.

Development assistance programmes provide many examples of resource management strategies aimed at improving the development of third world nations. Prescriptions in such strategies exemplify one sphere or two sphere solutions. These initiatives have normally been funded through donor agencies as aid packages.

The following section reviews a number of such programmes and comments on their shortcomings in achieving sustainable development. The remainder of this chapter is devoted to an exposition of the stakeholder theory of management leading to a development of a new Integrated Management Approach for intervention in resource management programmes. Management of the natural tropical forests for sustainable development provides a prime case study for testing this new approach.

2.3 Orthodox Management Strategies

2.3.1 Economic Development

In 1981 the Food and Agriculture Organization (FAO) published a guide for the planning and establishment of small and medium sized sawmills in developing countries (FAO, 1981). This guide concentrates on presenting the technical aspects of maximizing economic goals through efficient sawmill operations. The economic analysis presented (FAO, 1981, page 129) does make a minor reference to social goals by stating that the sawmill provides local employment. Despite the direct dependence of the sawmill on the forest resource, no consideration is given within the guide to the management requirements for the sustainable development of the forest resource *per se*.

A similar focus on the Economic sphere is evident in the approach taken in an earlier FAO guide for planning pulp and paper enterprises (FAO, 1973). The attention given to the biological aspects of the system based on resource use concentrates on the benefits of exploiting the natural tropical forests. The cited benefits of the natural tropical forests are a low initial investment in utilizing the resource and an absence of a lengthy "gestation" period between investment and economic return, conferring advantage over the alternative use of plantation forests. The guide recommends that those areas of natural tropical forests which are harvested to supply the pulp mill be liquidated and the land used for plantations of one or a few preferred species. The result of this strategy is to maximize the goal set of the Economic sphere, certainly at the expense of the goals of the Biological sphere and probably at the expense of the Social sphere.

The original feasibility study of one of the case study sawmills (Oy, 1975) provides another example of this approach. The study proposed that, as the commercial species found in the natural forest licence area were utilized, the area should be clear-felled of any remaining trees and converted to plantations of an unspecified "suitable species" to meet future supply considerations of the proposed mill. The study made no recognition of the fact that such clear-felling of the area would result in reduced biological diversity of the forest. In this example, therefore, the intent of the management strategy is to maximize the goal set of the Economic sphere. The Biological sphere is concomitantly minimized and the Social sphere is also compromised in the long-term.

The lack of cognizance of the social and biological aspects of resource development continued into the 1980s. For example, Gittinger's (1982) guide to economic analysis of agricultural projects, widely used as a reference manual for development projects, including those related to the forest resource, does not encourage the inclusion of environmental costs in economic analysis. Approaches to economic analysis are more fully discussed in Chapter 6.

2.3.2 Conservation

A more recent example of the lack of attention given to optimizing the goal sets of the three spheres is found in a type of international convention, the Tropical Forest Action Plan (TFAP) (FAO, 1985). The TFAP was aimed at coordinating the focus of the members of the donor community on the issue of the management of the tropical forest resource. Ross and Donovan (1986) and Lohmann and Colchester (1990) contend that

among the weaknesses of the TFAP are its meagre attention to conservation aspects, inadequate consideration of the trade-offs between economic development and forest conservation, and its "top down" resource management approach. Further, it does not involve organizations representing the more local perspectives. These criticisms have been echoed and elaborated by Sargent (1990) and Winterbottom (1990) in their formal critiques of the TFAP. The management strategies developed under the TFAP emphasize achievement of Economic sphere goal sets and are less concerned with the Biological and Social spheres of the sustainable development model.

Failure to address all the spheres of the sustainable development model is not limited to resource exploitation situations. Exclusive consideration to the goals of the Biological sphere at the expense of the goals of the Economic and the Social spheres is equally prone to failure. For example, reserves delineated for conserving an ecosystem are often fraught with unsanctioned economic exploitation that defeats the original purpose of the reserve. Further, clandestine exploitation is often wasteful because of the constraints imposed on the operation through its illegality (Castro, 1988a,b). Examples of project proposals for the delineation of bio-reserves are noticeably deficient in adequate methodology to address the modification of local resource use activities in order to achieve conservation objectives. For example, Heppner and Bovey (1987) suggest that the establishment of a forest ecological reserve be achieved by the cutting of boundary clearings and patrolling of the boundary "quickly before local opposition can be rallied". This approach does not address the local economic and social values of the forest area in question and thus is aimed at maximizing the Biological sphere in isolation. More recently the World Wide Fund for Nature has attempted to establish a conservation area by giving consideration to concerns within all three spheres at the planning stage (IUCN/UNEP/WWF, 1991). This approach is most relevant to continued research into the process of intervention, however; at this time it is too early to draw any conclusions regarding the outcomes.

It is sometimes openly acknowledged that management strategies aimed at optimizing single or double sphere goal sets, while promising to satisfy interests in the short-term, can not be expected to provide for long-term sustainable development (Barbier, 1990). In recognizing this, Burns (1986) presents an example of this in his outline of a development typology termed "runway deforestation". Runway deforestation is a forest resource management strategy which, in the short-term, aims to maximize the Economic sphere goal set by sacrificing short-term Biological and Social sphere goals. The forest capital of a nation is rapidly exploited and the capital gained from this nationally coordinated, purposeful deforestation reinvested within the nation in order

to build up the necessary infrastructure. The improved infrastructure would then support non-forest resource based development. The shortcomings of this approach become evident in that while there are examples of nations which have embarked on a rapid and purposeful liquidation of their forest capital, there are few, if any, examples of the successful reinvestment of the realized capital into the national infrastructure that could lead to sustainable development.

Systems of biological resource management which do not give due consideration to the simultaneous optimization of the goal sets of the three spheres will eventually fail to supply necessary goods and services. System failure will have an immediate effect on those people directly dependent on the system and a long-term effect on populations within wider boundaries, and ultimately globally.

There is growing pessimism that development assistance is not achieving the desired objective of sustainable development and a number of major agencies are currently reviewing their policies (e.g. World Bank, 1991). Nevertheless, there is still interest in the developed world in pursuing a program of aid to the lesser developed nations aimed at managing biological resources for the continued flow of goods and services for sustainable development (FAO, 1988a,b; McNeely, 1988; Palo, 1988). For example, the total value of forestry related aid rose from US\$ 500 million in 1985 to over US\$ 1 billion in 1987 (World Bank, 1987a). This rising level of investment indicates a general increase in awareness that failure of a given resource management system has the potential to affect other systems beyond its immediate boundary.

2.4 Intervention for Sustainable Development: the Need for a New Approach

Since donor funded intervention in existing systems of management is not leading to sustainable development, a new management model for intervention is required. There are examples of successful models for sustainable development in disciplines other than natural forest management which may be applicable.

One such example is found in agriculture. Chambers (1989) outlines an example of a successful approach for intervention to achieve sustainable development in agriculture³. He recommends that intervention for sustainable agricultural

³ It is the author's view that Chambers' (1989) concept of sustainable development does not correspond to the definition of sustained or sustainable development used in this study. Chambers (1989) defines sustained development as being "the uninterrupted spread of developments in agricultural practice within the agricultural community".

development should begin by determining "what the farmer would like from his basket of choices". This approach, termed "farmer first", represents a reversal of the conventional "top down" management orientation of development strategies. Chambers provides two principles of intervention in implementing the "farmer first" approach. The first is to initiate the intervention process at that point in the decision-making chain where it is easiest, simplest and quickest. By employing this principle, a learning environment is created where experience and confidence are gained. The second principle involves changing behaviour before changing attitudes. Taking action provides experience, and experience, more than exhortation, has been found effective in reorienting values, and therefore attitudes. This example of agricultural development offers an approach that steers development activities in a direction that is "farmer generated and farmer acceptable".

Despite some attractive elements of Chambers' approach, it cannot be directly applied to natural tropical forest management because of a fundamental difference between agricultural and natural tropical forest resource management systems; namely, the issue of control. In agriculture, control over the resource (the land) is most often established through occupancy and/or title and thus the manager (i.e., the farmer) can make decisions regarding the use of those resources in the pursuit of his own goals. In the case of forest resources, effective control over the forest is not always clearly established, therefore, these forest resources exist under frontier conditions.

2.4.1 Intervention Under Frontier Conditions

The existence of frontier conditions over an area of natural tropical forests brings a three-pronged complication to management for sustainable development, compared with situations where social controls exist.

First, in situations where there are effective social controls over the forest, those entrepreneurs exploiting the forest are normally responsible for bearing some level of the social costs of their activity. But in frontier conditions the social costs normally associated with the exploitation of the forest (such as royalties, taxes etc.) can be avoided by the entrepreneur. Forest areas under frontier conditions thus offer a positive inducement for economic exploitation, and represent a clear, preferred target for entrepreneurs seeking to maximize their economic returns through forest exploitation. Second, in frontier conditions resource users may gain access to a resource without paying the full social cost of that resource. Low valued uses will therefore

dominate at the expense of higher valued ones (Stroup and Baden, 1983). Third, the second complication is exacerbated by the fact that entrepreneurs aiming to maximize their economic goals prefer and actively seek out areas under frontier conditions. There is thus a progressive skewing of forest use to purely economic concerns.

The phenomenon of frontier conditions therefore demands a new focus for decision-making and enforcement of management objectives. As noted earlier in this chapter, resource utilization for sustainable development in many developing world situations involves some form of intervention. In frontier conditions, orthodox "top down" interventions into ongoing management systems are not working. The search for a new model of management intervention which takes account of the frontier conditions leads to consideration of the evolution of the modern corporation in the United States of America (USA). In the following section that evolution is traced and elements of its potential use in addressing the problem of appropriate intervention in natural tropical forest management are identified.

2.5 The Stakeholder Concept of the Modern Corporation

2.5.1 An Introduction to the Effect of Control on Management Systems

The evolution of the modern corporation in the USA began over two centuries ago (Evans and Freeman 1983). The precursor to the modern corporation was a business enterprise which embraced a corporate management strategy based on managerial capitalism⁴. This form of management succeeded because there was little or no social control imposed on the management, there was ineffective implementation of political decisions, and corporate management decision-making focused solely on maximizing benefits to the owners from the activities of the firm.

The modern USA corporation made a successful transition from an original environment of few social controls (i.e., frontier conditions) to one of intense social control and regulation by harnessing entrepreneurial drive in a number of ways. Examining the process of this transition may provide a key to solving the problem of the management of the natural tropical forests. The concept of managerial capitalism holds that the greatest good to all will result from the self-interested pursuit of business.

⁴ Managerial capitalism is based on the law of corporation which states that the corporation should be run in the interests of the stockholders of the firm. The basis of managerial capitalism is that in return for controlling the firm, the management vigorously pursues the interests of the stockholders (Evan and Freeman, 1983).

To follow this doctrine effectively, managers must be unencumbered in order to respond quickly to market forces. That is, they must be free of social controls. The validity of the theoretical claim that social equity is achieved through an "invisible hand"⁵ is flawed however, owing to the existence of externalities, moral hazards and monopoly conditions in the real world. The recognition of the existence of these realities has led society to protect its values through the imposition of external controls on enterprises operated under the banner of managerial capitalism. These controls have been imposed over time through such social institutions as governments, the judiciary, consumer and environmental groups, and employee unions. The imposition of social controls has effectively eliminated the frontier conditions under which the USA corporate manager was operating. Therefore, the conditions under which the orthodox corporate management system succeeded have changed. Consequently, as Evans and Freeman (1983) have noted, managerial capitalism has become an anachronism. They argue that with this change there is a need to redefine the concept of the management of the modern corporation to ensure the firm's long-term competitiveness and survival.

A management strategy based on the *Stakeholder Concept* has been suggested as a means for the firm to succeed in this new environment in which there is an expression of social values (Freeman, 1984; Evans and Freeman, 1983; Cleland 1986; Low, 1988). The stakeholder concept shares some elements common to other strategic management models, but is unique in that it is *relational*: it focuses on the firm's need to take into account its relationship with specific stakeholder groups as it sets its direction and formulates management strategies (Roberts and King, 1989). Systems theory holds that all aspects of society are interconnected and interdependent, and that no single component, such as the firm or a resource management strategy, can be understood in isolation. Furthermore, systems function according to the interactions of their constituent components, and a firm's ability to survive depends on its contribution to the maintenance of the overall system. The performance of a system therefore depends as much on how the parts work together as on how the parts perform independently (Low, 1988). Table 2.1 lists the elements of strategic management upon which the stakeholder concept is based.

⁵ Using the famous analogy of Adam Smith, (1910), An inquiry into the nature and causes of the wealth of nations, where Smith expounds that although individuals make choices for their own self interest, the greatest advantage to society as a whole was achieved by doing so since each individual was "led by an invisible hand to promote an end which was no part of his intention".

Table 2.1: The basic questions of strategic management, a non-relational management strategy upon which the stakeholder model is based.

The Questions	Purpose of the Questions
What is the mission of the organization?	(the direction the organization is taking)
What strategies shall be used to achieve this mission?	(strategy choice or options identified)
How should resources be allocated to implement chosen strategies?	(budget limitations)
What structures and systems will enable the strategies to be carried out?	(limitations to implementation of plans)
How can it be ensured that the organization is implementing the agreed upon strategies?	(control and evaluation of actions taken)

(adapted from Roberts and King, 1989)

2.5.2 Basis of the Stakeholder Concept

The stakeholder concept is founded on the notion that the firm must be concerned with the well-being of all the constituencies that affect and are affected by its activities (Freeman, 1984). The constituencies are termed *stakeholders*. A stakeholder is defined as any individual or group who can affect or is affected by the achievement of an organization's purpose. The stakeholders define the "environment" of the firm.

Freeman (1984) suggests that the foundation to long-term success in any business organization is the satisfaction of its key stakeholders. Satisfying key stakeholders requires that managers be proactive in their relationships with the firm's external environment and also that they enter willingly into discussions and negotiations with the key stakeholders (Roberts and King, 1989). Without the support of these groups and individuals, business organizations will not survive in the long-term (Freeman, 1984; Low, 1988). An important feature of the stakeholder concept is that it is considered a failure of management responsibility to have a management decision imposed on the firm from without - if effective negotiation could have avoided such a situation. An application of the stakeholder concept could follow a number of basic steps, as described in the following section.

2.5.3 Steps in Applying the Stakeholder Concept

The implementation of a management strategy based on the stakeholder concept involves five basic steps as shown in Table 2.2.

Table 2.2: The Five Steps of the Stakeholder Concept.

1.	Identification of the stakeholders.
2.	Identification of the stakeholder "stakes" ⁶ .
3.	Assessment of how well the current operation is meeting the needs of its stakeholders, i.e., the <i>status quo</i> .
4.	Readjustment of corporate priorities to bring the firm inline with stakeholder interests.
5.	Monitoring of the system and re-applying Steps 1 to 5 as required.

(adapted from Ackhoff, 1987; Freeman, 1984; Low, 1988; Roberts and King, 1989)

The usefulness of the stakeholder concept in corporate management has led to the development of a variety of standard procedures for its implementation at the enterprise level. In the following sections, procedures at each of these steps listed above are described, based on their application to corporate management. Modification of the standard approach to fit the natural tropical forests situation is then explained.

Step 1) Identification of the Stakeholders :

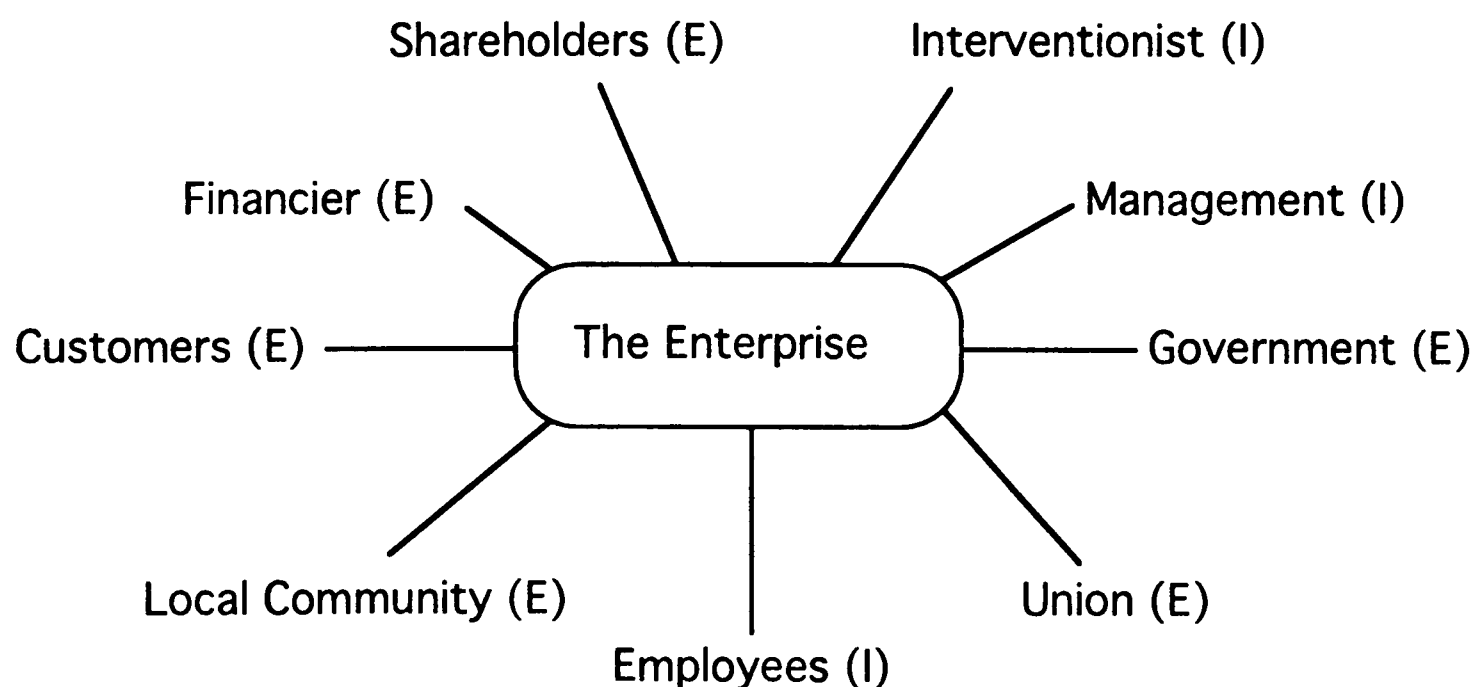
Stakeholders can be identified in a number of ways, including the use of an historical analysis of the organization's interface with its environment. Any group or individual that has the potential "to make a difference" to the organization must be categorized. Stakeholders may also be classified, based on their real or potential effect on the organization. Stakeholders can be classified as being either *internal* or *external* and as either *supportive* or *adversarial*. Internal stakeholders are defined as those stakeholders who are under the control of the manager of the enterprise. They are considered less likely to be adversarial to management (Cleland, 1986). External stakeholders are defined as those stakeholders not usually subject to the legal authority

⁶ The concept of a "Stake" is based on the idea of one's having something to lose or gain in a given situation and therefore the nature of the stake depends on the issue at hand (Freeman, 1984).

of the manager of the enterprise. They may be supportive or adversarial to management, but in the latter case provide a formidable challenge to management (Cleland, 1986).

A further method in helping to identify stakeholders is listing of the "strategic issues"⁷ that currently face or have faced the organization (Cleland, 1986). The *stakeholder map* is a useful tool for graphically representing the identified stakeholders. In Figure 2.3, the stakeholder map shows the organization (i.e., the enterprise) at the centre of a number of examples of stakeholders. This map shows that stakeholders may exist well outside the normal field of operation of the enterprise. For example, Ackoff (1987) notes that future generations are stakeholders since they may be affected by decisions made today. There is no one who can speak for them, therefore today's decisions must be made so as to preserve the ability of future generations to make decisions for themselves. In this sense, the stakeholder theory is consistent with the earlier discussion of sustainable development.

Figure 2.3: An example of a stakeholder map. The organization is in the centre. Stakeholders of the organization surround the organization. (E = External Stakeholder; I = Internal Stakeholder).



Step 2) Identification of Stakeholder "Stakes":

⁷ A strategic issue is defined as a condition or pressure, either internal or external, that will have a significant effect on the functioning of the organization (Brown, J.K. from Cleland, 1986).

The first task in the identification of the stakeholder stakes is to confirm the identity of the stakeholder focus (i.e., the contents of the central box of the stakeholder map). This will ensure that the subject of intervention is unequivocal. A *stake* is a claim on the organization which a stakeholder has. For example, the stake for the employees may be job security, the stake for the stockholders may be financial returns, and the stake for the local community may be economic and social stability. The stake of the interventionist may be broad, such as sustainable development of the enterprise, or specific, such as the conservation of a particular ecosystem. A stake may be tangible, for example, money or material resources, or intangible, such as time, prestige or self-esteem.

Once the stakeholders and stakes are identified, a relational list, consisting of each stakeholder and their stake(s), is drawn up.

In traditional management models *implicit* stakes (such as job security or continued supply of goods or services) are differentiated from *explicit* stakes (such as wage contracts). This differentiation is based on the fact that implicit stakes are not legally binding, therefore an organization may default on implicit claims and not necessarily suffer directly (e.g., go bankrupt). A basic tenet of traditional management models is that if an organization does not uphold explicit claims, it follows that the organization will suffer. Implicit stakes (as opposed to explicit stakes), therefore have a low fiscal standing and may not be considered a valid concern in the decision-making process in the traditional management model.

In the manager-stakeholder relationship model it is important that the implicit stake is perceived as being valid (Cornell and Sharpiro, 1987). To establish the validity of the implicit stake in the manager-stakeholder model, the demise of the organization as a result of failing to address implicit stakes must be recognized as a very real possibility. This possibility can be based on the over exploitation of the resource base or the failure of society to bear the social costs of a resource utilization strategy. In the application of the stakeholder concept to resource utilization strategies, bankruptcy does not necessarily mean only financial insolvency. Bankruptcy can be equated to environmental degradation or unacceptably high social costs which result in the cessation of the organization.

A stake, therefore, can be based on self-interest or on the communal good and may be economic, political, social or psychological in nature (Roberts and King, 1989). In Figure 2.4, examples of stakeholders and their stakes are presented. The identification of stakes

may be facilitated by using the same data gathered during the historical analysis and listing of strategic issues outlined in Step 1.

Figure 2.4: Stakeholders in Organization "X" and their stakes listed in chart form. A stakeholder may have more than one stake.

Organization "X"	
Stakeholder	Stake
Employees	job security job advancement
Management	job security success of Organization "X"
Financier	successful investment
Stockholders	dividends
Customer	reliable supply of quality goods
Government	tax revenue employment
Local Community	community stability tax revenue
Union	members

Step 3) Assessing the Status Quo:

Assessment of how well the firm is currently meeting the needs of the stakeholders involves a determination of what, if anything, needs to be changed to make the operation compatible with the stakeholders' perceived interests. It is vital to know which stakeholders benefit from the organization and which do not. This is because those stakeholders who perceive that their needs are not being met by current strategies may be more likely to support change and *vice versa*. Figure 2.5 illustrates an example of a relational presentation of the current operation's *status quo* in meeting stakeholder claims. The stakeholders are listed with their stakes, each stake being rated according to whether the current operation is exceeding the needs (+1), adequately meeting the

needs (0), or not meeting the needs (-1) of each respective stakeholder. The format of this chart can be expanded to include various assessments over time.

Figure 2.5: Representation of stakeholders and their stakes in an organization.

Organization "X"		
Stakeholder	Stake	Rating Score
Employees	job security	+1
	job advancement	+1
Management	job security	+1
	firm's success	+1
Financier	successful investment	+1
Stockholders	dividends	-1
Customer	reliable supply	-1
	quality goods	-1
Government	tax revenue	-1
	employment and community stability	+1
Board of Directors	prestige	-1
	personal gain	+1
Interventionist	sustainable development	-1

In this example the *status quo* is presented, however, more than one period of time may be illustrated. A column may be included to show an historical perspective of the assessment from an earlier period in the organization. Further columns may be added to note the effect of the implementation of new management strategies so that a comparative record of stakeholder perception may be constructed.

An important component of stakeholder assessment is weighting each stakeholder (Weiner and Brown, 1986; Roberts and King, 1989; Cleland, 1986). The process of weighting is relative and acknowledges the kinds and depth of power that each stakeholder wields in relation to the management system (Weiner and Brown, 1986). The interventionist determines the parameters which describe stakeholder power and ranks each stakeholder. Figure 2.6 shows an example of a stakeholder weighting process adapted from Weiner and Brown (1986). The interventionist would complete a chart such as this for each stakeholder in the organization. In this example, presented for illustration purposes only, the stakeholder is the Financier of Organization "X". A

chart would be completed for each stakeholder, with stakeholder weight being determined by summing the scores assigned for each *stakeholder province*.⁸ In Figure 2.6, each row (A to E) depicts a stakeholder characteristic. When considered together, this suite of characteristics represents the stakeholder province. Each stakeholder characteristic is assigned a relative score, in this case from 1 to 5. A greater relative score indicates that particular characteristic is strongly represented by the given stakeholder. The relative scores are summed and a weighting is determined for the given stakeholder. Larger sums indicate that the given stakeholder has a greater relative potential to influence the organization.

Figure 2.6: An example of a stakeholder weighting matrix.

STAKEHOLDER: <i>Financier</i>					
Relative Score					
Stakeholder Province	1	2	3	4	5
<u>A</u> Importance of the stakeholder to the success and to the survival of organization					X
<u>B</u> Authority of the stakeholder to determine decisions made in the organization			X		
<u>C</u> History of the stakeholder's role in successfully influencing decision-making in the organization (stakeholder credibility)		X			
<u>D</u> Access of the stakeholder to key decision-makers			X		
<u>E</u> Resource control of the stakeholder (e.g., finance/materials/labour)					X
WEIGHT..... <u>18 points</u>					

⁸ Stakeholder province describes the character of the relationship of the stakeholder to the organization. These characteristics are developed as required and may be assigned a relative score as depicted in the hypothetical matrix in Figure 2.6.

Once the weighting for each stakeholder is determined, each stakeholder is then assessed for the expected response to change in the existing management strategy. A response to intervention can be positive, neutral or negative.

A nine-cell matrix is created (Figure 2.7). The columns are labeled Positive, Negative and Neutral and the rows are labeled Heavy, Medium and Light, corresponding to weighting scores of 15 or more, 10 to 14, and 9 and under, respectively. Each stakeholder is assigned an appropriate cell. This matrix allows for any number of possible analyses. Stakeholders in the Heavy / Positive cell would be stakeholders who form the core support of the organization; Heavy / Neutral stakeholders would be key "swing" elements and Heavy / Negative stakeholders would form the nucleus of opposition. Determining which stakeholders fall into the Heavy / Negative category in advance will help in defusing or managing expected opposition to management strategy.

Figure 2.7: The Stakeholder Ranking Matrix.

Stakeholder Response to Change			
Stakeholder Weight	positive	negative	neutral
Heavy 15+	financier		
Medium 10 - 14			
Light 9 or less			

The information on which the Stakeholder Ranking Matrix is based is a result of an exercise by the interventionist in "judgment". Since judgments are necessarily subjective, too much qualification or quantification of this information could well result in judgment being masked as fact (Weiner and Brown, 1986). However, at this point in the analysis most of the information needed to identify, rank and select the stakeholders who must be involved in the negotiation activity is known. Some may rank so low as to make their inclusion superfluous. The interventionist has also gained an understanding of the relationship between the stakeholders and the objectives of the intervention process.

Step 4) Readjustment of Corporate Priorities:

In order to align the firm with stakeholder interests, an integrated corporate management strategy is developed. The goal of the strategy is to reconcile as many of the competing stakeholder needs as possible with corporate priorities, and to prepare the organization to address those that cannot be integrated and reconciled. The hypothesis supporting this goal is that creating compatibility between corporate priorities and stakeholder interests will produce a good fit between the firm and the external environment and thus will increase the probability of the firm's profitability and survival (Roberts and King, 1989).

Step 5) Monitoring of the System and Re-applying Steps 1 to 5 as Required:

The final phase of application of the stakeholder concept involves monitoring and assessing the way in which the readjustment of corporate priorities has met the stakeholders' needs. Figure 2.8 exemplifies a Post-Adjustment Status Chart, a relational presentation of how the adjusted operation is meeting stakeholder needs. This represents an extension of the *status quo* chart (Figure 2.5) with a catalogue of the changes the readjustment phase has brought about to meet the needs of the stakeholders.

Figure 2.8: A Post-Adjustment Status Chart illustrating a relational presentation of how the organization is meeting stakeholder needs.

Organization "X"			
Stakeholder	Stake	Rating Score	
		Status quo	Post-intervention
Employees	job security	0	+1
	job advancement	-1	0
Management	job security	0	+1
	success of Organization "X"	-1	0
Financier	successful investment	-1	0
Stockholders	dividends	0	-1
Customer	reliable supply	0	+1
	quality goods	0	+1
Government	tax revenue	0	0
	employment	0	0
Local Community	community stability	0	+1
	tax revenue	0	0
Union	members	-1	0

Management strategies for sustainable development of biological resources and management strategies based on the stakeholder concept share a number of characteristics. Both types focus on:

1. The inclusion of social values (i.e., values originating outside the immediate management system).
2. A long-term rather than a short-term time horizon.
3. The achievement of "success" of the system (for a firm, success is defined as its continued prosperity or existence; for a resource utilization system, success is defined as sustainable development).

4. The need for sacrifice in the short-term to reap gains in the long-term (Stroup and Baden, 1983; Low, 1988), and the need to overcome the human reality of self-interest of the individual in making *short-term* gains, while at the same time recognizing the need to serve human self-interest for gains in the *long-term*.
5. The need to understand how the system *actually* works not how the system *should* work (Low, 1988)⁹.

The stakeholder concept presents an ideal vehicle for introducing the elements necessary for sustainable development into the management strategies employed in resource utilization. The concept is applicable here for three principal reasons. First, the short-term sacrifice which must be made by the beneficiaries of managerial capitalism is achieved from *within* the enterprise. This is an important characteristic for those cases where the sacrifice is unlikely to be imposed from outside (Low, 1988). Second, the stakeholder concept is *relational*, requiring management to give consideration to the surrounding systems as well as the immediate, internal system of the enterprise (Roberts and King, 1989). Third, the key objective of management based on the stakeholder concept is to avoid the need for outside forces imposing non-negotiable resource use decisions upon the system (Roberts and King, 1989).

Two major distinctions must be stressed between the use of the stakeholder concept in USA corporations and its original application in modern-day frontier conditions. First, it is possible to learn from the experiences of USA corporations between 1750 and 1950 without actually experiencing the two-century "negative phase" of their history. Second, it must be recognized that in the USA situation, the concept arose in response to the rise of *extrinsic* social controls which curtailed pure free market decision-making. The application of the stakeholder concept to the modern USA corporation is thus considered essential to ensure the corporation's ability to survive in the long-term in a socially regulated environment (Freeman, 1984; Low, 1988). However, as was pointed out in Chapter 1, the condition of social control in the developing world is the converse to that found now in the USA. In the developing world, social controls are few or non-existent and single sphere free market capitalism operates in a *de facto* sense. Here, the

⁹ i.e., the *Positive* versus the *Normative* approach to economic analysis as reviewed by Hay (1989). Normative economics is concerned with judgments of "what ought to be" in contrast to positive economics which is concerned with "what is". Normative economics seeks to formulate criteria by which we can say that the *social welfare* in one economic situation is higher or lower than in another. The basic element of social welfare analysis is individual welfare or happiness. The presumption is that the individual is the best judge of his own welfare, and that he maximizes it. Through attempting to determine how a system actually works the information available to individuals is increased and thereby their decisions are more informed.

stakeholder concept is needed to introduce intrinsic social controls to existing single sphere resource utilization situations.

It becomes clear that the stakeholder concept can, in this way, be applied to any resource management problem. It is a method of managing intervention. The next section develops the mechanisms whereby the stakeholder concept can be usefully employed in a typical resource management situation: East African natural tropical forest management.

2.6 The Introduction of the Integrated Management Approach

In Chapter 1, existing resource management strategies were shown to lack the necessary breadth to facilitate sustainable development objectives. Most existing management tools were found to address concerns within the single, or at best, double sphere goal sets identified in Barbier's (1987) conceptual model of sustainable development. In order to manage resources for the purpose of sustainable development, there is a need for the development of an innovative management approach that incorporates a mechanism for successful intervention into existing management situations as well as integrating the objectives of the three spheres that comprise the model of a resource management system (Figure 1.1). Such an approach need not necessarily replace existing intervention mechanisms, but may complement and strengthen them. The essence of success for such an approach to the management of intervention is therefore an *integration* of the three spheres in the sustainable development model. A management approach that achieves this integration has been developed for this study and is termed the Integrated Management Approach (IMA).

The IMA has been designed to overcome shortcomings that have been shown to preclude traditional resource management strategies from being effective tools for achieving sustainable development. The IMA has been developed with specific reference to the added challenges to resource management that are found under frontier conditions. In this section the means by which the IMA addresses the problems faced in attempting resource management for sustainable development are presented, followed by a detailed description of the methodology of the IMA.

2.6.1 The Advantages of the IMA

Initially the application of the IMA provides information on the present or actual impacts associated with ongoing resource utilization activities. It also provides information on the effects that can be expected if the existing management strategy is continued under frontier conditions. This information has not always been available, and yet is vital to sectoral and national planners and policy makers (Gregerson, 1990).

The application of the IMA also imports the stakeholder concept into the intervention process itself and, ultimately, into the actual management strategy of the resource utilization system that is the focus of the intervention. The stakeholder concept provides guidelines for the definition, the identification and management of stakeholders.

The IMA also incorporates a step where facilitated negotiation between stakeholders is undertaken. This negotiation process also provides one method of overcoming the valuation problems that have been identified as being difficult to overcome during the development of strategies to achieve sustainable development (Arnold, 1985a,b; Leslie, 1987; Barbier, 1987; Cocklin, 1990). The negotiation process can lead to an optimization of the trade-offs between the goal sets of the three spheres of the model of sustainable development. In addition, a truly negotiated outcome implies a sense of equity of influence between the negotiators that becomes a positive and building force in resource management (Fisher, 1989).

The incorporation of such constructive forces in resource management is identified by Ascher and Healy (1990) as an essential basis of successful resource management for sustainable development through the development of what they term *virtuous circles*. A virtuous circle is described as the antithesis of the "*vicious circle of poverty*". A stark example of the vicious circle is the desertification of the African Sahel where population pressures exceed the capacity of a resource to regenerate and continue to support the increasing population.

Vicious circles, as described by Ascher and Healy (1990), are a result of current resource exploitation patterns in much of the Third World that are characterized by three elements. First, no person or institution takes responsibility for managing the resource. Second, governments often claim responsibility for managing resources without clear management goals and without the capacity to implement them. Third, management of

the resources of the developing world are hampered by poorly functioning price systems.

Virtuous circles, on the other hand, develop where, for example, benefit distribution among a rural population becomes more equitably distributed. This then creates rural savings that in turn can be mobilized for further development (Bager, 1980; Ascher and Healy, 1990). Higher rural incomes increase human capital through better health and education. As health risks are reduced the population growth slows as child survival increases and parents are better able to seek security through asset accumulation rather than a large family. The negotiation process undertaken by the stakeholders in the IMA contributes to the development of virtuous circles in that those individuals that are dependent on the natural forest resource as a resource base (be it timber or other values) are given the opportunity to balance the distribution of the forest-based benefits through the negotiation phase. Table 2.3 gives a summary of the characteristics of the IMA that describe its applicability to the process of intervention for sustainable development.

Table 2.3: Summary of the Key Reasons the IMA is Applicable to the Process of Intervention for Sustainable Development.

1.	The IMA facilitates collection of the information required for local, national and international resource planning and policy formulation.
2.	The IMA incorporates a step where facilitated negotiation between stakeholders is undertaken. Through this process it is possible to make difficult valuations that can be of assistance in the optimization of trade-offs between the goals sets of the three spheres.
3.	The IMA imports the stakeholder management concept into the intervention process itself and, ultimately, to the actual management strategy of the resource utilization system that is the focus of the intervention, thus building virtuous circles rather than vicious circles.
4.	The IMA provides for a ranking process applicable on many levels such as, for example, within local, regional and international contexts and within the Biological, Social and Economic spheres of the model of sustainable development.

2.6.2 The Interventionist and the IMA

The key player in the application of the IMA is the *interventionist*. For the purpose of this study, an interventionist is defined as any individual or group that undertakes to change an ongoing management system. Although in this study the interventionist is from overseas, the interventionist can be any stakeholder from either within or without the organization. The successful implementation of the IMA depends on the ability of the interventionist to fill two roles. The first role being that of the facilitator of the intervention process and the second being that of a stakeholder within the existing resource management system. The interventionist must also successfully establish credibility as being an "honest broker" with interests that plainly accord with the provision of sustainable social, biological and economic benefits. The interventionist must be able both to understand and to solve problems and be able to negotiate effectively with the full spectrum of potential stakeholders in the system. The success or failure of the IMA hinges largely on the interpersonal skills, personal character and experience of the interventionist. The appointment criteria for the interventionist must reflect not only the need for a technical expert with a genuine interest in the welfare of the people of the community and country subject to the intervention, but also the skills necessary to successfully convey that interest to the stakeholders.

The interventionist must also be a skilled negotiator because the resulting resource management strategy must be understood to serve the self-interest of all its stakeholders. A forum is therefore necessary where decisions can be reached by stakeholders whose self-interests may be conflicting. The negotiation process is expected to be a learning experience for all stakeholder groups since all stakeholders express their *ambit claims* and the arguments to justify each claim. The negotiation process is pivotal in establishing a plan of action, mutually acceptable to all stakeholders within the context of the management system. The plan of action must be matched with suitable incentives¹⁰ and penalties that are also determined in the negotiation process to encourage the accountability of each decision-maker. The interventionist may use incentives as part of the negotiation process in the IMA as a means of encouraging changes in ongoing behaviour which favour sustainable development. It is important however, that the appropriate type of incentive is

¹⁰ McNeely (1988) has reviewed incentives for natural resource management classifying them as being either direct or indirect. Direct incentives include those which involve a direct cash payment (eg., fees, rewards, loans or compensation) or in-kind payments (food or domestic animals). Indirect incentives include tax incentives, securities, community development activities, education and training. He describes examples of these types of incentives applicable at the community level or the national level.

matched to each circumstance. Direct incentives may feature more prominently in the early phases of the IMA and be more applicable in frontier conditions. Indirect incentives require a higher degree of social accountability and may be more applicable in later re-applications of the IMA.

2.6.3 The Objective of Intervention

For the purpose of this study, the objective of the intervention process is to incorporate new values or adjust existing values within an ongoing resource management situation so that the outcome of the activities undertaken within that system more closely satisfies the conditions for achieving sustainable development. To achieve the objective of intervention using the IMA, the interventionist would be advised to refer to a set of guidelines developed by IUCN (1991) called "Principles of Sustainable Development". These guidelines are summarized in Table 2.4.

Table 2.4: Principles for Sustainable Development (from IUCN, 1991).

1.	Respect and care for the community of life.
2.	Improve the quality of life.
3.	Minimize the depletion of non-renewable resources.
4.	Stay within the carrying capacity. ¹¹
5.	Change personal attitudes and practices.
6.	Incorporate local decision-making.
7.	Provide a national framework for integrating development and conservation.
8.	Create global alliances.

¹¹ Slessor (1990) provides a definition for carrying capacity. It is tied to resources used by people in a given territory taking into account the known resource base as well as socioeconomic factors.

2.6.4 The Regional and International Context of the IMA

Intervention through the IMA cannot operate successfully in localised isolation. The IMA must be undertaken in the context of support at the national and regional level for intervention activities which are aimed at achieving sustainable development. Such support may be described in national policy or proclaimed in a government's manifesto. With this condition met, the interventionist must then obtain endorsement from the authorities for taking specific action in the field. Upon gaining the necessary approval and support for the intervention process, the interventionist establishes initial links with key decision-makers within the ongoing system of resource management (i.e., the target system for intervention). Once this preliminary stage has been accomplished, local implementation of the IMA may begin.

2.6.5 Implementing the IMA

The steps of the IMA relate to the general case. They can, however, be adapted and applied to a variety of situations, either ongoing or newly initiated, that would benefit from the introduction of new values into the prevailing decision-making process aimed at sustainable development. The IMA could be used where new resource management strategies are being developed (for example, in the establishment of an ecosystem conservation area) or where a resource development plan is being implemented. For the present study, the IMA is adapted for application to ongoing resource utilization strategies that are characterized by the local sawmill. This focus is shown in Figure 1.3 where the indigenous sawmill enterprise system is depicted in terms of the model of sustainable development shown in Figure 1.2. In the following section, the adaptations of the general steps of the IMA as outlined in Table 2.5 are described for its application to the local sawmill enterprise. Three sawmill enterprises case studies are introduced in later sections.

Table 2.5: Summary of the steps of the IMA for the General Case.

1.	Collection of information to describe the system as it was intended to operate (i.e., the Technical Limit ¹²) and as it is found at the time of intervention (i.e., the Benchmark Situation ¹³). The development of Negotiation Aims ¹⁴ for the interventionist based on the information collected. - (see Appendices for Chapters 3, 4 & 5).
2.	Identification of the key stakeholders (internal, external, supportive and adversarial). - (<i>Stakeholder Map</i>).
3.	Identification of stakeholder stakes. - (<i>Stake chart</i>).
4.	Assessment of the effectiveness of the current strategies in meeting all stakeholders' perceived needs. - (<i>Stake Effectiveness Chart - Post Intervention</i>).
5.	• Convening of Roundtable activities for the presentation of stakeholder claims and negotiation for the purpose of formulating goals and a new management strategy aimed at achieving sustainable development. • Plans are developed by the stakeholders (<i>Stakeholder Action Plan - SAP</i>) that include an internal monitoring function based on agreed terms and conditions (that include penalties for non-compliance). • SAP is implemented.
6.	• Review and evaluation of the effectiveness of the intervention process and the SAP including notation of the achievements towards sustainable development - (see Appendices Chapter 6: <i>Criteria Rating - Post Intervention Period</i>). • Updates and reiterations of SAP as deemed necessary.

¹² The *Technical Limit* is defined for the purpose of this study as the theoretical potential that the system has for maximizing the goal sets of the three spheres that comprise the conceptual model of sustainable development (see also section 2.7).

¹³ The *Benchmark Situation* is defined for the purpose of this study as the state of the system, as is it found at the time of intervention, in meeting the technical limits assigned (see also section 2.7).

¹⁴ The *Negotiation Aims* are defined for the purpose of this study as the goals that the interventionist considers necessary for the system under study to achieve its Technical Limit in a sustainable manner. The Negotiation Aims are determined by the interventionist for each criterion after the Technical Limits and the Benchmark Situation have been established and recorded.

2.7 Step One of the IMA

Step One of the IMA for the sawmill enterprise requires the interventionist to collect as much information as possible about the resource utilization system, as defined by the activity of the enterprise, within the constraints of time and money available. The present state of an enterprise is a function of its past. Therefore, to ensure that the interventionist attains as full an understanding of the enterprise system as possible, an *Historical Review* of the enterprise with respect to the three spheres, Biological, Economic and Social, must be undertaken. For each of the three spheres of the resource utilization system in question, a number of criteria are identified that isolate the key components within each sphere. These criteria are used by the interventionist as a guide in the collection of information about the enterprise.

To further assist the interventionist in undertaking this step of the IMA, three categories for the information have been established. The first category is termed the *Technical Limit*, or the theoretical potential that the system has for maximizing the goal sets of the spheres. The second category is termed the *Benchmark Situation*. This category is used to describe the state of the system as is it found at the time of intervention in meeting the Technical Limit. The third category is termed the *Negotiation Aims*. The Negotiation Aims are determined by the interventionist for each criterion after the Technical Limit and the Benchmark Situation have been established and recorded. The interventionist must then develop the Negotiation Aims relying on a comparative assessment of the Benchmark Situation to the Technical Limit, personal experience and the principles of sustainable Development (IUCN, 1991). The Negotiation Aims are goals that the interventionist considers necessary for the system under study to achieve its Technical Limit in a sustainable manner. A negotiation aim may not be necessary or applicable if the Benchmark Situation compares to the Technical Limit. An example of a typical chart set-up for one sphere is presented in Figure 2.9. The criteria are shown on the left-hand-side and the Technical Limit, the Benchmark Situation and the Negotiation Aims are listed from left to right across the top, forming a basic structure to guide in the collection of information for Step One of the IMA.

Figure 2.9: An example of a chart created for the collection of information regarding the Technical Limit and the Benchmark Situation and for the notation of Negotiation Aims for IMA Step 1.

<u>FRAME</u>	<u>CRITERIA</u>	<u>TECHNICAL LIMIT</u>	<u>BENCHMARK SITUATION</u>	<u>NEGOTIATION AIM</u>	<u>COMMENTS</u>
Tenure	1. Security of tenure	Tenure to forest land secure, NTCS holds a 10 year Timber Licence and Licence (Republic of Kenya, Licence to Extract and Mill Timber 1982-1991). The Licence is within a Gazetted Forest (Castro, 1988).	Tenure to forest land insecure. Access to the forest as per the Timber Licence restricted by District Forester (NTCS min 18/8; min 57/86). Limited access granted NTCS min 15/86). Forest closed by Chief Conservator May 19/86 (NTCS min 86/76).	For adherence to the Terms and Conditions of the Licence. All changes to be done in consultation with the Licencee and with respect to the existing tenure arrangements.	

2.7.1 Rating the Criteria:

The information collected in Step One for the Technical Limits and for the Benchmark Situation can be rated to identify those criteria, within a given sphere of a given enterprise, that either contribute to or detract from the attainment of the goals of a given sphere. The rating system can also guide the better allocation of scarce resources where, for example, more than one enterprise is under consideration for intervention. For the purpose of this study, a rating of positive one (+1) is assigned to those criteria that are contributing to the attainment of the sphere goals and a value of negative one (-1) is assigned to those criteria that are detracting from the achievement of the sphere goals. Those criteria that are judged to have no immediate effect on the sphere goals are assigned a neutral value of "not applicable" (n/a).

For example, in the case of the criterion *Security of tenure* illustrated in Figure 2.9, the Technical Limit would be rated as +1 and the Benchmark Situation as -1. In contrast, had tenure arrangements not been legally sanctioned, the Technical Limit would have been rated as either -1 or n/a; had the licence been upheld rather than restricted or denied, the Benchmark Situation would have been rated as +1.

The interventionist thus develops a matrix comparable to that illustrated in Figure 2.10, in which the Technical Limit and Benchmark Situation is rated for each criterion. Comparison of the ratings for each criterion allows a ranking of the criteria, as described below.

Figure 2.10: An example of a criterion rating table that was developed for Step One of the IMA.

<u>Frame</u>		<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>
Tenure	1.	Security of tenure	+1	-1	*
	2.	Threats to tenure	+1	+1	
Forest Management Activities	3.	Setting objectives	+1	-1	*
	4.	Yield control (AAC)	+1	-1	*
	5.	Area of forest	+1	+1	
	6.	Species composition	+1	-1	*
	7.	Age/size and volume distribution	+1	-1	*
	8.	Growth rates	-1	-1	*
	9.	Quality distribution	+1	-1	*
	10.	Relative prices	+1	-1	*
	11.	Intrinsic limitations to regeneration	+1	-1	*
	12.	Extrinsic limitations to regeneration	+1	-1	*
	13.	Protection	+1	-1	*
	14.	Working plans	+1	-1	*
	15.	Felling cycles	+1	-1	*
	16.	Concessions	+1	-1	*
	17.	Roads	+1	-1	*
	18.	Buildings	+1	-1	*
	19.	Boundaries	+1	-1	*
	20.	Sample plots	+1	-1	*
	21.	Prediction	+1	-1	*
	22.	Costings	-1	-1	*
	23.	Annual records	+1	-1	*
	24.	Organisation of silvicultural work	-1	-1	*
Silviculture Techniques	25.	Regulation of shade and canopy openings	+1	-1	*
	26.	Treatments to select species mix	+1	-1	*
	27.	Woody climber cutting	+1	-1	*
	28.	Poisoning	n/a	n/a	
	29.	Enrichment planting	+1	-1	*
	30.	Selection cutting	+1	-1	*
	31.	Seed tree provision	+1	-1	*
		TABLE SUMMARY :	27/ +1	2 / +1	
			3/-1	28/ -1	
			1/ n/a	1/ n/a	

* denotes that the Benchmark Situation is not meeting the Technical Limit for that criterion and that the development of a Negotiation Aim is warranted.

2.7.2 Ranking the Criteria:

The process of ranking has been designed to assist in more rapidly assessing the degree to which the activities undertaken within each criterion of a sphere are either contributing to or detracting from the goal sets of that sphere. Ranking also aids in the comparison of those areas that require corrective attention through the negotiation phase of the IMA.

There are two methods suggested for the ranking process using the individual ratings. One method is to assess the ratings assigned to the *individual* criterion for the Technical Limit and for the Benchmark Situation. The purpose of this approach is to assist the interventionist in the preparation of a strategy for development of Negotiation Aims for each criterion. To accomplish this, the interventionist compares the ratings assigned to the Technical Limit and the Benchmark Situation for a given criterion. There are four potential combinations of criterion ratings that may become evident from the comparison. The various combinations of the ratings for each category and the implications to the development of a negotiation strategy for each of these ratings combinations is listed in Table 2.6. By comparing these ratings, a ranking of the criteria enables allocation of resources and priorities for the negotiation phase.

Table 2.6: The expected implications to the Negotiation Aims for the Combinations of the Technical Limit and Benchmark Situation Ratings.

Technical Limit Rating	Benchmark Situation Rating	Implications for Negotiation Aims
+1	+1	<i>No negotiations are necessary.</i> The system is working according to plan, no negotiations are necessary.
-1	+1	<i>Negotiation is necessary, but not immediately.</i> Planning or infrastructure is lacking which may identify the need for negotiations at the regional or international level, but current practice is acceptable, therefore negotiations are not necessary immediately.
+1	-1	<i>Negotiation is necessary; system is not working to plan.</i> The system is not operating according to the technical limit, therefore, negotiation is necessary.
-1	-1	<i>Neither planning nor practice in place, this circumstance identifies the need for negotiation on both regional/international and local levels.</i>

A second way to rank the system is to assess the aggregate of Technical Limit and the Benchmark Situation for the sphere. This approach provides a summary ranking of the Technical Limit and the Benchmark Situation for each sphere for the purpose of rough comparison between spheres and, ultimately, a variety of separate enterprises. This ranking procedure is accomplished by summing the rating values assigned to each criterion under the Technical Limit and the Benchmark Situation. This sum of positive ratings is compared to the total number of criteria. The ideal situation would be one where the sum of the criteria ratings and the number of criteria are equal. In those cases where the sum of the value of the criteria ratings is less than the total number of criteria, the need for the development of Negotiation Aims is identified (for example see Figure 2.10).

A shortcoming of this method of ranking the criterion for each sphere is that it gives equal weight to each criterion. There is no proven basis for this weighting, however, for the purpose of this study equal weighting of each criterion is considered sufficient to achieve the objectives of this Step. This process of ranking is one aspect of the IMA where further research and evaluation would be useful in improving the reliability of the weighting and therefore the wider application of Step One to such areas as policy and planning in the regional and international levels. This aspect of the IMA is not addressed within this study.

Once the Technical Limit and the Benchmark Situation have been identified and the interventionist has undertaken an overall assessment of the system, the next requirement of Step One is the development of the Negotiation Aims. In this endeavour the interventionist must be guided by the needs of the system, as evident from the comparison of the Technical Limit and Benchmark Situation and by the principles of sustainable development (IUCN, 1991). The gathering and rating of information and the development of Negotiation Aims in this Step of the IMA serves as a guide to the interventionist in undertaking the successive steps in the IMA. Another important benefit of Step One of the IMA is the establishment of a "benchmark" for the system. The resulting benchmark assessment will be used in later steps of the IMA when the impact of the intervention is evaluated. Also the benchmark assessments will serve in the development of the "virtuous circles" espoused by Ascher and Healey (1990) for the sectoral and national level planning and policy development.

By using the insights gained through the historical review and information collection in Step One, the interventionist will be better able to undertake the dual roles of facilitator

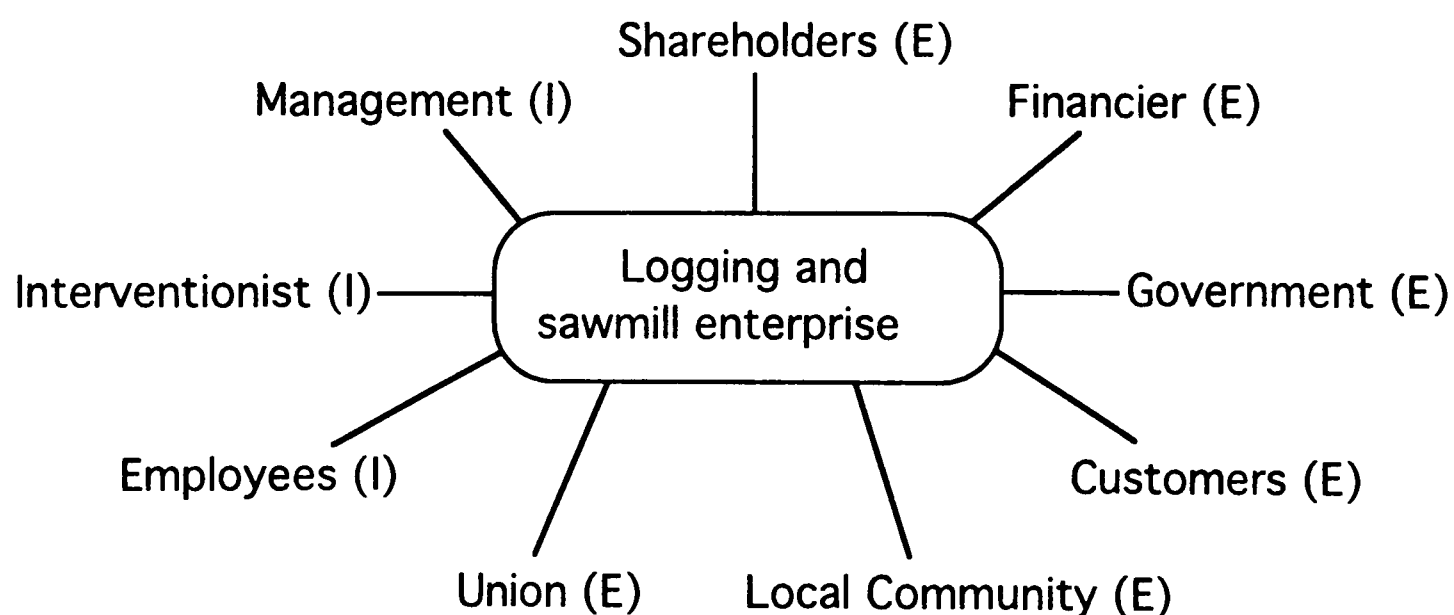
and stakeholder in Steps Two, Three, and Four by having a more critical assessment of who the stakeholders are, what their stakes are, and how heavily their interests ought to be weighed with respect to the objectives of the intervention.

2.7.3 Step Two of the IMA: Identification of Key Stakeholders

Individuals or groups who can affect, or can be affected by, the activities of an organization are termed stakeholders. In this Step of the IMA a *stakeholder map* for the enterprise is constructed (see Figure 2.11). The map should include stakeholders that are both internal (such as employees) and external (such as government regulators, competitors and financial institutions).

In preparation for the negotiation phase, the interventionist should, where possible, note candidly whether a stakeholder is supportive or is adversarial to the aims of sustainable development of the system represented by the enterprise.

Figure 2.11: A Sample Stakeholder Map for the enterprise showing the various stakeholders and their designation as External (E) or Internal (I).



2.7.4 Step Three of the IMA: Identification of Stakes

Once the interventionist has identified the stakeholders of the organization, the next step is to determine their stakes and list them for each stakeholder (Figure 2.12). It is possible for the stakeholders and their stakes to change with time and the interventionist must ensure that this Step is completed for every iteration of the IMA.

Such a chart would provide a useful record of stakeholders and the stakes over time that may prove invaluable as individuals involved in the system leave. Additional columns therefore, will be included as new strategies are implemented so that a comparative record of stakeholder perception can be constructed.

Figure 2.12: Stakeholder and stakeholder stakes chart for the application of the IMA to a sawmill enterprise.

The Organization: Sawmill and Logging Operation "X"	
Stakeholder	Stake
Employees	job security
	job advancement
Management	job security
	firm's success
Financier	successful investment
Stockholders	dividends, capital value of stock
Customer	reliable supply of quality goods

2.7.5 Step Four of the IMA: Assessment of the Effectiveness of the Current Strategies in Meeting all Stakeholders' Claims

In this Step, the interventionist creates an Effectiveness Chart to record his or her assessment of the stakeholder's positions in terms of whether or not the organization is meeting the needs of the stakeholders. This chart draws attention to areas of concern to the stakeholders that will require attention in the negotiation phase. The assessment column will also serve as a benchmark that will be used in post-intervention assessment

and ongoing monitoring of the application of the IMA. The Effectiveness Chart (Figure 2.13) represents an extension of the stakeholder/stake chart (Figure 2.12). One method of rating the effectiveness of the current management strategies of the enterprise in meeting the stake(s) of a given stakeholder suggested for use in this study is to assign a value of positive one (+1) for stakes that are satisfied by current management strategies and a value of negative one (-1) for stakes that are not being satisfied. These ratings can be compared as the IMA is re-applied over time.

Figure 2.13: An example of an Effectiveness Chart developed by the interventionist for the Benchmark Situation and the first iteration of the IMA.

Stakeholder	Stake	As found at time of intervention (Benchmark)	at First Iteration of IMA
Employees	job security	-1	+1
	job advancement	-1	+1
Management	job security	+1	-1
	firm's success	+1	-1
Financier	successful investment	+1	-1
Stockholders	dividends	-1	-1
Customer	reliable supply of quality goods	-1	-1
Total		-1	+3

Further refinement of this Step could involve weighting the scores (using the weighting matrix discussed earlier in Section 2.5.3, Step 3); however, for the purpose of this study, the assessment of the stakeholder stakes will not employ the use of these techniques. The incorporation of these additional techniques in further studies or applications of the IMA, however, would provide the opportunity to assess the applicability of these techniques to the process of intervention using the IMA.

2.7.6 Step Five of the IMA: Convening Roundtable Sessions

The central player in the IMA is the *interventionist*. Intervention is based on the belief held by the interventionist that he has a "stake" in an ongoing resource management strategy. The interventionist should encourage the development of sensible Ambit Claims that are based on a sound understanding of the system and that are developed by as many stakeholders as resources permit. The IMA is a means of introducing the stakeholder concept to all participants in the resource utilization system, which is the focus of the intervention.

In undertaking the Roundtable Session in Step Five the interventionist aims to complete two activities: Part A, the Roundtable Presentations, and Part B, the Roundtable Negotiations. In this step the interventionist must carefully fill the role of both the *Facilitator* and the *Stakeholder*.

After the stakeholder ranking has been completed, the interventionist, in the role of Facilitator, convenes a Roundtable session. Ideally, the participants in the Roundtable are all those stakeholders whose rank indicates that they are of significance to the organization.

In Part A, the interventionist, in the role of Facilitator, invites participants to meet at the Roundtable to present and justify their claims on the organization. The interventionist ensures that the presentation session is managed so that the maximum information is gained. The interventionist in the role of Stakeholder also presents his claims based on the integration and optimization of the three spheres. If the presentations from the stakeholders prompt counter arguments from the other stakeholders in defense of their claims on the organization, then a further source of data on the resource utilization system becomes available. This outcome provides all stakeholders with additional information that will enable them to participate more fully in the next phase of this step, Part B.

In Part B of Step Five of the IMA, the Facilitator convenes the Roundtable Negotiations. The first task in the negotiation process is the drafting of a *Mission Statement*. A Mission Statement succinctly expresses the common interest of the stakeholders and the organization. The Facilitator invites all the Roundtable participants to contribute to the formulation of the Mission Statement. Its drafting serves to place the various individual claims on the organization into a wider perspective and provides each participant with

a common focus point. The Mission Statement serves as a starting point in the negotiation process.

The *negotiation process* enables the stakeholders' Ambit Claims to be refined through consensus. In the process of negotiation each stakeholder must recognize the legitimate claims of the other stakeholders. Each stakeholder must also acknowledge the effect that maximum pursuit of his claims may have on other stakeholders' claims and the well-being of the organization. Through this process it becomes apparent that the stakeholder claims that aim at the maximization of self-interest based on the maximization of single sphere goals must be modified so that all stakeholders' interests may be served by the organization. The modification of any one claim must occur within the framework of all claims and within the context of the integration and optimization of the goals in the three spheres which describe Sustainable Development. For the implementation of modified goals the Roundtable participants can develop a set of plans that describe the interventions which are considered to be possible to accomplish by the Roundtable. These plans, termed *Stakeholder Action Plans (SAPs)* for the purpose of this study would, under ideal circumstances, include the following features: a Mission Statement and a synopsis of the system as found at the time of intervention, the new strategies and their expected impact, and where resources permit, an estimate of the costs that would be required to implement the SAPs. The SAPs could also include an estimate of the cost incurred if the existing behaviour of the system is not changed (this is to allow the interventionist agency a chance to re-assess its commitment to the intervention scheme). The SAPs are then confirmed by relevant regional and international authorities and the agency which is sponsoring the intervention. Each SAP must include mutually agreed goals and standards to be met, built-in incentives and penalties and a monitoring and review process, so that individual accountability is an integral part of the Plan. Once the SAPs are agreed upon the implementation process can begin.

The intended outcome of the negotiation process in Step Five of the IMA is for the long-term survival of the organization and the generation of social and economic benefits over the long-term. For the activities of the enterprise to lead towards sustainable development, the negotiation process must accomplish the following:

- i) the creation of a restructured decision-making process in which stakeholders contribute to the management of the organization,

- ii) the creation of an organization that encourages and harnesses entrepreneurial skills,
- iii) the development of a set of mutually agreed standards of performance for all activities, with built-in incentives and penalties for stakeholder behaviour, and
- iv) the placement of a monitoring and review process for further refinement of activities within the system having the enterprise as a focus.

A summary of the outcomes expected from the completion of Step Five of the IMA are:

- a) data collection: it is necessary for each stakeholder to present a full argument to substantiate his stake in the organization, which leads to more information being available both to the interventionist and to the other stakeholders.
- b) establishment of gross Ambit Claims: list all known stakes on the organization.
- c) refinement of gross Ambit Claims through consensus and agreement of mutually agreeable action plans: a Stakeholder Action Plan of Interventions leading to the formulation of a new resource utilization strategy aimed at achieving sustainable development. Where possible the goals within each action plan will be linked to incentives and penalties.

2.7.7 Step Six of the IMA: Review and Monitoring of the IMA

An important element of every management strategy is an ongoing monitoring process. This step in the IMA requires that there is an ongoing process of field checks to ensure that the agreed to standards are met as well as to adjudicate the incentives and penalties of the various stakeholders. The management of the organization is an ongoing process and the IMA must be re-applied to incorporate changes in the conditions in the organization and the claims of the stakeholders. The monitoring process also contributes to identifying needs for re-application of the IMA. Therefore, Step Six of the IMA involves a process of ongoing formal review of the implementation of the IMA and the SAPs. The review must determine whether the SAPs are succeeding and will facilitate the re-application of the IMA steps to identify opportunities or needs for further fine tuning of the resource management system.

2.7.8 The Outcome of the Application of the IMA

For an application of the IMA to be considered successful the various steps would ideally be applied more than once within an ongoing enterprise.

However, under circumstances where the repeated application of the IMA is not possible there are immediate benefits which can still be realized even from the partial application of the IMA. The focus of the IMA can thus be applied to any enterprise operating under frontier conditions, and any information which can be gathered from its initial application will be useful to planners and administrators.

There are a number of expected outcomes from the initial application of the IMA with respect to the enterprise. These are:

- A Benchmark assessment
- A Stakeholder Analysis
- A gross list of stakeholder Ambit Claims
- A refined list of stakeholder Ambit Claims intended to:
 - a) encourage a change in activities in the short-term and
 - b) to encourage a change in activities in the long-term,
- Stakeholder Action Plans (SAPs)
- A Mission Statement

The eventual outcome of the application of the IMA, being an iterative process, is that the enterprise found operating under frontier conditions will eventually evolve into a successful enterprise operating under socially accountable conditions and contributing to sustainable development. Through the incorporation of stakeholder theory and the three sphere model of sustainable development into the management structure of an enterprise, the IMA has the following key elements that set it apart from traditional management techniques: 1) it encourages the empowerment of a broader base of decision-makers, 2) it promotes a greater flow of information and, therefore, provides an improved method of identifying values at the local, national and international levels, and 3) it provides a mechanism to develop balanced trade-offs between various values.

This chapter began with a description of the derivation of the IMA, followed by a presentation of the steps of the IMA as developed for application to a single enterprise. This chapter ends with an introductory description of the case study enterprises.

Further details, including the historic and political development and geographic characteristics of each case study, are provided in Appendix 2.

2.8 Introduction to the Case Studies

In Chapter 1 we identified conditions which hinder the successful implementation of traditional natural tropical forest management systems (FAO, 1989a). The case studies selected for this study are located in countries where many of these conditions exist. These conditions include social problems, such as rapid population growth, leading to increased population densities and conflicts regarding forest land use for agriculture, livestock grazing, fuelwood, building poles and timber. This tension regarding land use is coupled with uncertain land tenure and poor expression of social values for the forest through the social leadership. Economic problems include infrastructure limitations such as poor transportation and communications, low levels of public funding resulting in weak institutions, poor access to capital (especially foreign exchange), and low levels of mineral resources as sources of wealth. There is also limited knowledge of the extent, condition, content, growth rates and ecological interdependence of species of the natural tropical forest areas (Sayer and Whitmore, 1991). In addition, there are minimal actual and potential alternative domestic sources for many of the benefits of the natural tropical forest ecosystem.

As Slessor (1988) indicates, a knowledge of the resources as well as the factors of a socio-cultural nature is necessary in determining the economic carrying capacity for a given area. This knowledge can form the basis for understanding the sustainability of that system. The countries where the case studies are located do not have comprehensive social control. Obtaining this knowledge is not readily accomplished at a regional or national level for those areas where there is little or no social control. However, it is feasible at the local level. The biological factors of the forest ecosystems from which the case study sawmills obtain their raw materials and the socio-economic impact of each sawmill enterprise can be synthesised to form a unique analytical framework for the investigation of sustainable development.

The specific case studies, described below, were chosen because it was believed that they would provide valuable insights into the challenge of and solutions to natural tropical forest management using the proposed IMA programme. As these case studies represent possibly "worst case" scenarios it is likely that the lessons learned can

profitably be applied to forest exploitation systems in other countries having similar conditions.

2.8.1 Selection of the Case Studies

The case studies selected for this study are three sawmill enterprises located in East Africa. The first case study is the Nithi Timber Cooperative Society Limited in Kenya. The second and third case studies, located in Southeastern Tanzania, are the Mingoyo Cooperative Sawmill and African Blackwood Enterprises, respectively. The three enterprises share a number of common features:

- (a) Each relies on the natural tropical forest as a source for logs. Two of the case study operations are based exclusively on one species found only in the natural tropical forest. Although the production of suitable amounts of acceptable quality of this species in plantations may prove feasible, there are no operational plantations in existence at this time (although plans for a plantation scheme have been drawn up (White, 1988)). The other case study enterprise was developed specifically to exploit a particular area of indigenous forest. It could quite feasibly utilize plantation softwoods or hardwoods, but the closest plantations are allocated to other enterprises and, in any case, these plantations are beyond the distance that had been determined economically feasible for log transport to the mill at the time of the study.
- (b) The sawmills are locally developed and operated. Each sawmill was founded by local interests: a Cooperative Society, a Parastatal¹⁵ and a private entrepreneur. Each enterprise is independently responsible for its day-to-day operations and marketing.
- (c) The enterprises represent a significant portion of the two nations' timber sectors. The maximum annual allowable harvest volume of the Kenyan case study is 10% of the national annual allowable harvest volume. This is a significant proportion of the national activity considering that the remaining cut is allocated among approximately 100 long-term licence-holding sawmills. The combined production of the two other case studies represented 86% of the total Tanzanian production during the study period.
- (d) The sawmills operate under a national policy umbrella which advocates the management of the natural tropical forest. The national policy or manifesto

¹⁵ The term Parastatal is used to describe an enterprise in Tanzania that is owned by the national government.

proclaimed by the Minister responsible for forests in each country was for sustainable management of the natural tropical forest resource (personal communication; Minister of Natural Resources, Kenya, June 11, 1986 and Minister of Lands, Natural Resources and Tourism, Tanzania, August 3, 1987).

- (e) Each enterprise harvests and transports its own log supply using its own employees and equipment. A limited amount of log preparation is undertaken by local people on a speculative basis for possible sale to one of the traveling log buyers from the Tanzanian sawmills, but this does not occur on a regular basis nor does it represent a substantial proportion of the annual log requirements of the sawmill.

To assist in the clarification of presentation, only Case Study 1 will be considered in the main body of the text. Step One of the IMA is presented for each sphere in the following three chapters. Information for Step One of the IMA for the other case studies is presented in the appendices.

2.9 A Technical Description of the Case Study Operations

The Nithi Timber Cooperative Society is one of the 105 long-term sawmills in Kenya. In 1987, the Society's 10 Year Timber Licence amounted to 10% of the total annual licenced indigenous sawlog volume¹⁶. As previously noted the production of the two Tanzanian case study sawmills represented 86% of the total national production at the time of the field work (Moore and Hall, 1987). As such, the case studies served as a significant sample of the existing industry in each country. The basic technical characteristics of each enterprise are presented in Table 2.7. There are many other factors that, in combination with these technical aspects of an enterprise, more fully define it in its biological, social and economic context. A comprehensive introduction to these aspects of the case studies is presented in Appendix 2.

¹⁶ the estimated annual volume of indigenous sawlogs was 100,000 m³ (World Bank Kenya Forestry Subsector Review, 1987).

Table 2.7: Summary of Technical Characteristics of the Case Studies.

Name	Nithi Timber	Mingoyo Sawmill	African Blackwood
Location	E. Mt Kenya	S.E. Tanzania	S.E. Tanzania
Type	Band Saw ⁱ	Circular Saw ⁱⁱ	Circular Saw ⁱⁱ
Product	Sawnwood/Furniture ⁱ	Musical Instruments Billets/Sawnwood ⁱⁱ	Musical Instruments Billets ⁱⁱ
Log input per Year	5,000 to 10,000 m ³ ^{iv}	350 to 400 m ³ ⁱⁱ	550 to 600 m ³ ⁱⁱⁱ
Recovery Rate ¹⁷ from Delivered Logs	35% ^{iv}	4-7% ⁱⁱ	7-10% ⁱⁱ
Recovery Rate from Harvested Logs	30% ⁱ	1% ^v	1% ^v
Production Capacity (Sawnwood)	25 m ³ per shift ⁱ	0.45 m ³ per shift ⁱⁱ	5.5 m ³ per shift ⁱⁱ
Number of Employees	100 ^{iv}	20 (2 shifts/day) ⁱⁱⁱ	38 ⁱⁱⁱ
Forest Type ^{vi}	Montane Wet	Open Woodlands Dry	Open Woodlands Dry
Primary Species	<u>Ocotea usambarensis</u> ⁱ East African Camphor	<u>Dalbergia</u> <u>melanoxylon</u> ⁱⁱⁱ East African Blackwood	<u>Dalbergia</u> <u>melanoxylon</u> ⁱⁱⁱ East African Blackwood
Licence Area	17,900 ha ⁱ	unlimited access ⁱⁱ	unlimited access ⁱⁱ
Date of Start-up	1981 ⁱ	1985 ⁱⁱ	1985 ⁱⁱ
Type of Ownership	Co-operative ⁱ	Parastatal ⁱⁱ	Private ⁱⁱ
Market	Domestic ⁱ	Foreign ⁱⁱ	Foreign ⁱⁱ
Secondary Processing	furniture/pre-fab housing ⁱ	charcoal ⁱⁱⁱ	charcoal ⁱⁱⁱ
Average Log Dimensions	1.0m diameter, 2.5m length ^{iv}	0.3m diameter, 3.0m length ⁱⁱⁱ	0.4m diameter, 3.0m length ⁱⁱⁱ
Average Log Volume (m ³)	2 ^{iv}	0.21 ⁱⁱⁱ	0.37 ⁱⁱⁱ
Selling Price/m ³ Sawnwood - \$US (1986)	\$370 ^{iv}	\$13,500 ⁱⁱ	\$13,500 ⁱⁱ

Sources:

- i) Hemmingson, 1984.
- ii) Moore and Hall, 1987.
- iii) Hall, 1988a.
- iv) Hall, 1985.
- v) Hall, 1987-88; Author's estimates made during personal field observations. This figure refers to the volume of export grade billets recovered from estimated volume of logs harvested.
- vi) Wormald, 1984.
- vii) Greenway, 1973

¹⁷ the recovery rate is defined as the percent of timber produced from a given volume of logs (Williston, 1982).

2.10 Relevance of the Case Studies to the Hypothesis

The three case studies selected for this study exhibit many of the social, economic and ecological conditions which have been shown to hinder the successful implementation of traditional natural tropical forest management systems. For example, in Kenya, the administration of the Nithi Timber Cooperative Society Limited forest licence is lacking accountability because of internal failures in the government Forest Department (NTCS Commission Minutes, 1986-1987, *numerous references*; Hemmingson, 1984; World Bank, 1987b; Ministry of Cooperative Development, 1986). In Tanzania the policy of free access to public lands by any individual or entity is part of the national land use policy (Moore and Hall, 1987; Kewero, 1990). This policy essentially negates the implementation of strict natural tropical forest management by the Forest Department. The land area involved is an estimated 70% of the forested lands not under reserve status; approximately 22 million hectares (Kewero, 1990). Also, the three case studies provide examples of three different types of enterprise management and two types of natural tropical forest. As well, in the two Tanzanian case studies, the recovery rate from the felled logs (which was as low as 1%) indicates that the existing system is working against sustainable forest management principles.

As such, these case studies match the types of situations identified in Chapter 1 and provide a solid basis for evaluation of our hypothesis, namely that by focusing on the indigenous sawmill, methods which contribute to the sustainable development of the natural tropical forest system can be determined. The operating factors found in the case study areas highlight the central problem with respect to forest management in these areas: a lack of the successful implementation of measures which assist in the sustainable development of the system based on the exploitation of the natural tropical forest.

The remainder of this study is devoted to the application of the IMA to these case studies. In Chapter 1, it was stated that the three spheres which together describe the concept of sustainable development are interrelated. However, for the purpose of organized data collection and presentation, Step One of the IMA is applied separately to the Biological, the Social and the Economic spheres of each case study in Chapters 3, 4, and 5, respectively. These three chapters follow a similar pattern: each system is introduced and the criteria for data collection are developed. The information collected under these criteria is categorized under the following headings: the Technical Limit and the Benchmark Situation. The interventionist determines what must be the objective of negotiation from the information gathered for each criterion so that the

overall goals of the system can be met. This information is then listed under a third category, the Negotiation Aims, for each of the criterion listed. Therefore, in the following three chapters, the first step of the IMA, "the Collection of Information", is presented. This is followed by a chapter in which the remaining steps of the IMA are applied to the case studies and a chapter in which the IMA is evaluated and the conclusion of the study is drawn. There is also a postscript to this study that briefly describes events for each case study that have occurred since the conclusion of the study period.

2.11 A Note on the Accuracy and Reliability of the Methods Described

Decision-makers strive to obtain the most reliable and accurate information available before making a decision. There are, however, constraints on the gathering of information and on determining its reliability and accuracy. These constraints are a function of the amount of time and money which are available to the decision-maker at a given point in time.

The degree of accuracy and reliability of information is a matter of concern in the application of the IMA. However, its application is still valid and useful in cases where data are limited, but immediate action is considered necessary in order to effect a change in ongoing behaviour. In such cases it is accepted that it will be necessary to forge ahead with the best available information.

There are some features built into the IMA which strengthen the degree of reliability and also increase the amount of information made available. One way in which greater accuracy and reliability of information is encouraged is the negotiation process. Effective participation in the negotiation process requires that each stakeholder group bring the best information it can to the negotiation table in order to present its interests in the best and most convincing light. This encourages the input of the stakeholders, each of whom has expertise and a specialist's perspective in his own area of interest and responsibility. The negotiation process also encourages each stakeholder to investigate and be prepared with the most accurate and reliable information to enable it to argue effectively against other stakeholder groups as well. The IMA provides for ongoing monitoring of the enterprise with respect to the goals which were set through negotiation into the Stakeholder Action Plans. This allows for the fine tuning of the system as more information becomes available over time.

Chapter 3

The Biological Sphere

3.0 Introduction

In the description of Step One of the IMA in Chapter 2, it was recommended that the interventionist be guided in the collection of information through the use of groups of issues or management elements termed "criteria". The interventionist must develop the most comprehensive list of criteria that available resources permit. In this chapter, the process for the development of criteria for the Biological sphere is outlined, followed by the application of Step One of the IMA to the Biological sphere of the case studies.

Within the conceptual model of sustainable development represented by the intersection of the three spheres, each sphere has its own unique set of goals (Barbier, 1987). The generic goals ascribed to the Biological sphere are genetic diversity, ecological resilience and biological productivity. The goals for the Biological sphere are applicable to areas that are dedicated purely for the preservation of biological resources. However, in the conceptual model of sustainable development the three spheres are shown to be interrelated and to be interdependent. Therefore, to reflect this character of interdependence and interrelation in the spheres describing the concept of sustainable development and for the purpose of this study, the Biological sphere in Figure 1.3 is renamed the Forest Management sphere. For the application of the IMA undertaken in this study on the sawmill enterprise, the goal of the Forest Management sphere is for the perpetuation of the forest ecosystem that is the source of raw materials for the sawmill. The renaming of the Biological sphere is not intended to imply that the basic goals of the Biological sphere are to be replaced, but rather they remain as the standards against which the trade-offs necessary for sustainable development must be made. Attempts to meet this goal in the natural tropical forest have been made by forest managers.

In the past, various forest management systems have been developed and applied to the natural tropical forest resource. The principles upon which many of the tropical forest management systems have been based can be traced to the practices developed by European foresters over the last two and half centuries (Baur, 1964). These principles

were developed for application to the temperate forests but were taken by foresters trained in Europe and Great Britain to the tropical forests during the period of European colonial activity. Although the records of some silvicultural systems developed and implemented in the tropical forests have been lost (Palmer, 1987a), there is a substantial record of the forest management systems that have been developed and implemented operationally in the tropics (for example, Baur, 1964; FAO 1989a,b; Schmidt, 1991).

3.1 Forest Management Criteria

3.1.1 Problems with Conventional Models

A comprehensive outline of twenty-four silvicultural systems that have been applied to tropical forests has been compiled as a reference for this study from the available literature. A detailed table of these systems is presented in Appendix 3.1, Forest Management Systems for the Natural Tropical Forest. Most of these forest management systems were based on the judicious manipulation of the existing flora through a wide variety of management and silvicultural treatments including, for example, selective felling, the girdling of residuals, the provision of seed trees and climber cutting. The objective of these practices was to capitalize on the natural resilience of the forest ecosystem and to favour the biological productivity and character of certain tree species. Also these systems relied, in the main, on natural regeneration for the perpetuation of the forest ecosystem after exploitation. Nevertheless, there are examples where enrichment planting, using species indigenous to the forest being treated, were used to supplement the existing natural regeneration (eg., the Modified Malayan Uniform System - Peninsula Malaysia and the Arena Shelterwood System) (Baur, 1964). The forest management systems detailed in Appendix 3.1 are summarized in Table 3.1. From a review of the status of these systems as outlined in Appendix 3.1, it becomes evident that not all systems are still being currently applied, for a variety of reasons.

Table 3.1: A Summary of Management Systems for the Natural Tropical Forest.

	<u>Name of System</u>	<u>Date</u>	<u>Main Species or Forest Type</u>	<u>Comments</u>
1.	Malayan Uniform System (MUS) - Malaysia (lowland)	1948 - 1989	<u>Dipterocarp</u> spp.	Based on selected natural regeneration existing at time of felling, determined by pre-harvest regeneration surveys. - Considered to be a good method where forest types still exist.
2.	"Gutta Percha"- Peninsular Malaysia	1900 - 1910	<u>Palaquium gutta</u> <u>Balanocarpus heimi</u> (changal)	Plantations of <u>P. gutta</u> and Para rubber (<u>Hevea brasiliensis</u>) and Enrichment planting of <u>B. heimi</u> (Barnard, 1954).
3.	Departmental Improvement Fellings (DIF) - Peninsular Malaysia	1910 - 1922	Forest areas exploited <u>P. gutta</u> and <u>B. heimi</u>	This is an improvement operation.
4.	Commercial Regeneration Fellings - Peninsular Malaysia	1927 - 1947	Equatorial rainforest	Natural regeneration.
5.	Regeneration Improvement Felling (RIF) - Peninsular Malaysia	1927 - 1941	Lowland equatorial rainforest near major population	Natural regeneration.
6.	Modified Malayan Uniform System - (MUS) Peninsular Malaysia	1960 - 1988	Hill <u>Dipterocarp</u> , steep lowlands and upper slopes	Natural regeneration with enrichment planting. Tending of crop trees as indicated by n+1, n+2 and n+5 surveys (FAO, 1989b).
7.	Selective Management System (SMS) - Peninsular Malaysia	1970 - 1988	<u>Dipterocarp</u>	Minimum residual stocking of 32 stems per hectare with 50 cm minimum DBH for dipterocarps and 30-40 cm DBH for other commercial species (Thang, 1987) - little knowledge of likely future crops from areas treated with this system.
8.	Modified Malaysian Uniform System (MUS) - Sabah	1956 - 1983	<u>Dipterocarp</u>	Natural or enrichment where necessary - No increase in the rate of application expected. (FAO, 1989b).
9.	Overstory Removal - Sarawak	1974 - 1980	Mixed <u>Dipterocarp</u> Forest (MDF)	Natural - not considered a practical system (FAO, 1989b).
10.	Sarawak Modified Malayan Uniform System (MUS) - Sarawak	1974 - 1980	Mixed <u>Dipterocarp</u> Forest (MDF)	Natural regeneration and selected advanced regeneration - continued application expected (FAO, 1989b).
11.	Liberation Thinning - Sarawak	1974 - 1988	Mixed <u>Dipterocarp</u> Forest (MDF)	Natural advanced regeneration - results look more promising than Overstory Removal and Modified Malayan Uniform System (MUS) (FAO, 1989b) for MDF, however, it is too early to appraise the method in all aspects.
12.	Indonesian Selective System - Indonesia	1970 - 1984	Natural forest	Natural - not considered a successful system because residuals are not left after felling (Johnson and Dykstra, 1978).

13.	Selective Logging Management System - Philippines	1954 - 1989	<u>Dipterocarp</u>	Natural - future uncertain due to problems such as illegal cutting in second stage, non-implementation of the prescription, pulpwood requirements overtaking timber requirements resulting in early felling at 20 years.
14.	Selection System or Selection and Improvement - India	1900 - 1989	Evergreen and semi-evergreen moist + dry deciduous	Natural and enrichment - applied where possible, however, non-timber pressures on forest growing.
15.	Philippines-German Timber Stand Improvement - Philippines	1975 - 1981	<u>Dipterocarp</u>	Natural - the political situation in the country has left the future of this system in question.
16.	Tropical Shelterwood System (TSS) - Nigeria (and Ghana)	1944 - 1966	Natural forest (<u>Khaya</u> , <u>Guarea</u> , <u>Chlorophora</u>), (Baur, 1964)	Natural regeneration under a shelterwood - rate of harvest has been and continues to be so high that all valuable timber will have been harvested by 2000 (FAO, 1989b). Restoration of stands exploited without preharvest treatment is difficult.
17.	Amelioration des Peuplements Naturels (APN) - Côte d'Ivoire	1950 - 1960	Logged over forests <u>Tarrietia utilis</u>	Natural - In 1976 trials thinning non-commercial species have shown positive results on increasing the growth of valued medium sized stems better than the outcome of harvesting only which does not specifically favour the valued stems. An area of evergreen forest in Côte d'Ivoire has been established as an operational pilot programme (Maitre, 1987).
18.	Selection System - Ghana	1960 - 1991	Semi-humid tropical forest	Considerable felling damage to residual stand because of short cycles. Regeneration of less valuable shade tolerant species increased because of small canopy openings (Schmidt, 1991). Criticisms that the prescribed removals at 15 years exceeds the increment and cannot be sustained lead to a felling cycle of 40 years after logging all commercial species as recommended by Asabere (1987).
19.	Uniformisation par la Haute (Normalization) - Zaire (Belgian Congo)	1950 - 1960	Tropical moist forest	Treatment made no effort to encourage regeneration where it was not naturally occurring. Abandoned at independence - 1960.
20.	Uniform System - Uganda	1953 - 1970	Rainforest	Natural regeneration - continued application following the original general principles depending on the re-establishment of stability in the country (FAO, 1989a).
21.	Arena Shelterwood System (Arena Forest Reserve) - Trinidad	1927 - 1987	Disturbed regenerated seasonal evergreen forest	Natural, although various plantings of indigenous and exotic species were undertaken over the period of application (Palmer, 1987a). The potential of this system is not being met (Palmer, 1987a,b)
22.	Queensland Treatment Rules (1946) - Australia	1946 - 1954	Rainforest	Natural residuals and from residual seed trees.

23.	Queensland Treatment Rules (1954) - Australia	1954 - 1987	Rainforest	Natural residual, seed tree source, some enrichment planting (<i>Flindersia braylana</i>) (5,000 ha, Poore, 1989) - possible that society may change collective mind and logging may resume in future.
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The Selection System of India (#14), the Departmental Improvement Fellings of Peninsular Malaysia (#3), the Selective Logging Management System of the Philippines (#13) and the Selection System of Ghana (#18) and the Regeneration Improvement Felling (RIF) of Peninsular Malaysia (#5) have been assessed as failures. This assessment can be traced to the cessation of management control over the forest land base. This loss of control resulted in over cutting or the outright conversion of the forest land to agricultural uses. Other systems are no longer applied due mainly to a change in political conditions resulting in a lack of support over time to the forest management system. Examples include the Gutta-Percha system of Peninsular Malaysia (#2), the Modified Malayan Uniform System of Peninsular Malaysia (#6), the Philippines-German Timber Stand Improvement System of the Philippines (#15), the Uniformisation par la Haute (Normalization) of Zaire (#19), the Arena Shelterwood of Trinidad (#21) and the Queensland Treatment Rules of Australia (#22 & #23). Others have been discontinued because the ecological reaction and final outcome of the treatments were not definitive. These include the Selective Management System of Peninsular Malaysia, The Overstory Removal and Liberation Thinning of Sarawak (#9 & #11), the Indonesian Selective System of Indonesia (#12), the Tropical Shelterwood System of Nigeria and Ghana (#16) and the Amelioration des Peuplements Naturels (APN) of Côte d'Ivoire (#17). In summary, three reasons can be identified for the lack of success of the many tropical forest management systems, *viz*:

- 1) a lack of control over the land base that leads to over cutting or actual conversion of the land base to agricultural uses,
- 2) a change in political conditions resulting in a cessation of the support needed over time to fulfill the requirements of the prescribed forest management activities, and
- 3) the actual biological outcome of the treatment is not definite resulting in the abandonment of the system due to a loss of confidence in the worthiness of the expense.

Conversely, where these conditions *are* found in association with a forest management system, the system is found to be still actively applied. Schmidt (1991) and Palmer

(1987a,b) note that there are valuable lessons to be learned from an examination of past forest management experiences, whether they are deemed successful or not.

Accordingly, the present study can draw from the principles of past successful models the following characteristics:

- i) the tenure of the forest lands for the purpose of forestry was secure over time,
- ii) the silvicultural prescription was technically valid and was followed over time, and
- iii) the objectives of the original prescription remained valid over time (i.e., the silvicultural system was not applied in isolation from social and economic considerations).

These characteristics can be termed Tenure, Forest Management Practices and Silviculture Techniques, respectively. These provide a suitable series of "frames" under which the factors that define the detailed conditions required for the successful achievement of the goals of the Forest Management sphere under particular circumstances can be listed. The insight gained through the review of past practices provides the foundation for the development of a list of those conditions that are required to be met for the successful achievement of forest management objectives. These conditions, or *criteria*, can be discussed under the three frames (Tenure, Forest Management Practices and Silviculture Techniques) and be used by the interventionist as a guide in undertaking Step One of the IMA: the collection of information and the subsequent development of Negotiation Aims for the Forest Management sphere of the sawmill enterprise.

3.1.2 Selection of Key Criteria¹⁸

The criteria selected in this study were judged by the interventionist as those most relevant to the case studies. They were nominated following a review of the relevant literature, from the feasibility study of each enterprise, and as a result of discussions with the stakeholders of case study enterprise. The IMA is intended to be a dynamic process, and has been designed specifically to promote refinement of the criteria over time, through the conduct of successive round table meetings. However, the time available for conduct of this particular study was too limited, and other demands on the interventionist too great, to allow reassessment of the criteria in this case.

¹⁸ In the following descriptions, terms adopted as criteria will be italicised.

Although conservation of biodiversity diversity is a significant element within the concept of sustainable development, criteria for biodiversity conservation have not been explicitly identified within the suite of criteria established for the purposes of this study. However, elements of the issue are implicitly considered within the criteria listed for the Forest Management sphere, in two ways. The first, is through acknowledgment of the requirements for conservation that is inherent within other criteria particularly # 3 setting objectives, # 11 and # 12 intrinsic and extrinsic limitations to regeneration, #13 protection, # 14 working plans, # 20 sample plots, and # 26 Treatments to select species mix all require that consideration be given to conservation and biodiversity issues. The second means of consideration is through the interventionist himself; as the protagonist for sustainable development, the interventionist is charged with the responsibility of ensuring that the goals for all three spheres of the model of sustainable development are pursued within the framework of the IMA. Although this treatment of conservation issues was considered adequate for the case studies considered here, the explicit development of conservation criteria may be desirable in other applications of the IMA.

- a) Tenure: Tenure refers to the legal ownership status of the forest land. Land tenure arrangements can become complex, however, for the purpose of this study, the tenure of an area of land will be deemed as being either privately owned or publicly owned. Public lands may be either accessible without restriction or gazetted with access restricted by a government. *Tenure* arrangements are least secure on ungazetted public land, while lands owned privately would be expected to have a greater security of tenure (Romm, 1986). Under frontier conditions tenure designations are unclear and yet, the status of land tenure is perhaps the most crucial of all the criteria relating to forest management (Leslie, 1987b). An understanding, therefore, of the potential changes to the land tenure arrangement is an important factor in the planning of intervention in forest management activities and is listed as *threats to tenure*.
- b) Forest Management Activities: The success of forest management practices on a given area of forest depends on proper planning. Forest management planning - as with any sound planning operation - requires the *setting of objectives* within known parameters. The objectives of the intervention process within the application of the IMA have previously been stated. To intervene effectively, the objectives of the ongoing management system must be known.

The objective for natural forest management activities could include habitat protection, timber production or water quality and soil conservation. However,

forests are complex ecosystems and the achievement of objectives is unlikely without an extensive knowledge of the system. Therefore, as a guide for the interventionist an extensive list of criteria under the category of Forest Management activities is presented, most of which are standard components found in traditional forest management plans.

Yield control is the determination of the amount of timber that is to be removed from the forest area within a given period of time. One method of determining this amount is under sustained yield management where the objective is to manage the *forest area* so that a known quantity and quality of timber can be extracted over time on a sustained basis.

The concept of Annual Allowable Cut (AAC) is derived from this management concept. There are some problems associated with this technique (as outlined in Chapter 1), however, the information required to calculate the AAC provides the forest manager or the interventionist with a comprehensive description of the forest. For example, in determining the AAC the following information is required: the *area of the forest, the species composition, growth rates, quality distribution and relative prices*. These lend equally as criteria for the forest management category.

The forest manager must be able to predict with confidence the outcome of a given activity in the forest. Since forest management depends on the successful regeneration of known species in the forest area, limits to regeneration must be understood by the forest manager. Limits to regeneration are classified as either *intrinsic* or *extrinsic*. Intrinsic limits to regeneration refer to those aspects of the tree species itself that may limit its ability to regenerate, such as seed production or shade tolerance. Extrinsic limits to regeneration refer to environmental factors that affect regeneration, such as soils, water availability or fire. A knowledge of practices that can *protect* the forest from the undesirable effects of fire, wind, animals and disease on the forest is also necessary for the forest manager to avoid predisposing the forest to these problems.

Part of the overall management planning process is the development of short time frame plans known as *Working Plans*. These operational plans are developed to provide a framework for agreed schedules, lead times, and location of work and include a knowledge of *felling cycles* where the appropriate time is kept between entries in multiple entry selection felling or between rotations where single entry clear felling is planned. These plans are based on the areas within the forest

formally allocated to timber extraction usually referred to as *concessions*.

Appropriate and timely access to the forest area is required, therefore, the planning, the location and type of *roads*, or quality and scheduling of their construction, maintenance and removal is an important aspect of the planning activity. For example, a poorly drained or located road can lead to negative environmental consequences or inefficient access to the forest.

Forest management activities require the use of workers, machinery and in some cases draught animals. Suitable and safe accommodation and workshop *buildings* are therefore required at a convenient location to the workplace. It is important to plan these facilities in such a way as to minimize their associated negative environmental impacts, such as the discharge of pollutants, and reduce the chance of fire escaping to the forest.

The forest area must be delineated and *boundaries* established as early as possible for the gross forest area and for any reserves within the forest that are to be excluded from disturbance. Sample plots must also be established for the purposes of monitoring the forest for the effects of forest management activities as well as for gaining further knowledge of the undisturbed forest conditions to provide a comparative index for the disturbed areas. The sample plot information will also contribute to increasing the reliability of *predictions* regarding the outcome of various treatments of the forest area and the *costing* of potential treatments. *Annual records* are also an important source of information for the planning phase and for the *organization of silvicultural work*. It is therefore important to consult with past records and to maintain annual records of all aspects of the management process.

- c) Silviculture Techniques: There are a number of measures that can be undertaken by the forest manager to achieve certain desired results in the forest. These techniques fall under a number of general headings such as *regulation of shade and canopy openings, treatments to select species mix, woody climber cutting, poisoning, enrichment planting, selection cutting* and *seed tree provision*. These treatments may be combined as deemed necessary by the forest manager based on the knowledge of the forest ecosystem in question.

The criteria established for the purpose of this study have been drawn from a number of sources including Baskerville, 1988; Synnott, 1989; Synnott and Kemp, Unasylva Vol 28 #112-113; Burgess, 1989; Palmer, 1987; IUCN, 1991; Mok and Poore, 1991; Leslie, 1985; Arnold, 1985, 1989; FAO, 1989a,b; Gomez-Pompa et. al., 1991; Whitmore, 1991; and

Schmidt, 1991. A summary of the criteria for the Forest Management sphere is listed in Figure 3.1.

In the following section, the main highlights of the Forest Management sphere of the Nithi Timber Cooperative Limited case study forest is presented. This overview is based on the fully referenced tables found in Appendix 3.2. The Forest Management Sphere information for the forest area of the Mingoyo and African Blackwood Case Studies is outlined in Appendix 1, Section 1 and is based on the fully referenced tables in Appendix 3.3.

Figure 3.1: Forest Management Criteria Developed for Use in the Application of the IMA.

<u>Frame</u>		<u>Criteria</u>
Tenure	1.	Security of tenure
	2.	Threats to tenure
Forest Management Activities	3.	Setting objectives
	4.	Yield control (AAC)
	5.	Area of forest
	6.	Species composition
	7.	Age/size and volume distribution
	8.	Growth rates
	9.	Quality distribution
	10.	Relative prices
	11.	Intrinsic limitations to regeneration
	12.	Extrinsic limitations to regeneration
	13.	Protection
	14.	Working plans
	15.	Felling cycles
	16.	Concessions
	17.	Roads
	18.	Buildings
	19.	Boundaries
	20.	Sample plots
	21.	Prediction
Silviculture Techniques	22.	Costings
	23.	Annual records
	24.	Organisation of silvicultural work
	25.	Regulation of shade and canopy openings
	26.	Treatments to select species mix
	27.	Woody climber cutting
	28.	Poisoning
	29.	Enrichment planting
	30.	Selection cutting
	31.	Seed tree provision
		TABLE SUMMARY

3.1.3 Principles in Applying the IMA

The aim of Step One of the IMA is initially to describe the Technical Limit and the Benchmark Situation of the organization. The established criteria are used by the interventionist as a guide in the collection of this information that in turn forms the foundation for the development of the Negotiation Aims which is the primary outcome of this Step. In the previous chapter, three sawmill enterprises case studies were introduced. Two of these, Mingoyo Cooperative Sawmill and African Blackwood Enterprises, share similar forest resource conditions, are found in close proximity to one another and depend on the same forest area for their timber resources. For these enterprises therefore, the forest type that they share will be referred to as the mpingo forest type and its presentation will be applicable to both the Mingoyo Cooperative Sawmill and African Blackwood Enterprises case studies; differences, where they occur, will be noted. The information regarding the forest resource for Nithi Timber Cooperative Society Limited will be presented as the camphor forest type.

In the application of Step One of the IMA to the case studies, comprehensive tables listing the forest management criteria under the headings of Tenure, Forest Management Practices and Silviculture Techniques were produced as a reference. The tables are found in the Appendices to this chapter and provide details for the Technical Limit, the Benchmark Situation and the Negotiation Aims for the case study forest areas. The camphor Forest Management Criteria Listing in Appendix 3.2 describes the forest resource area for the Nithi Timber Cooperative Society Limited. The mpingo Forest Management Criteria Listing in Appendix 3.3 describes the forest resource area for the Mingoyo Sawmill Limited and African Blackwood Enterprises.

3.2 Application to the Case Studies

In the following sections, the criteria developed for use in the application of the IMA are employed in the collection and documentation of the Technical Limit and the Benchmark Situation of the forest management aspects of the forest areas utilized by the the Nithi Timber Cooperative Society Limited (Case Study 1).

3.2.1 Nithi Timber Cooperative Society Limited

- a) Technical Limit: In reviewing the information listed for each of the criteria for forest management for the Nithi Timber Cooperative Society Limited's forest area under the category of Technical Limit (Appendix 3.2), it appears that most of the criteria required to meet the stated forest management objectives are met. Tenure of the forest area was secured through a 10 Year Licence to Extract Timber subject to regulations on activities in the forest stipulated by the Forest Department. The licence area was within a gazetted forest area and the boundaries of that forest area had not changed since they were established in 1910 (Castro, 1988a,b). However, some local interest was reported in the conversion of some of the lower elevations of the gazetted forest area to agricultural uses (Mugambi, 1986). An operational forest inventory of the licence area had been conducted providing a sound basis upon which to plan forest management activities. Information on the location, quality and quantity of all species had been established for the licence area. An annual allowable cut had been set that was intended not to exceed the estimated growth rate of the forest. Information on the intrinsic and extrinsic limits to regeneration of the major species was available (Moreau, 1935; Abraham, 1957; Willan, 1957; Willan, 1961) as well as tested methods of protection against competition with regeneration from brambles (Willan, 1961). Within the forest licence agreement, there were provisions for the development of working plans where concessions, road and building locations and felling cycles were to be established. Further information on costings, on the organization of silviculture work and on predictions of treatment outcomes was available from research sample plots that had been established in a similar forest area (Wood, 1963).

The outcome of various silvicultural techniques on the mature camphor forest, such as the regulation of shade, treatments to select species mix, poisoning and enrichment planting, have been well documented. For example, successful regeneration has been shown to occur after complete canopy opening (Willan, 1961), however, although root suckers sprout repeatedly from root nodules of felled or standing trees, they wither under closed canopy conditions (MacDonald, 1956). Crown closure conditions could also be controlled through the application of herbicides (such as 245-T or 24-D) to competing vegetation or overstory trees (Abraham, 1958). Enrichment planting of seedlings and transplanted root suckers was found to be a feasible method of supplementing natural regeneration levels achieved from root suckers on-site (Abraham, 1958). Also, Willan (1961) established

that group tree selection felling and not single tree selection led to conditions favourable to natural forest regeneration.

- b) Benchmark Situation: A review of the Benchmark Situation criteria for forest management indicates that the case study forest management system, as it was found at the time of intervention, was not meeting the objectives stated for forest management. The tenure of the forest area under the forest licence was insecure. Amendments to the forest licence had been unilaterally made at the local level and access to the licence area by the case study enterprise as described in the licence agreement was not possible (NTCS min.18/85). Also the forest boundary was being relocated to a position 100 metres into the gazetted forest and the former forest area was converted to agricultural uses (World Bank, 1987b). Forest management activities were found to be inconsistent with proven practices. The stated forest management objectives of environmental protection and limited commercial timber extraction were not likely to be met through the management methods practised at the time of intervention. The restriction of access to the licence area and the reluctance of the Forest Department to honour the selection responsibilities outlined in the licence resulted in the volume of wood that was extracted being below the minimum volume stated in the licence. This volume was also less than the amount of wood required by the enterprise to remain above its break-even threshold of production. If the enterprise could not remain fiscally viable, then the objective of limited economic utilization of the forest for timber production was therefore also in jeopardy.

Felling practices enforced by the Forest Department were for single tree selection felling only, which is a practice known not to promote regeneration (Willan, 1961). Therefore, the second forest management objective of protecting the forest ecosystem was not being met because the combination of single tree removal resulting in no regeneration was a process that was degrading the forest. Of the twenty-three tree species of merchantable size listed in the forest inventory, eleven were permitted to be felled under the terms of the forest licence. In practice, however, of the available commercial species, only camphor and podo were selected for felling. Of these two species, camphor represented the greatest volume on the licence and the greatest volume selected for felling. Camphor is the more costly of the two species to fell, transport and process due to its large size, the irregular stems and the excessive amount of decay in the trees selected for felling by the Forest Department (NTCS, 1985-1987).

Extrinsic factors, such as browsing of the root suckers by elephants and bush-bucks, and small canopy gap size from single tree felling practices, were restricting camphor regeneration and yet no corrective action was being taken. Also, there was no collaborative production of working plans between the enterprise and the Forest Department to facilitate efficient road construction, maintenance and planning. There was also ineffective forest boundary patrols that resulted in uncontrolled extraction of camphor timber from the licence area and adjacent gazetted forest areas to such an extent that there was a glut of camphor timber in the market. Selling prices of camphor timber were lower than the per unit production costs of legitimate operators such as the case study enterprise. No silviculture techniques that are known to promote regeneration were undertaken on the licence area. The only silvicultural practice was single tree felling and this practice was leading to fewer mature trees and not promoting any regeneration (NTCS, 1985-87).

3.3 Rating the Criteria

Once the information for each of the criteria has been listed, a comparative assessment of the Technical Limit and Benchmark Situation is made by the interventionist in order to gain the perspective necessary for the development of the Negotiation Aims. Part of the assessment process that has been suggested in the outline of Step One of the IMA (Section 2.7.1) is the rating of the criteria. The method proposed for rating the criteria involves the assignment of a value of +1 for a criterion that is considered to be contributing to the achievement of the sphere goals and a value of -1 for a criterion that is found to be detracting from the achievement of the sphere goals.

A criterion rating was completed for the case study forests by using the information for the case study forest areas (Appendix 3.2 and Appendix 3.3). It is important to remember, however, that this rating system is not designed to assign a weighting to the criterion, but rather to give a general indication of the sphere conditions and indicate those criteria that do require attention. For example, security of tenure is flagged as a problem in the camphor Forest Management Criteria Rating Table, and is one of twenty-eight criteria so flagged. However, when the system is viewed as a whole, the implications of the status of the issues identified in this criteria can be seen to have a much greater immediate consequence to the attainment of the sphere goals than many of the other criteria.

It is important, therefore, that results of the rating method employed in this phase of the IMA are not taken out of context since different stakeholders may assign different weights to a given criterion. The weighting of the criteria will emerge through the Roundtable negotiations in Step Five of the IMA. In Table 3.2, the ratings for the camphor forest management (Nithi Timber Cooperative Society Limited) criteria are presented.

Table 3.2: Camphor Forest Management Criteria Ratings.

Frame		Criteria	Technical Limit	Benchmark Situation	Negotiation Aims
Tenure	1.	Security of tenure	+1	-1	*
	2.	Threats to tenure	+1	+1	*
Forest Management Activities	3.	Setting objectives	+1	-1	*
	4.	Yield control (AAC)	+1	-1	*
	5.	Area of forest	+1	+1	*
	6.	Species composition	+1	-1	*
	7.	Age/size and volume distribution	+1	-1	*
	8.	Growth rates	-1	-1	*
	9.	Quality distribution	+1	-1	*
	10.	Relative prices	+1	-1	*
	11.	Intrinsic limitations to regeneration	+1	-1	*
	12.	Extrinsic limitations to regeneration	+1	-1	*
	13.	Protection	+1	-1	*
	14.	Working plans	+1	-1	*
	15.	Felling cycles	+1	-1	*
	16.	Concessions	+1	-1	*
	17.	Roads	+1	-1	*
	18.	Buildings	+1	-1	*
	19.	Boundaries	+1	-1	*
	20.	Sample plots	+1	-1	*
	21.	Prediction	+1	-1	*
	22.	Costings	-1	-1	*
	23.	Annual records	+1	-1	*
	24.	Organisation of silvicultural work	-1	-1	*
Silviculture Techniques	25.	Regulation of shade and canopy openings	+1	-1	*
	26.	Treatments to select species mix	+1	-1	*
	27.	Woody climber cutting	n/a	n/a	
	28.	Poisoning	n/a	n/a	
	29.	Enrichment planting	+1	-1	*
	30.	Selection cutting	+1	-1	*
	31.	Seed tree provision	+1	-1	*
		TABLE SUMMARY	26 / +1	2 / +1	
			3 / -1	27 / -1	
			2 n/a	2 n/a	

The ratings of the criteria for the Technical Limit of the camphor forest resulted in, of a possible thirty-one, twenty-six +1 values, giving an overall indication that most of the criteria for meeting the goals of the sphere are met. The ratings of the criteria for the Benchmark Situation of the camphor forest as presented in Table 3.2 are twenty-seven -1 values, giving an indication that the system, as found at the time of intervention, was not able to meet the goals of the sphere.

A review of the information collected for the criteria for the Technical Limit and the Benchmark Situation is intended to provide the interventionist with the necessary perspective to support the development of the Negotiation Aims. The Negotiation Aims summarize the changes that are required to be made so that the operation under study can meet the goals of the sphere. The Negotiation Aims are also used by the interventionist in the Roundtable negotiations in Step Five of the IMA.

3.4 Development of the Negotiation Aims

- a) Principles: The IMA is designed such that required changes to the ongoing system under study are determined through Roundtable negotiations. A comparative assessment of the Technical Limit and the Benchmark Situation in the criteria rating exercise help to identify the activity levels within various criteria that require modification. The Negotiation Aims developed for the Forest Management sphere of for the forest area of each case study are presented in detail for each criteria in Appendices 3.2 and 3.3, under the heading Negotiation Aims. In Table 3.3, the camphor forest management Negotiation Aims are presented for each criterion that would be served through successful negotiation. The mpingo forest management Negotiation Aims are presented in Appendix 1 Section 1.

Table 3.3: Camphor Forest Management Negotiation Aims.

Frame		Criteria	Negotiation Aim
Tenure	1.	Security of tenure	For adherence to the terms and conditions of the Licence. All changes to be done in consultation with the Licencee and with respect to the existing tenure arrangements.
	2.	Threats to tenure	Not an issue which affects the enterprise at this time.
Forest Management Activities	3.	Setting objectives	Larger openings of perhaps 5 to 6 trees to allow light to penetrate canopy and to reduce crown closure, combined with some stand tending or enrichment planting (Parry, 1957; Willan, 1961; Halsworth, 1983, p.132). Preserve inherent bioeconomic productivity.
	4.	Yield control	Negotiate for compliance with existing Licence.
	5.	Area of forest	Retain Licence area.
	6.	Species composition	For compliance with the Licence.
	7.	Age/size and volume distribution	To balance selection process with selection from the mature age class as well as the over mature and decadent age classes.
	8.	Growth rates	For the establishment of growth and yield plots and for the updating and remeasurement of the permanent sample plots on Mt. Kilimanjaro.
	9.	Quality distribution	Negotiate for a more balanced distribution between volumes of low quality and better quality logs based on recovery rates and production costs at the sawmill and actual market prices.
	10.	Relative prices	Selling price must reflect costs plus profit. For better control of access to the gazetted forests to reduce the competition in the market place from illegally produced timber.
	11.	Intrinsic limitations to regeneration	Larger openings and with tending and protection and enrichment where required to ensure regeneration of camphor and successful replacement of camphor into the canopy.
	12.	Extrinsic limitations to regeneration	Creation of larger gaps, tending of regeneration and enrichment planting where necessary.
	13.	Protection	n/a
	14.	Working plans	For compliance with the terms and conditions of the 10 Year Licence.
	15.	Felling cycles	For larger gaps to encourage the regeneration of camphor.
	16.	Concessions	For compliance with Forest Department regulations on forest use in all areas to reduce uncontrolled harvest.
	17.	Roads	For strict road closure during rains, compensation for maintenance costs as per licence and early notification of approval of road location to permit road construction in dry periods one rainy season before logging to allow for hardening of the road surface.

	18.	Buildings	For employee accommodation facilities and for timber storage sheds.
	19.	Boundaries	For the terms and conditions of the Licence to be enforced.
	20.	Sample plots	For the establishment of permanent sample plots to monitor regeneration, crown response to openings and growth rates.
	21.	Prediction	For adherence to the terms and conditions of the Licence and for larger openings and monitoring for potential enrichment planting/tending to ensure the redevelopment of the forest over time.
	22.	Costings	To determine costs for various forest management options.
	23.	Annual records	To have records for felling, log production, log marking (for royalty billing) log transport, log delivery to mill, log input into mill, daily production, daily sales.
	24.	Organisation of silviculture work	For compliance with the Licence by the which would encourage the natural regeneration of the forest.
Silviculture Techniques	25.	Regulation of shade and canopy openings	For logging and transport activities to facilitate any silvicultural work planned by the Forest Department.
	26.	Treatments to select species	For group selection felling combined with monitoring of opening and subsequent tending.
	27.	Woody climber cutting	n/a
	28.	Poisoning	n/a
	29.	Enrichment planting	For preharvest assessment of root sucker numbers and vigor to determine if selection felling choices could be modified to favour areas with greater potential for regeneration.
	30.	Selection cutting	For group selection felling with directional felling to create natural barriers from tops to dissuade elephant traffic.
	31.	Seed tree provision	For investigations into local seed production and conditions which could enhance natural regeneration from seedlings.

b) Nithi Timber Cooperative Society Limited

The key elements of the negotiation strategy can be summarized from the information in Table 3.3 listed for the Tenure, Forest Management and Silviculture Techniques Frames. The fundamental issue under the heading of Tenure is that of the need for the adherence to the Terms and Conditions of the Licence Agreement. This is required to provide the basis to overcome many of the difficulties in meeting the goals of the Forest Management sphere such as the determining of yield control, developing working plans, identifying concession and road locations and maintaining boundaries. In the Forest Management Frame, there are issues that, in the short-term, do not restrict the successful operation of the sawmill enterprise. These issues, however, must be resolved in order that, in the long-run, the enterprise operations contribute to a strategy aimed at sustainable development. For example, the implementation of group selection felling is suggested in order to provide the conditions that are considered necessary for regeneration of camphor, thereby ensuring the continued supply of camphor timber, as well as protecting the character of the forest over the long-term. Other issues identified are the need for research into the growth and yield of the forest and into the costings of forest management activities and the establishment of record-keeping systems to facilitate better forest management planning.

A number of silviculture techniques were also identified as having the potential to aid in the meeting of the goals for the Forest Management sphere. The pre-harvest assessment of root sucker locations, vigour and comparative concentrations is suggested as a means of helping to choose group selection areas where regeneration would be more plentiful. Directional felling of trees is another technique suggested to create natural barriers around openings created by group selection felling as a means of restricting access to the openings by browsing animals. Also, the means for the identification of potential seed trees and the conditions required for successful germination of seeds is suggested.

* * *

In this chapter, a summary of the problems of conventional methods of forest management were reviewed. From that discussion, three frames of the enterprise were suggested to provide an alternative framework to assess forest management activities for the case studies and to provide a guide for the interventionist in the application of Step One of the IMA. These frames were chosen to mirror the goals that have been

identified for the Biological sphere in the model of sustainable development (Figure 1.2). Information for each criterion was obtained from the field and subsequently each criteria was rated. This information was used to develop Negotiation Aims for each criterion for use by the interventionist in later steps of the IMA. In the next chapter, Step One of the IMA is applied to the Social sphere of the model of sustainable development. The Social sphere for each case study will be assessed in a manner similar to that taken for the Biological sphere in this chapter.

Chapter 4

The Social Sphere

4.0 Introduction

Within the conceptual model of sustainable development shown in Figure 1.2, represented by the intersection of the three spheres, each sphere has its own unique set of goals (Barbier, 1987). This chapter deals with the Social sphere. The generic goals ascribed to the Social sphere are for the support of cultural diversity, social justice and participation, institutional stability and to enhance equity.

In the description of Step One of the IMA in Chapter 2, it was recommended that the interventionist be guided in the collection of information through the use of groups of issues or management elements termed "criteria". The interventionist must develop the most comprehensive list of criteria that available resources permit. In this chapter, the process for the development of criteria for the Social sphere is outlined, followed by the application of Step One of the IMA to the Social sphere of the case studies.

In the conceptual model of sustainable development the goals of the three spheres are shown to be interrelated and to be interdependent. It is essential that this character of interrelation and interdependence of the three spheres be reflected in the application of the IMA on the sawmill enterprise. For the purpose of this study, the Social sphere is renamed the Social Welfare sphere. The goal of this sphere is the optimization of the social benefits from an existing forest-based economic system that, for the purpose of this study, is the local sawmill enterprise. The basic goals of the Social sphere, as outlined by Barbier (1987), remain as the standards against which the trade-offs necessary for sustainable development must be made.

In order to achieve this goal of perpetuating the social benefits derived from the indigenous sawmill enterprise in balance with the goals of the other two spheres, it is necessary to incorporate the concept of sustainable development into the management strategies of indigenous forest-based enterprises. This is the purpose of applying the IMA to the case study enterprises. To accomplish this task, the interventionist must apply the IMA to gain the necessary level of understanding of those *aspects* of a given enterprise that influence the level of social benefits derived from the economic activity.

For the purpose of this study, five aspects have been selected that provide a direct link between the case study enterprise system and the goals of the Social sphere. These aspects are 1) institutions, 2) business management, 3) market mechanisms, 4) benefit distribution and 5) indirect benefits/costs. These five aspects of the enterprise provide a framework for the classification of criteria that are selected to guide the interventionist both in the collection of information and in the development of Negotiations Aims for the Social sphere of the case study enterprises.

In this chapter, conventional models used to determine costs and benefits of economic activity are described and evaluated. The problems evident with these conventional methods when they are applied within the context of the concept of sustainable development are discussed. Using the lessons learned from this review of the conventional models, a set of criteria that more fully describes the social aspects of the case study enterprises is developed to provide guidance to the interventionist during application of Step One of the IMA (the collection of information for the Technical Limit and for the Benchmark Situation for each of the case study enterprises). As in the previous chapter, Negotiation Aims are developed for each criterion by the interventionist through a comparison of the data collected for each Benchmark Situation and Technical Limit. The information presented in this chapter has been summarized from the fully referenced data presented in Appendices 4.1, 4.2 and 4.3.

4.1 Social Welfare Criteria

4.1.1 Review of Conventional Models

Conventional models used to assess the costs and benefits of economic activity can be broadly classified into two categories, those of financial or economic analyses. The scope and limitations of each of these methodologies have been comprehensively reviewed elsewhere (e.g. Laarman and Contreras, 1991; Walker, 1990; Price, 1989; Barbier, 1987; Leslie, 1975, 1977, and 1987a,b; Stroup and Baden, 1983; Sinden and Worrell, 1979; Samuelson, 1976); in general, the scope of financial analysis is too limited to be a useful guide to the interventionist in evaluation of the Social sphere. However, the application of the broader economic analysis is limited by the assumptions it demands and the judgments required in the light of these (Barbier, 1987; Palmer, 1987a,b; Stroup and Baden, 1983; Sinden and Worrell, 1979; Samuelson, 1976). Although judgment is dependent on the perception of the individual, conventional models of economic theory assume that it can be universally valid (Leslie, 1987a,b;

Stroup and Baden, 1983; Gittinger, 1982; Sinden and Worrell, 1979; Samuelson, 1976). This fundamental weakness in conventional economic theory restricts its use as a guide or tool for the purpose of this study, where the interventionist's objective is to introduce the concept of sustainable development into an existing system of economic activity. Within our concept of sustainable development, the evaluation of the Social sphere requires a *qualitative* assessment of the economic activity in question (Barbier, 1987) - the principal difficulty of conventional methods (Laarman and Contreras, 1991; Walker, 1990; Price, 1989; Barbier, 1987; Leslie, 1975, 1977, and 1987a,b; Samuelson, 1976).

The IMA has been developed to provide a mechanism to facilitate judgments between a variety of value suites. This is achieved through an iterative process that facilitates the equitable introduction of values and a framework for their integration into existing economic activity. In the case of the Social sphere, the criteria described below were identified as those of most relevance to this study; the list of criteria is itself a matter of judgment, and therefore not definitive.

4.1.2 Selection of Key Criteria¹⁹

Criteria were developed for this sphere to assist the interventionist in accomplishing Step One of the IMA. For the Social sphere, twenty-four criteria were developed for the six aspects: institutions, people management, market mechanisms, benefit distribution, indirect benefits, and indirect costs. The development of these criteria was based on the needs indicated by the Social sphere goals outlined in Figure 1.2 using sources such as Repetto and Gillis, 1988; Laarman and Contreras, 1991; Hough, 1988; Arnold, 1985a; Daniels, 1987; Brooks and Grant, 1992; Romm, 1986; Sargent, 1989; Gunn, 1991; Gittinger, 1982; Weiner and Brown, 1986; Low, 1988; Roberts and King, 1989; Williston, 1981; FAO, 1973; Mok and Poore, 1991; and others as noted in the following section.

¹⁹ In this section, terms adopted as criteria are italicized.

a) Institutions:

An institution is a significant organizational structure in a society or culture. Institutions are managed to achieve certain objectives. Institutions may be complex, having multiple layers of bureaucracy and specialized departments such as those required for a national government. An institution may also be manifest in a more basic arrangement such as an established employees' association having a simple organizational structure, designed to serve a specific purpose in a certain context. The degree to which the goals of the Social sphere can be met by an enterprise is determined, in part, by the influence on the enterprise of various institutions that exist within and outside of the enterprise (Repetto and Gillis, 1988; Laarman and Contreras, 1991). Criteria must be developed that guide the interventionist in identifying the various institutions that affect the enterprise and the influence those institutions exert on the activities within that enterprise.

Government officials play a variety of roles with respect to an enterprise and it is important for the interventionist to identify the relevant offices and to understand how the people occupying positions in those offices interpret their role with respect to the enterprise (Arnold, 1985a; Repetto and Gillis, 1988; Sargent, 1989). For publicly owned enterprises it is important to remain publicly accountable and maintain *independent auditing* of the enterprise (Hough, 1988). Where an enterprise utilizes a public resource it is important to know how *public participation* in the management activities of the enterprise is facilitated (Arnold, 1985a; Daniels, 1987; Brooks and Grant, 1992). Two common institutional arrangements used to facilitate the relationship between the management of an enterprise and its employees are *associations*, such as an employers' association or an employees' trade union. For the internal management of an enterprise, *documented policies and procedures* are basic elements that provide the foundation for the employee-employer relationship (Romm, 1986; Sargent, 1989; Gunn, 1991).

b) People Management

The success of any enterprise is based on how effective the individuals involved directly and indirectly with the organization are managed (Freeman and Portney, 1989). Wise managers develop *clear management goals* and ensure that they are made well known (Weiner and Brown, 1986; Low, 1988). There must be established *lines of reporting* so that all employees understand the relationship that each employee's position has within the organization (Williston, 1981; FAO, 1973; Mok and Poore, 1991).

The *accountability of the managers* of an enterprise is also an important consideration in the efficient operation of an enterprise (Laarman and Contreras, 1991; Gunn, 1991). Although managers spend considerable time ensuring that others within the organization are accountable, they themselves must ensure that they, too, are answerable for their decisions and actions as leaders of the enterprise (Gunn, 1991).

Both the *generation of employment* opportunities (Arnold, 1985a) and the creation of conditions whereby the *job satisfaction* of the employees is improved (Williston, 1981) are aspects of an enterprise that, when properly managed, lead to better employee relations and ultimately to better productivity within the enterprise (Morita, 1992; Low, 1988).

c) Market Mechanisms

Three criteria that describe market related aspects affecting the stability of the enterprise as an institution are the *pricing system*, *the purchasing contracts*, and *the supply contracts*. (Gittinger, 1982; Repetto and Gillis, 1989). It is important for the interventionist to understand what method is used by the enterprise in setting its product prices and to identify any conditions that may be influencing the price structure (Kumar, 1986). To further enhance the stability of the enterprise, the management should endeavor to establish contracted relationships for both its supply of goods, such as raw materials and maintenance supplies, and for the sale of its products (FAO, 1975). One aspect of the market that is beyond the control of the enterprise management is the *stability of currency*. Changes in the value of currency must be closely monitored to minimize potential adverse affects on the enterprise (FAO, 1981).

d) Benefit Distribution

It is not possible within the confines of this study to identify all the benefits that are created by a given enterprise. For the purpose of this study, the criteria selected for this aspect of the Social sphere will be the *distribution of the profits* of the enterprise among three groups, the *shareholders*, the *employees* and the *community*.

e) Indirect Benefits

Positive effects that are evident outside the immediate enterprise system itself can be found at the *local*, *national*, and *international* levels. It is important for the interventionist to identify the indirect benefits of the enterprise system at each level and monitor the

real or potential effects at each level that come about through changes in the enterprise (Roberts and King, 1989).

f) Indirect Costs

The interventionist must identify the negative effects of the ongoing enterprise system that impact at the *local*, *national*, and *international* levels to be prepared for possible pressures from external stakeholders (Cleland, 1986).

g) Summary of Selected Criteria

In Figure 4.1, the criteria selected for the Social sphere are listed. In the following section, highlights of the information collected during the application of Step One of the IMA to the case studies are presented.

Figure 4.1: Social Welfare Criteria Developed for Use in the Application of the IMA.

<u>Aspect</u>		<u>Criteria</u>
Institutions	1.	Government officials
	2.	Independent auditing
	3.	Public participation
	4.	Associations
	5.	Trade unions
	6.	Documented policies & procedures
People Management	7.	Clear management goals
	8.	Lines of reporting
	9.	Accountability of management
	10.	Employment generation
	11.	Job satisfaction
Market Mechanisms	12.	Pricing system
	13.	Purchasing contracts
	14.	Supply contracts
	15.	Stability of currency
Benefit Distribution	16.	Shareholders' share of profits
	17.	Employees' share of profits
	18.	Community's share of profits
Indirect Benefits	19.	Local
	20.	National
	21.	International
Indirect Costs	22.	Local
	23.	National
	24.	International

4.2 Application to the Case Studies

In this section, the selected criteria are used to guide the interventionist in the collection and documentation of the Technical Limit and of the Benchmark Situation for the various aspects of the Social Welfare sphere of the case study enterprises. The information presented in this section in summary format is based on the fully referenced Appendices 4.1, 4.2 and 4.3.

4.2.1 Nithi Timber Cooperative Society Limited

a) Technical Limit

In reviewing the information listed for each of the criteria for social welfare for the Nithi Timber Cooperative Society Limited under the category of Technical Limit (Appendix 4.1), it appears that most of the criteria required to meet the stated objectives of the

Social Welfare sphere are met. Those government officials that interact with the enterprise are identified and the respective roles and responsibilities of those officers are described (NTCS/min75/1). The administrative regulations for the enterprise were enshrined in national law and require that an independent audit of the enterprise be published each year (Githingi, 1985). The public were to be able to participate in the affairs of the enterprise directly by becoming shareholders in the cooperative or indirectly through the democratic system of national government (Githingi, 1985). There was an association representing employers in enterprises similar in nature to this one and the employees were members of a national trade union (Njage, 1985). The policies and procedures for the enterprise were to be developed, modified and published by a Board of Directors that was to meet at least on a quarterly basis (Oy, 1975).

The management of the people involved with the enterprise was planned and there were clear management goals described for this enterprise (Oy, 1975). Lines of reporting were established in an organization chart and the management of the Society was accountable to the membership of the Society through the presentation of an annual report at the Annual General Meeting and to the national government through the acts and regulations governing cooperative enterprises (Oy, 1975).

There were plans for the continued generation of direct employment through development of sales outlets and value-added processing at the enterprise. Employee job satisfaction was considered via the planned establishment of employee training, job descriptions and formal lines of reporting (Oy, 1975).

There were plans to arrange for contracts for the purchasing of necessary goods and services for the enterprise and for the supply of timber to customers that required steady supplies of significant volumes over time (Oy, 1975; Hemmingson, 1985). The assumption in planning was that free market conditions would exist and that any changes in the value of the local currency would be based on *international agreements* (Oy, 1975).

The financial profits from the enterprise were expected to be distributed to shareholders in the form of dividends by the company (Githingi, 1985). The employees were not included in any direct profit sharing plan (Njage, 1985). The local community was to benefit indirectly from the enterprise through the multiplier effect. The community-at-large was to benefit through taxation of the enterprise and the supply of an indigenous primary resource (Oy, 1975).

The indirect benefits that were noted at the local level included a secure, direct employment opportunity for local people as well as anticipated indirect local employment servicing the enterprise and the employees. At the national level, the indirect benefits were expected to result from having timber supplied locally, thereby avoiding the importation of timber and the expenditure of foreign exchange (Oy, 1975). Also, the planned conversion of the over-mature forest resource to a regenerating area that could be exploited again in the future was considered to be a positive objective for the nation (Oy, 1975). As a cooperative, the operations of the enterprise were subject to the rules and regulations of government directives, therefore internationally accepted standards of forest utilization and employee rights could be imposed on the enterprise (Oy, 1975; Githingi, 1985).

Some negative externalities were identified in the planning stage. At the local level, the traditional forest users would have their access to the forest restricted (Oy, 1975). There would also be an increase in heavy vehicular traffic in the rural access roads. Nationally, the planned level of activity in the forest would radically alter a significant portion of the total forested land base of the country from an undisturbed ecosystem to a young regenerating forest area (Mwangi, 1985). The proposed level of forest harvesting ignored non-timber forest values such as tourism, wildlife, traditional local uses and genetic resources (Oy, 1975). From an international perspective, this narrow focus on forest values would precipitate negative externalities in association with the activities of the enterprise.

b) Benchmark Situation

A review of the Benchmark Situation criteria for the social welfare system indicates that the case study enterprise, as it was found at the time of intervention, was not effectively meeting the objectives stated for the Social Welfare sphere. Those responsibilities that were understood to rest with the government officials had been left unfulfilled. This resulted in the neglect of a number of planned activities such as the Annual General Meeting and the annual independent audit of the enterprise. In this manner there was no organized participation by the members of the Society and the general public into the affairs of the enterprise (NTCS/PM/July/85; NTCS/min 31/85, 38/85, 48/85, 51/85).

The enterprise was not a member of the Kenya Woodworker Employers' Association. All non-management employees of the enterprise were members of the Kenya

Woodworkers' Union; however, there had been no union agreement in place for over one year. No negotiations between the union and the management had been attempted since the agreement lapsed (NTCS/PM/July/85). Specific regulations developed by the trade union and various government ministries were applied to certain aspects of the operation, however, no comprehensive policies and procedures manual had been prepared for the various operations of the enterprise (NTCS/PM/July/85).

Management goals for the enterprise were not defined (Hemmingson, 1985). A further indication of the low level of expertise at the managerial level was the absence of formal lines of reporting (NTCS/PM/August/85). The management personnel demonstrated a lack of accountability to both the shareholders, in the absence of any formal reporting initiatives to them, and to the employees, in the lack of formal job descriptions and the absence of a union agreement (NTCS/min 44/85). The management had generated some new employment through the establishment of a number of on-site value-added activities that required both skilled and non-skilled labour (NTCS/PM/July/85).

The selling prices for the products of the enterprise were found to have been set by the appointed Commission and these prices did not reflect the costs incurred in producing the goods (NTCS/PM/August/85). The management had also entered into a contract to supply a volume of timber on an annual basis. However, the contracted volume of timber exceeded the enterprise's production capacity and the selling price was lower than the production cost (NTCS/min 24/85). No contracts had been made with respect to the supply of regular services and supplies required by the enterprise (NTCS/PM/July/85). All purchases made by the management required approval from the local official of the Ministry of Cooperative Development. This process delayed the immediate purchase of urgently required supplies and led to a reduction in productivity (Njage, 1985).

The value of the local currency was not stable (Kimbui, 1985). In comparison to the foreign currencies the Kenyan Shilling had shown a steady decline (50%) over the period since the initial feasibility study had been conducted and this trend was forecast to continue in the future (Kimbui, 1985). The planned, equal distribution of financial benefits to each shareholder was not possible for two reasons. First, the share register was found to be incomplete as not all shares and shareholders were registered and second, the enterprise had not generated any profits in its time of operation (Njage, 1985).

Despite the clear evidence that this enterprise was not meeting many of the goals of the Social Welfare sphere, there were some indirect benefits resulting from this operation. The enterprise had maintained over eighty local people in full time employment for five years as well as employing up to twenty casual labourers (NTCS/PM/August/85). There were a number of small scale industries based on the sawmill by-products and also some small furniture enterprises that utilized lower grades of timber for the local market (Chevangi, 1985). At the national level, the timber that was produced at the mill supplied value-added enterprises in all the major centres of the nation. At the international level, the enterprise did not violate any international standards (Chevangi, 1985).

There were also negative externalities associated with this case study. At the local level, this enterprise was termed by some people as being a "political football" and it was the focus of much local pessimism (NTCS/min 31/85). At the national level, the ban on the export of timber from Kenya, combined with the low demand in the domestic market, contributed to the increase in the debt load of the enterprise. Also, the harvesting pattern permitted by the local forestry officer did not result in vigorous regeneration of timber species (NTCS/PM/July/Aug./85). At the international level, the negative externalities were apparent: non-timber values of the Licence area were not considered in the decision-making processes that ultimately affected the forest ecosystem utilized by the enterprise (Mbinde, 1985).

4.3 Rating the Criteria

Once the information for each criterion has been listed, a comparative assessment of the Technical limit and the Benchmark Situation can be made by the interventionist. Through such a comparison, the perspective necessary to develop the Negotiation Aims can be developed. In Table 4.1, the criteria for the Social Welfare sphere for the Nithi Timber Case Study are rated using the method described for Step One of the IMA (Section 2.7.1). Those criteria that are considered to be factors contributing in the achievement of the sphere goals are rated as +1. Those criteria that are considered to be factors detracting from the achievement of the sphere goals are rated as -1. These ratings are to be used as a guide only for the initial phase of the IMA. The weighting of these criteria will emerge through the Roundtable negotiations in Step Five of the IMA. The criteria for the Social Welfare sphere for Case Study 2 and 3 are presented in Appendix 1, Section 2.

Table 4.1: Nithi Timber Cooperative Society Limited Social Welfare Criteria Ratings.

<u>Aspect</u>		<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aims</u>
Institutions	1.	Government officials	+1	-1	*
	2.	Independent auditing	+1	-1	*
	3.	Public participation	+1	-1	*
	4.	Associations	+1	-1	*
	5.	Trade unions	+1	-1	*
	6.	Documented policies & procedures	+1	-1	*
Business Management	7.	Clear management goals	+1	-1	*
	8.	Lines of reporting	+1	-1	*
	9.	Accountability of management	+1	-1	*
	10.	Employment generation	+1	-1	*
	11.	Job satisfaction	+1	-1	*
Market Mechanisms	12.	Pricing system	+1	-1	*
	13.	Purchasing contracts	+1	-1	*
	14.	Supply contracts	+1	-1	*
	15.	Stability of currency	+1	-1	*
Benefit Distribution	16.	Shareholders' share of profits	+1	-1	*
	17.	Employees' share of profits	+1	-1	*
	18.	Community's share of profits	-1	-1	*
Indirect Benefits	19.	Local	+1	-1	*
	20.	National	+1	-1	*
	21.	International	+1	-1	*
Indirect Costs	22.	Local	-1	-1	*
	23.	National	-1	-1	*
	24.	International	-1	-1	*
TABLE SUMMARY			20/+1	0/+1	
			4/-1	24/-1	

For the Social Welfare sphere, twenty-four criteria were developed to assist the interventionist in accomplishing Step One of the IMA. The ratings of the Technical Limit criteria for the Nithi Timber Cooperative Society Limited (Table 4.1) resulted in a total of twenty +1 values and four -1 values. Accordingly, most of the criteria for meeting the goals of the sphere appear to be met in the planning stage. The ratings of the criteria for the Benchmark Situation resulted in all twenty-four criteria having a -1 value, giving an indication that this case study enterprise was not meeting the goals of the Social Welfare sphere at the time of intervention.

The review and assessment of the data collected for each criteria under the Technical Limit and the Benchmark Situation are intended to provide the interventionist with the necessary perspective to develop and support the Negotiation Aims. The Negotiation Aims constitute the focus for changes deemed necessary to meet the Social Welfare sphere goals. Negotiation Aims are used by the interventionist during the Roundtable negotiations in Step Five of the IMA.

4.4 Development of the Negotiation Aims

a) Principles

The IMA is designed such that required changes to the ongoing system under study are determined through Roundtable negotiations. The comparative assessment of the Technical Limit and the Benchmark Situation in the criteria rating exercise helps to identify the activity areas within various criteria that require modification. The Negotiation Aims developed for the Social Welfare sphere of each case study are presented in detail for each criterion in Appendices 4.1, 4.2 and 4.3 under the heading Negotiation Aims. A summary of the Negotiation Aims developed for the Nithi Timber Cooperative Limited case study enterprise is presented in Table 4.2. The Negotiation Aims developed for Case Study 2 and 3 are presented in Appendix 1, Section 2.

Table 4.2: Nithi Timber Cooperative Society Limited Social Welfare Negotiation Aims.

<u>Aspect</u>		<u>Criteria</u>	<u>Negotiation Aim</u>
Institutions	1.	Government officials	For the full, accountable participation of the relevant government officials in carrying out their duties which affect the affairs of the enterprise.
	2.	Independent auditing	For the immediate audit of the accounts for the two previous years. For an assessment of the management activities in order to suggest a means by which the auditing of the accounts would be done on a regular basis.
	3.	Public participation	For the undertaking of regular and well planned Annual General Meetings.
	4.	Associations	For the Society to assess the costs and benefits of membership in the Kenya Timber and Woodworks Employer's Association (KTWEA)
	5.	Trade unions	For the Society to investigate the cost and benefits of membership in the KTWEA with regard to their role in conducting negotiations with the employees' union on behalf of the Society.

	6.	Documented policies and procedures	For the development and documentation of policies and procedures designed specifically for the successful operation of the enterprise which incorporated the regulations of the employees' union, the Ministry of Cooperative Development and the Forest Department.
Business Management	7.	Clear goals	For the establishment of a set of management goals that include solicited input from employees, members, government officials and NGOs.
	8.	Lines of reporting	For the establishment of clear lines of reporting and the documentation of an organization chart, job descriptions and procedures for the conduct of internal reporting and discipline in consultation with the employees' union.
	9.	Accountability of management	For an Annual General Meeting.
	10.	Employment generation	For the expansion of the value-added activities for the creation of more employment opportunities and for consideration to carrying out the planned establishment of a sales and value-added facility in Nairobi.
	11.	Job satisfaction	For the establishment of clear job descriptions, lines of reporting, operations procedures, employee appeal procedures (in-house), means for employee contribution to enterprise management, employee training, increments based on merit and experience, a bonus system and employee career paths.
Market Mechanisms	12.	Pricing system	For an investigation into the reasons why the timber was priced below production costs.
	13.	Purchasing contracts	For an assessment of the timber tendering procedure to determine what action the Society should undertake to supply the tender in a cost effective manner.
	14.	Supply contracts	For the establishment of a floating fund to be used on the authority of the Project Manager for the purchasing of essential or emergency spares and services. The PM's decisions would be cleared at the next meeting of the management commission.
	15.	Stability of currency	For an assessment of the expected needs of the Society which would require foreign exchange, in order to determine the most cost effective strategy for their purchase.
Benefit Distribution	16.	Shareholders' share of profits	For a report to the shareholders on the status of the enterprise.
	17.	Employees' share of profits	For an incentive scheme whereby the employees receive some predetermined and agreed upon portion of the profits generated by the Society's operation.
	18.	Community's share of profits	For the development of a scheme whereby the local community could directly benefit with a share from the profits of the enterprise such as discounts for school and hospital furniture.
Indirect Benefits	19.	Local	For the vigorous expansion of the value-added sector of the enterprise such as preservative treatment of those species which unless treated are not readily marketed and for the furniture and prefabricated housing manufacture.
	20.	National	For a forest management method which would use the harvesting activities to predispose the logged area to regenerate into a vigorous crop for future harvesting.

	21.	International	For the assessment of the implications of the Forest Department's strategy for individual tree felling on the sustainability of the forest resource and an assessment of the Society's record in carrying out the instructions of the Forest Department.
Indirect Costs	22.	Local	For the assessment of the operation in order to identify the roadblocks to its success and possible solutions which would be agreeable to those having influence over the activities of the enterprise.
	23.	National	For the restriction of uncontrolled exploitation of the forest resource in Kenya in order that the planned and licenced operations could operate in a fair market environment and thereby benefit the nation.
	24.	International	For a harvesting regime which encourages the regeneration of the original forest ecosystem.

b) Nithi Timber Cooperative Society Limited

The rating of information gathered for the Technical Limit and the Benchmark Situation for this case study indicates that, while the enterprise was based on good planning, in practice it was failing to meet all of the criteria. The elements of the Negotiation Aims for this case study are summarized in Table 4.2. The Negotiation Aims listed for each criterion can be summarized under the aspect headings for this sphere.

The institutions associated with the Nithi Timber Cooperative Society Limited enterprise all required strengthening. It was essential that the relevant government officials undertook their responsibilities in a full and accountable manner. The enterprise management was also to have improved its accountability through the immediate initiation of a complete financial audit of the enterprise and to arrange for an Annual General Meeting for the membership without delay. To improve employee-employer relations, the management also was to investigate the costs and benefits to the enterprise of membership in the Kenya Timber and Woodworkers Employers' Association (KTWEA) and to initiate negotiations with the employees' union representatives.

There was found to be a need for management to develop and publish the following guidelines for the enterprise: clear management goals, an organization chart with job descriptions, procedures for employee-employer relations, employee training, salary review guidelines and a bonus system linked to productivity. These guidelines would formalize the management and employee relations and provide for better internal accountability throughout the enterprise.

The market mechanisms in place at the time of intervention required immediate rationalization. The pricing system was based on arbitrary decisions and prices were lower than production costs. Also, to improve efficiency, it was necessary for the management to negotiate long-term contracts for both the sale of timber and for the supply of scheduled maintenance and replacement parts.

As a Cooperative Society with over 16,000 members, this enterprise had the potential to distribute benefits among the local citizens through share dividends. It could have also increased employee benefits through a production based bonus system for its employees. More demonstrative benefits for the local community could also have been arranged through discounting the timber prices for schools and hospitals. Through the expansion of the value-added sector of the enterprise greater levels of employment would be achieved at this rural enterprise.

The nation would have enjoyed positive effects over time if a forest management regime had been initiated to ensure that the forest regenerated into a resource that could be harvested again in the future. Positive international externalities (such as maintenance of biodiversity) would have resulted from the Society's ability and reputation to harvest according to international standards, thus the enterprise would have enjoyed the support of the international community.

There was a need identified for an assessment of the effects of the enterprise on the traditional users of the forest resources to identify possible means to reduce any local negative externalities caused by the operations. At the national level, the harvesting techniques imposed by the Forest Department were not promoting a vigorous re-growth of the existing ecosystem which over time would result in a degradation of the national forest heritage. To avoid negative externalities at the international level there was a need to practice a harvesting regime that protected the character of the current ecosystem over time.

* * *

In this chapter, a summary of the problems of conventional models of social valuation were presented. From that discussion, five social aspects of the enterprise were suggested to provide an alternative framework for assessing social values and a guide for the interventionist in the application of Step One of the IMA. These aspects were chosen to mirror the goals that have been identified for the Social Welfare sphere in the model of sustainable development (Figure 1.2). Information for each criterion was obtained from the field and subsequently each criterion was rated. This information

was used to develop Negotiation Aims for each criterion for use by the interventionist in later steps of the IMA. In the next chapter, Step One of the IMA is applied to the Economic sphere from the model of sustainable development. The Economic sphere for each case study is assessed in a similar manner as the Biological and Social Welfare spheres. The Economic sphere is the third and last sphere in the model of sustainable development to be presented in this study.

Chapter 5

The Economic Sphere

5.0 Introduction

In the description of Step One of the IMA in Chapter 2, it was recommended that the interventionist be guided in the collection of information through the use of groups of issues or management elements termed "criteria". The interventionist must develop the most comprehensive list of criteria that available resources permit. In this chapter, the process for the development of criteria for the Economic Sphere is outlined, followed by the application of Step One of the IMA to the Economic sphere of the case studies.

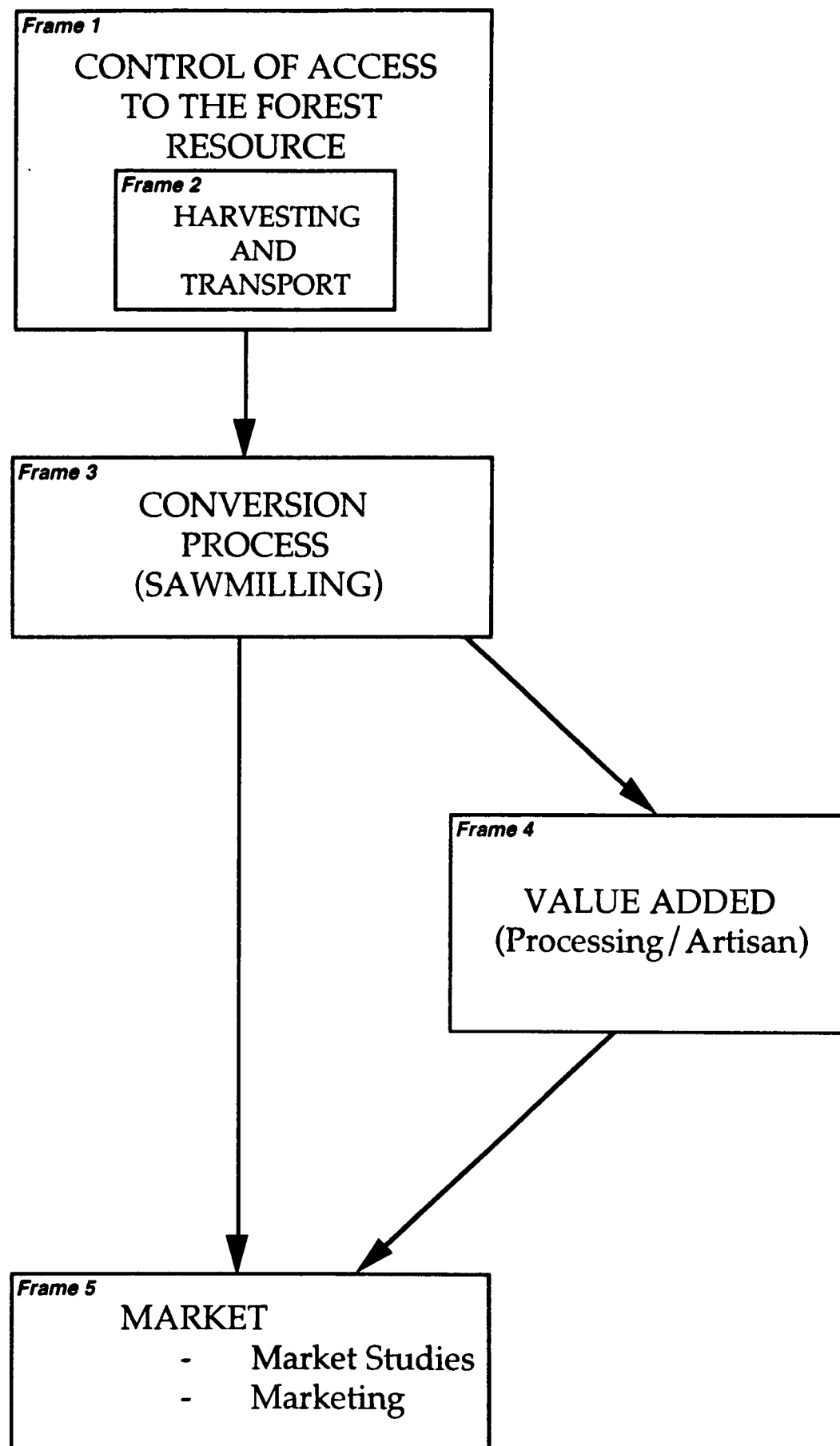
Within the conceptual model of Sustainable Development, represented by the intersection of the three spheres, each sphere has its own unique set of goals (Barbier, 1987). The generic goals ascribed to the Economic sphere are to increase the satisfaction of basic needs, to maximize financial returns and to supply goods and services. The goals for the Economic sphere are applicable to activities that are dedicated to the supply of goods and services.

However, in the conceptual model of sustainable development the goals of the three spheres are shown to be interrelated and to be interdependent. Therefore, to reflect this character of interdependence and interrelation between the spheres that describe the concept of Sustainable Development and to facilitate the application of the IMA to the sawmill enterprise, the goal of the Economic sphere is to perpetuate the economic benefits that are the outputs of the sawmill enterprise. The basic goals of the Economic sphere, as outlined by Barbier (1987), remain as the standards against which the trade-offs necessary for sustainable development must be made.

In order to achieve this goal of perpetuating the economic benefits derived from the indigenous sawmill enterprise in balance with the goals of the other two spheres, it is necessary to incorporate the concept of Sustainable Development into the management strategies of indigenous forest-based enterprises. This is the purpose of applying the IMA to the case study enterprises. A central hypothesis of this study is that to accomplish this task, the interventionist must apply the IMA in order to achieve the necessary level of understanding of those activities that constitute the enterprise. For the general case, the constituent activities of an enterprise can be classified according to

three basic levels: 1) the procurement of a supply of raw materials, 2) the processing of the raw materials into a product, and 3) the sale of that product (FAO, 1986). These three levels of economic activity are expanded for the purpose of this study, so that they are presented in a format that is more relevant to the enterprises used as case studies. In Figure 5.1, a frame model is presented that outlines five steps, identified for the purpose of this study, in the process of industrial timber production.

Figure 5.1: A Frame Model of the Process of Industrial Timber Production.



Frames 1 and 2 of the model represent level 1: the procurement of raw materials. The case study enterprises are dependent on publicly owned forest resources for their timber supply. These enterprises all harvest and transport logs to their mills. Frames 3 and 4 represent level two; the processing of the raw materials into goods. The case study enterprises process logs into either dimensional timber, as represented by Frame 3, or into finished products as depicted by Frame 4. Frame 5 depicts both market

studies²⁰ and marketing²¹. This frame represents the selling of the product, which is the third level of the enterprise's economic activity. The five frames presented in Figure 5.1 provide an outline for the development of criteria to guide the interventionist in information collection and developing Negotiation Aims required for Step One of the IMA, as applied to the indigenous forest-based enterprise.

In the following sections, the criteria for Step One of the IMA are developed using the five frames as process levels for data presentation. The criteria will be applied to the three case study enterprises and the data collected to describe the Technical Limit, the Benchmark Situation and the Negotiation Aims for the Economic sphere will be presented for this, the third and final sphere of the Conceptual Model of Sustainable Development. The chapter following will outline the application of the remaining steps of the IMA to the case studies.

5.1 Sawmilling Management Criteria

Management of a sawmilling enterprise, like any other, requires an understanding of financial and economic analysis. In the following section conventional models that are used to guide the management of enterprises are reviewed to provide the foundation for the development of the criteria for the Economic sphere.

5.1.1 Problems with Conventional Models

In the past, economic activity has been studied to better enable managers to forecast the outcome of various management options to achieve the goals ascribed to the Economic sphere. The *Financial Analysis Method* is one method used to evaluate the outcome of possible management decisions on an enterprise or an individual (Sinden and Worrell, 1979). Financial analysis is characterized by its reliance on *market prices*²². The common measure of account is the real income change of the entity that is being

²⁰ see Market Studies in Section 6.1.2.

²¹ see Marketing in Section 6.1.2.

²² In a market economy people express their comparative valuations of things by the amount of money they are willing to spend on them. Through observation of the market, some indication of the value of certain things can be gained. As exchange activities are undertaken over a long period of time there is a tendency for recognizable prices to develop for various things. These prices are known as *market prices* or *financial prices*. For the purpose of this study the term *market price* will be used and is defined as a price at which a good or service is actually exchanged for another good or service (as an in kind payment) or for money (Gittinger, 1982).

analysed. Real income change is usually valued at domestic market prices and expressed in local currency terminology (Gittinger, 1982). Financial analysis is used to guide management decisions that affect the achievement of the Economic sphere goals for the individual or for an enterprise. The use of market prices, however, limits the applicability of the financial method of analysis to the enterprise or individual, and does not directly account for related social or environmental issues, including externalities.

Despite its limitations, the principles of financial analysis are important in the development of criteria used in the application of the IMA by the interventionist. The interventionist must gain as full an understanding of the economic activity as is permitted by available resources. The development of criteria for the Economic sphere can be attained through an examination of the basic information required to conduct a financial analysis. In the next section the criteria developed under each of the economic activity levels of Figure 5.1 are described. In Chapter 7, the integration and optimization of the goals of the three spheres will be addressed through the facilitated negotiations in Step Four of the IMA.

5.1.2 Selection of Key Criteria²³

a) Control of Access

A fundamental prerequisite to any economic activity is the knowledge of what raw materials are available and under what circumstances these raw materials are available over time. For forest-based enterprises, such as the case study enterprises presented in this study, where the forest is not owned by the entrepreneur, access to the resource can be a function of the will of its owners - be they public officials or private landowners. A knowledge of the control over the access to the forest resources is an important element of a financial analysis (Arnold, 1985a). On one hand, access may be restricted to such an extent that the resulting level of raw material supply would be insufficient to support the planned level of activity of the enterprise. Where production levels fall, the maintenance of a market position for the enterprise could become difficult. Conversely, unrestricted access to the raw materials by all suppliers may have an equally negative effect on a given enterprise as competitors increase the supply of similar goods on the market and prices drop below a profitable price. In both cases the goals of the Economic sphere would not be reached for that particular enterprise. Therefore, information on *access to the resource* is vital in planning intervention in the economic

²³ In the following descriptions, terms adopted as criteria are italicized.

activities of an enterprise that is dependent on a forest resource not under the direct control of that enterprise (Arnold, 1985a; Romm, 1986).

b) Harvest and Transport

For many sawmill enterprises the harvest and transport of logs for the sawmill production process is treated as a separate economic activity conducted by third parties (eg., sub-contractors). However, the enterprises presented as case studies in this study harvest and transport their own supply of raw materials. Determining suitable quantities of raw materials that are available to the processing unit over time is a fundamental issue in the planning any economic activity (Williston, 1981) and in this case, the *total available volume* (i.e., Target Log²⁴ component of a forest area) is the criterion chosen for assessing the economic activity of the sawmill (Williston, 1981). Once the potential availability of raw materials is determined, the *logging equipment* necessary to harvest, handle and transport the appropriate volume of logs under prevailing local conditions must be resolved (Oy, 1975). Because the level of efficiency of the harvest and transport of logs is a relevant in-house issue for the case study enterprises, the *cost per cubic metre of logs delivered to the sawmill* is an important criterion (FAO, 1975).

c) The Sawmill

In this study the sawmill enterprises were established operations. The sawmill has been suggested as the appropriate focus of the application of the IMA where enterprises are operating under frontier conditions. The sawmill must therefore be carefully assessed by the interventionist as a prerequisite to the fulfilling of the objectives of the IMA. The *ownership pattern of the enterprise* and thereby the identity of the key decision-makers of the enterprise must be determined (Page, 1984). A full description and understanding of the *physical plant* (i.e., the components of the mill itself) is also required of the interventionist (Williston, 1981). The *availability of capital* to the enterprise is an important characteristic that provides some indication of the track record of the enterprise as seen by the financial experts and of the potential limit to change of the current operation (Arnold, 1985a). The *return on net assets*, or price-earning ratio, is a key measure of the health of the investment channelled into the enterprise (Little, 1986; Gittinger, 1982). The *rated mill log input* indicates the expected upper limit on the log input capacity of the sawmill and, when assessed, provides an indication of the

²⁴ For the purposes of this study, the term "Target Log" refers to that component of the forest inventory that meets the specified log dimensions for a given timber conversion process.

performance level of the sawmill as well as an estimate of the potential productivity of the sawmill (Williston, 1981).

There are a number of criteria that provide an overall sense of the performance of the existing processing facility that are adapted for the purpose of this study from Williston (1981). The volume of *sawn wood production (by species) per shift* provides a basic measure of the output of the mill. The *annual sales volume* expressed as cubic metres per year by *species of sawn wood and shorts*²⁵ indicates how well production is matched to market demand. Timber production by volume is an essential criterion that provides a comparative measure of *production costs* (Fisher, 1989).

Measuring the overall efficiency of a sawmill operation can be achieved through a measure of a number of functions. The volume of timber output produced by the mill from a given volume of log input is termed the *Timber Recovery Rate* and is a measure common to the sawmill industry (Williston, 1981). Given similar conditions, a band saw would be expected to have a higher rate of recovery than a circular saw. The timber recovery rate is also influenced by log dimensions, log quality and the desired output of the sawmill. These measures of processing efficiency must be assessed in context of the suite of *production methods* practiced at the mill site including, for example, *quality control* and *material handling*. Also, a comparison of *operating time available* to actual time operating provides another measure of operating efficiency. The *production efficiency* (or the volume produced per employee per year) and the *overhead and depreciation per cubic metre* are also measures that indicate efficiency levels (Williston, 1981; FAO, 1981; FAO, 1986).

d) Value-Added

For this study, the process level termed value-added will refer to those activities undertaken to increase the market value of a given piece of "raw" timber produced by the sawmill.

Williston (1981) describes these activities as those that include such basic operations as proper *seasoning, grading* and *end trimming*. *Correct storage* and subsequent *seasoning* of freshly sawn wood are critical factors that affect the market value of a piece of timber. Improper attention to these activities usually results in degrade such as warping, cupping, blue staining, and insect infestation, and thus a significantly lower price. *Grading* timber to recognized standards contributes two important functions of the mill:

²⁵ Sawn timber having a length between 1 metre and 2 metres (Williston, 1981).

1) the sales department can charge the appropriate prices for each group of products and 2) timber grading can provide valuable feedback to the manager and aid in determining the most profitable manner of milling logs (Williston, 1981).

Cutting to order is also a means of adding value to the end-product, however there are increased costs associated with this strategy (Williston, 1981). The reduced efficiency of the mill must be fully factored into the selling price, as well as the extra cost burden associated with marketing the low grade timber that is the by-product of cutting to order. *Resawing and edging, planing, shaping and molding wood, and treatment with preservatives* are all basic value-added activities that are frequently located at the sawmill site (FAO, 1975; Williston, 1981).

e) Market Studies

Entrepreneurs initiate market studies to identify the character of a given market in order to determine the potential opportunity for selling a given product in that market (FAO, 1975). Market studies are an important component of financial planning for an enterprise (Fisseha, 1985). A number of criteria are identified for the purpose of this study that allow for the assessment of market study activities at a given enterprise. The *extent of market survey* (national or international) and a *description of the products to be investigated*, identify the boundaries of the market study. The *identification of competitors*, both existing and potential, and the *national economic advantage over competition* of the enterprise further refines the relationship of the enterprise with the market place (Grut, 1988). Finally, the suitability of the enterprise *vis-à-vis* its *built-in cost structure as a limiting factor* and the actual *market prices* help to assess the probability of successful entry into the market place with a given product by an enterprise (Laarman and Contreras, 1991).

f) Marketing

Marketing practices are commonly understood to be the means by which the enterprise undertakes the sale of its products although marketing may extend to market studies as discussed above. In general, there are two sales strategies (FAO, 1975). In one, the enterprise deals directly with the end-users. This is termed *direct sales and shipment* and is considered the normal sales method for those enterprises producing a specialized product. The second method, termed *indirect sales and shipment*, is usually chosen by those enterprises producing a product that can be used in a versatile manner by many end-users. The enterprise sells to an distribution network rather than to an end-user.

An important facet of an enterprise's marketing strategy in a competitive market place is its *customer relations practices and pricing* (Repetto and Gillis, 1988). The level of attention to customer relations and pricing structure can influence the market position of an enterprise and the *degree of customer loyalty over time* (FAO, 1975). Increasing customer loyalty through flexible pricing structures and appropriate service reduces the costs of selling the product.

Summary of the Selected Criteria

In Figure 5.2, a summary of the above criteria for the Economic sphere is given.

Figure 5.2: Generic sawmill management criteria developed for use in the application of the IMA.

Process level		Criteria
Control of access	1.	Degree of Access to Resource
Harvest + Transport	2.	Total available volume (i.e., Target Log component)
	3.	Logging Equipment
	4.	Cost of logs delivered to the sawmill per m ³
The Sawmill	5.	Ownership of the enterprise
	6.	Physical Plant
	7.	Availability of capital
	8.	Return on net assets/Price-earnings ratio
	9.	Mill log input capacity (e.g. m ³ /shift m ³ /year)
	10.	Sawn wood production m ³ /shift, by species
	11.	Sales m ³ /year by species sawn wood, shorts
	12.	Production cost: currency units/m ³
	13.	Timber recovery rate: log input/sawn wood output
	14.	Production methods: quality control, handling
	15.	Operating times available
	16.	Production Efficiency: e.g. m ³ /employee/yr.
	17.	Overhead, Depreciation/m ³
Value Added	18.	Seasoning (drying)
	19.	Grading
	20.	End trimming
	21.	Cutting to order
	22.	Resawing/Edger
	23.	Planing, shaping, molding
	24.	Treatment with preservatives
	25.	Final product production
Market Studies	26.	Extent of market survey: national - international
	27.	Description of end-products to be researched
	28.	Identification of competitors: existing potential
	29.	National economic advantage over competitors
	30.	Built-in costs structure as a limiting factor
	31.	Prices
Marketing	32.	Direct sales and shipment: specialization
	33.	Indirect sales and shipments: diversification
	34.	Customer relations practices and pricing practices
	35.	Market position, degree of customer loyalty/time

In the following section, highlights of the information collected during Step One of the IMA for the Economic sphere are presented for each of the case study enterprises. This represents a summary review of the full suite of criteria and is based on the fully referenced Appendices 5.1, 5.2 and 5.3.

5.1.3 Principles in Applying the IMA

In the application of Step One of the IMA, the established criteria are used by the interventionist as a guide in the collection of information relevant to each of the case study enterprises. This information forms the basis for the development of the Negotiation Aims which is the primary outcome of Step One of the IMA.

A comprehensive table listing the economic criteria under the headings Control of Access, Harvest & Transport, the Sawmill, Value-Added, and Market Studies & Marketing is produced in Appendix 5.1 (Nithi Timber Cooperative Society Limited Sawmilling Criteria Listing), Appendix 5.2 (Mingoyo Cooperative Sawmilling Criteria Listing), and Appendix 5.3 (African Blackwood Enterprises Sawmilling Criteria Listing).

5.2 Application to the Case Studies

5.2.1 Nithi Timber Cooperative Society Limited

a) Technical Limit

Control of access to the forest resource is the responsibility of the Kenyan Forest Department and is administered through the Nithi Timber Cooperative Society's ten year licence to extract timber. The total available merchantable volume exceeded 2.3 million cubic metres (Republic of Kenya, 1984).

The principles and expectations for operation of the Nithi Timber Cooperative Society's sawmill project were established through an initial feasibility study (Oy, 1975). In the feasibility study, adequate equipment, training and supervision of personnel to efficiently transport the required volume of logs was planned for at a known cost (Oy, 1975).

The enterprise was organized as a limited company owned and operated by a Cooperative Society under the Cooperative Society's Act of Kenya (1963). The physical plant was based on four band saws all having power feed mechanisms. The availability of capital was limited to share revenues and loans from the Cooperative Bank of Kenya (Kimbui, 1985). The expected rate of return on the investment was 20% over the 10 year period of the timber licence (Oy, 1975). The rated log input capacity was 25m³ of logs per eight hour shift at an expected recovery rate of 45% (Oy, 1975) and the production of sawn wood was in excess of 5,000 cubic metres per year. The planned output of timber was expected to be readily absorbed by the domestic market alone (Oy, 1975). Market studies had been undertaken both at the national and international level and although an international market was identified, all production was expected to be absorbed by the national market (Oy, 1975).

Production efficiency was to be maintained in the sawmill by using the "mill run" method of sawing, followed by end trimming, grading, and seasoning by air drying. The shift period planned was 48 hours in 5.5 days/ week for 277 days per year. The expected production efficiency was set at 45 cubic metres per employee per year (Oy, 1975). The factory equipment was to be written off over 10 years and the logging equipment over 5 years (Oy, 1975). A review of the Technical Limit for value-added processing indicates that some basic value-added practices were provided. Seasoning, grading and end trimming were part of the activities planned. The sawmill equipment and its layout provided for flexible processing. Cutting to order and resawing were definite management options. Planing, shaping, moulding, and the treatment of timber with preservatives were not in the immediate plans. The single final product planned other than sawn timber was charcoal from mill waste and non-commercial species (Oy, 1975).

The feasibility study included suggestions to investigate market products other than dimension timber, such as kiln dried, treated or semi-processed timber products and charcoal. Actual and potential competitors were not identified, although the market was described as having a much greater demand than supply. The built-in costs were calculated based on the assumption of full production and sales, and prices were set at 25% over production costs (Oy, 1975).

There was no national economic advantage enjoyed by this enterprise in the international market since it did not export, except that for the national market there were protective taxes on imported timber (Oy, 1975). The marketing strategy for the enterprise concentrated on direct sales with some long-term plans for a separate

distribution yard in the future. As demand was expected to exceed supply, market share was not considered an overly important concern. Customer relations and pricing practices were to be determined by upper management as required by market conditions (Oy, 1975).

b) Benchmark Situation

A review of the criteria for the benchmark situation for this enterprise indicated that the management system, as it was found at the time of intervention, was not meeting the planned objectives of the feasibility study (i.e., the Technical Limit, in our study terms).

The degree of access to the resource was controlled unilaterally by the local Kenya Forest Department officials without formal amendment to the existing licence (NTCSmin18/85, 7/86). Access to the forest was also limited by weather conditions. Rainfall during two extended rainy seasons rendered the forest roads impassable for up to 24 weeks per year leaving only 28 weeks per year available for log transport (NTCS/PM/July85).

The total available volume of target logs had been identified through a formal forest inventory (Republic of Kenya, 1967, 1984) within the licence area. At the time of intervention the enterprise had been in operation for over four years and had not yet harvested an annual volume equal to the minimum annual volume allowed under the licence (NTCS/PM/July85). The log harvesting and log transport equipment was under capacity for existing conditions. For example, the maximum capacity of the log winch was less than the average log load of this operation and the average load on the log transport equipment exceeded the load rating of the equipment. There was no road maintenance equipment or road maintenance program in place, which led to road conditions that regularly increased the degree of load stress to the log transport equipment that traveled over the roads to the point of gross failure (Hemmingson, 1985; NTCS/PM/July85). All forest equipment was in a state of serious disrepair (Hemmingson, 1985; NTCS/PM/July85). The cost of log delivery was, on average, twice the planned amount (NTCS/PM/June85). Factors contributing to the excessive log delivery costs included the unplanned access to the forest during the rains on poorly maintained roads.

The enterprise is owned by a Cooperative Society. The planned management system of the enterprise, through an elected committee, failed (NTCS/min14/83). A government-

imposed solution of a commission of appointed local authorities also failed to provide effective management of the sawmill. There had been no annual membership meeting for more than two years (NTCS/PM/July85). The physical plant that was built was significantly superior in capacity and design to that planned (i.e., there was a mismatch between capital expenditure and production efficiency). The production capacity of the mill was significantly reduced due to poor maintenance and repair of the machinery (NTCS/PM/July85). The enterprise had almost doubled its debt through the extension of an overdraft facility and the continual non-payment of the principal.

The rated mill log input capacity was met only during planned and closely supervised test run periods. The average output of the mill ranged from 34% to 84% of rated minimum capacity (NTCS/PM/July85). The sale of mill output was limited to top grade material and as a result over 1000m³ of unsold and improperly stored timber was found on-site at the time of intervention (NTCS/PM/July85). Average production costs were higher than forecast, even though the production capability of the enterprise was as good or better than the level originally projected. The average recovery rate for camphor was the same as projected (45%) and the recovery rate for podo was found to be higher (60%) at the time of intervention (Hemmingson, 1985).

Production methods were found to be contrary to planned and stated policy. Cutting to order and resawing to produce only prime grade timber was found to be the normal operations at the mill at the time of intervention (NTCS/PM/June85). Any other timber grade that was produced was abandoned. The planned work year was 250 days. Down-time for such reasons as employee "bank days", and employee union actions, and a lack of preventive maintenance reduced the number of available working days by two days per month or approximately one percent (NTCS/PM/June85).

The efficiency of the sawmill was found to be less than half the value projected in the feasibility study, even for the year with the highest production volume recorded (NTCS Production Records 1981-1984). An assessment of the depreciation of the sawmill equipment found that the wear on the physical plant was about 50% less than expected. This was because the mill had been run at about 50% capacity since it began operations. The logging equipment, however, was found in a condition that was almost irreparable. It was determined that this was because this equipment was not adequately engineered for the site conditions (NTCS/PM/July85).

For the Benchmark Situation each of the criteria listed under the *Value-added* process level was found to be inferior to the planned activities, with the exception of the

resawing/edger criterion. The resaw roller bed set-up at the mill offered flexibility in milling options that reduced bottlenecks and improved efficiency. However, no proper storage, drying or grading practices were implemented (NTCS/PM/July85). The end-trimmer was used to trim every defect from every board rather than being used to only square the ends of mill run boards. This produced significant volumes of low grade timber and shorts. The sawmill output was geared to customer specified dimensions including a pre-set thickness that was found to be 10% greater than industry standards for nominal thickness boards. Planing, shaping and thinning services were offered at the enterprise, however the pricing of these services was not based on actual costs (NTCS/PM/Sept85). There were no wood preservative treatment facilities at the plant and none were planned (Oy, 1975; NTCS/PM/ Aug85). The final product produced at the mill did not include charcoal as had been planned, rather furniture and prefabricated housing was produced. The pricing of these products did not again reflect actual production costs (NTCS/PM/July85).

The market conditions identified in the original market study did not pertain to the enterprise at the time of intervention (Hemmingson, 1985; NTCS/PM/June85). There was very low demand for camphor timber in the domestic market and the formal proactive market studies planned for finished products had not been undertaken (NTCS/PM/ Aug85). The competition in the market place to supply camphor timber was extreme and market prices were below the production costs of the enterprise (NTCS/PM/ Aug85). The planned advantage of an efficient mill and formal tenure over a licenced volume of wood for the mill was thus a burden rather than an advantage. Under the conditions prevailing at the time of intervention there was unrestricted access to the forest for timber extraction by unlicensed operators (Mbinde, 1985; Chevangi, 1985).

The sales method planned for the enterprise was direct marketing (Oy, 1975). However, there was a contractual arrangement between the enterprise and an exclusive agent at the time of intervention (NTCS/PM/ Aug85). The enterprise had not undertaken any initiatives to develop a distribution network (Njage, 1985). Customer relations practices were unsatisfactory and employees were unaccountable for sales procedures (NTCS/PM/June85). Selling prices did not reflect production costs and customer relations were not aimed at benefiting the enterprise (NTCS/PM/July85; Cooperative Bank of Kenya Report, Jan. 1985).

5.3 Rating the Criteria

According to the IMA model (Chapter 2), the information for each of the criteria of the Economic sphere was listed and a comparative assessment of the Technical Limit and the Benchmark Situation made. In this way the interventionist can gain the perspective necessary for the development of the Negotiation Aims. Part of the assessment process that has been suggested in the outline of Step One of the IMA (Section 2.7.1) is the rating of the criteria. The method proposed for rating the criteria involves the assignment of a value of +1 for a criterion that is considered to be contributing to the achievement of the sphere goals and a value of -1 for a criterion that is found to be detracting from the achievement of the sphere goals. Using the information for the case study sawmill enterprises (detailed in Appendices 5.1, 5.2 and 5.3), a criterion rating was completed for each case study enterprise.

As indicated for the previous two spheres, this rating system is not designed to assign a weighting to the criteria, but rather to give a general indication of the sphere conditions and indicate those criteria that require attention in the negotiation phase. It is important therefore that results of the rating method employed in this phase of the IMA are not taken out of context. Different stakeholders may assign differing weights for a given criterion, and the final weighting of the criteria will emerge through the Roundtable negotiations in Step Five of the IMA. The ratings for the criteria of the Nithi Timber Cooperative Society Limited case study sawmill enterprise are presented in Table 5.1. The ratings for the criteria for Case Study 2 and 3 are presented in Appendix 1, Section 3.

Table 5.1: Nithi Timber Cooperative Limited Sawmilling Management Criteria Ratings.

<u>Process level</u>		<u>Criterion</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>
Control of access	1.	Degree of Access to Resource	+1	-1	*
Harvest and Transport	2.	Total Available Volume (ie. Target Log component)	+1	-1	*
	3.	Logging Equipment	+1	-1	*
	4.	Cost of logs delivered to the sawmill per m ³	+1	-1	*
The Sawmill	5.	Ownership of the enterprise	+1	-1	*
	6.	Physical Plant	-1	-1	*
	7.	Availability of capital	+1	-1	*
	8.	Return on net assets/Price-earnings ratio	+1	-1	*
	9.	Mill log input capacity (eg. m ³ /shift or m ³ /year).	+1	-1	*
	10.	Sawnwood production m ³ /shift, by species	+1	-1	*
	11.	Sales m ³ /year, by species, sawnwood, shorts	+1	-1	*
	12.	Production cost: currency units/m ³	+1	-1	*
	13.	Timber recovery rate: log input/sawnwood output	+1	-1	*
	14.	Production methods: quality control, handling	+1	-1	*
	15.	Operating time available	+1	-1	*
	16.	Production Efficiency: (m ³ /employee/year)	+1	-1	*
	17.	Overhead, Depreciation/m ³	+1	-1	*
Value-Added	18.	Seasoning (drying)	+1	-1	*
	19.	Grading	+1	-1	*
	20.	End trimming	+1	-1	*
	21.	Cutting to order	-1	-1	*
	22.	Resawing/Edger	+1	+1	
	23.	Planing, shaping, molding	-1	-1	*
	24.	Treatment with preservatives	+1	-1	*
	25.	Final product production	+1	-1	*
Market Studies	26.	Extent of market survey : national and international	+1	-1	*
	27.	Description of end-products to be researched	+1	-1	
	28.	Identification of competitors: existing and potential	+1	-1	*
	29.	National economic advantage over competitors	+1	-1	*
	30.	Built-in costs structure as a limiting factor			
	31.	Prices	+1	-1	*
Marketing	32.	Direct sales and shipment: specialization	+1	-1	*
	33.	Indirect sales and shipments: diversification	+1	-1	*
	34.	Customer relations practices and pricing practices	+1	-1	*

	35.	Market position, degree of customer loyalty/time	+1	-1	*
		TABLE SUMMARY	32/+1	1/+1	
			3/-1	34/-1	

The ratings of the criteria for the Technical Limit and Benchmark Situation of the Nithi Timber Cooperative Society Limited (Table 5.1) show that of the total thirty-five criteria there are thirty-two +1 values for the Technical Limit giving an overall indication that most of the criteria for meeting the goals of the Economic sphere are met. The Benchmark Situation for this case was thirty-four -1 values, giving an indication that the system, as found at the time of intervention, is not able to meet the goals of the sphere.

This review of the information collected for the criteria under the Technical Limit and the Benchmark Situation provides the interventionist with the perspective necessary to support the development of the Negotiation Aims. The Negotiation Aims summarize the changes that are required to be made so that the operation under study can meet the goals of the sphere. The Negotiation Aims are also used by the interventionist in the Roundtable negotiations in Step Five of the IMA.

5.4 Development of the Negotiation Aims

a) Principles

The IMA is designed such that required changes to the ongoing system under study are determined through Roundtable negotiations. The comparative assessment of the Technical Limit and the Benchmark Situation in the criteria rating exercise help to identify the activity levels within various criteria that require modification. The Negotiation Aims developed for the Economic sphere for the three case study enterprises are presented in detail for each criteria in Appendices 5.1, 5.2 and 5.3, under the heading Negotiation Aims. A summary of the Negotiation Aims, as determined for the Nithi Timber Cooperative Society Limited case study enterprise, are presented in Table 5.2. In Appendix 1, Section 3 the Negotiation Aims are presented for each of the criteria for Case Study 2 and 3 for the Economic sphere.

Table 5.2: Nithi Timber Cooperative Society Limited Summary of the Sawmilling Management Negotiation Aims.

<u>Process level</u>		<u>Criteria</u>	<u>Negotiation Aim</u>
Control of access	1.	Degree of Access to Resource	A) For adherence to the original Licence agreement. B) To ensure that any changes in the existing tenure agreement are approved by all relevant authorities.
Harvest and Transport	2.	Total available volume (i.e., Target Log component)	For adherence to the Licence and for the development of felling plans. For the selection of trees to be felled in a co-ordinated manner with the enterprise to facilitate harvesting and extraction of logs during the dry seasons (Appendix 6.1.1).
	3.	Logging Equipment	For the upgrading of logging equipment stable to a rated capacity for known working conditions. For a 2 year lead time on felling plans as per the Licence. For improved mechanics facilities with a lock-up, equipment, spares and supplies.
	4.	Cost of logs delivered to the sawmill per m ³	A) For a minimum two year lead time on tree selection within mutually agreed felling plans as stipulated in the Licence. B) For a minimum selection of 5,000 m ³ of merchantable logs per year with a two year lead time to facilitate road construction etc.
The Sawmill	5.	Ownership of the enterprise	For the facilitation of inputs from the membership (i.e., the owners). For a final adjudication and update on the membership register.
	6.	Physical Plant	For facilities for sorting and storing sawnwood. For a supply of new blades. For a waste wood removal system within the mill. For the servicing of the generators to improve fuel efficiency and for connection to the national power grid.
	7.	Availability of capital	For compensation from the Ministry of Environment for breach of contract based on the restriction of access to the raw materials as per the 10 Year Licence which led to uneconomical production levels, inefficiencies and an increased debt load.
	8.	Return on net assets/ Price-earnings ratio	For a full investigation and report of the reasons for the poor performance of the enterprise.
	9.	Mill log input capacity (e.g. m ³ /shift or m ³ /year).	A) For cooperation of the Forest Department to permit a planned logging operation. B) For the implementation of preventative maintenance program in the mill. C) For the implementation of new reporting structure within the operation.
	10.	Sawnwood production m ³ /shift, by species	For the same issues as for previous criterion.
	11.	Sales m ³ /year by species sawnwood, shorts	Same as for the previous two criterion.
	12.	Production cost: currency units/m ³	Same as above and for better record-keeping.

	13.	Timber recovery rate: log input/sawnwood output	A)For a greater component of better quality trees in the Forest Department selection process to offset the expense of milling poor quality logs. B)To ensure that logs were graded and stored to facilitate the scheduling of log input by grade and species.
	14.	Production methods: quality control, handling	For mill run sawmilling, grading and sorting of logs in the yard with respect to the initial breakdown characteristics of each log to permit judicious log input choice dependent on flow or bottlenecks downstream in the mill. See checklist in (Appendix 6.1.8).
	15.	Operating time available	A)For a preventative maintenance programme including scheduled parts purchasing, B)For accountable employee reporting structure and C)For felling plans with a two year lead time.
	16.	Production Efficiency: (m ³ /employee / year)	A full investigation and report for the reasons for the low production efficiency with recommendations for actions which would increase the efficiency.
	17.	Overheads, Depreciation/m ³	A)For a reappraisal of the depreciation charges based on the actual levels of wear on the sawmill equipment. B)For a renegotiation of the loans and interest charges. C)For the replacement of worn equipment which was reducing production efficiency.
Value-Added	18.	Seasoning (drying)	For the stickering and stacking of sorted sawnwood for daily production purposes. For the provision of covered storage. For the provision of sawnwood handling equipment for the storage area. For the restriction of "hot loading" timber from mill deck to the customers' vehicles.
	19.	Grading	For mill run production, licenced timber grading at the trimmer benches and sorting of graded timber.
	20.	End trimming	For the end trimmer to be used for squaring and trimming ends only.
	21.	Cutting to order	For mill run production or for premium pricing on custom orders. Reduce the width setting to 1.125".
	22.	Resawing/ Edger	For more efficient use of available tools.
	23.	Planing, shaping, molding	For studies to assess a cost effective strategy for these value-added services.
	24.	Treatment with preservatives	For the investigation into the development of a treatment facility to treat some of the licenced species which were fast growing and regenerated easily but were less favoured in the market because they are subject to insect and fungal attack such as <u>macaraga</u> spp.
	25.	Final product production	For an appraisal of the potential for the conversion of sawmill waste into a final product form. For an appraisal of the furniture factory to establish costs and productivity to establish costs and determine suitable productivity bonus.
Market Studies	26.	Extent of market survey national & international	For permission to export sawnwood. For the enforcement of the Forest Access rules to reduce the uncontrolled extraction of camphor by unlicensed operators so that the availability of timber in the market would reflect the licenced volumes.

	27.	Description of end products to be researched	A) For the assessment of possible end products such as air dried, planed, shaped or finished products such as school, office, church and household furniture for the local market and for knock down furniture for the expatriate market. B) For the assessment of the feasibility of expansion of the existing facility to enable the production of the end products to the required standards efficiently.
	28.	Identification of competitors: existing and potent	For the restriction of uncontrolled access to the forest reserves for the purpose of timber production.
	29.	National economic advantage over competitors	n/a
	30.	Built in costs structure as a limiting factor	For the restriction of access to the forest resource by those operators who were not accountable and do not pay taxes and other usual overheads. For the provision of the log supply as indicated in the 10 year Licence to permit full production.
	31.	Prices	For the increase in log supply to enable an increase in production and efficiency and a reduction in the proportion of overheads per m ³ of sawnwood. For the elimination of the sources of illegal sawnwood which was deflating the market prices.
Marketing	32.	Direct sales and shipment: specialization	A) For the payment of commission to sales agent only on introduction orders. B) For the cancelling of the sales agent contract. For increased effort in direct sales.
	33.	Indirect sales and shipments: diversification	For the cancellation of the sales agent's contract and to develop in-house expertise for a sales yard locally and in Nairobi.
	34.	Customer relations and pricing practices	For the establishment of procedures for sales and customer relations to ensure inhouse accountability and customer satisfaction.
	35.	Market position, degree of customer loyalty over time	For the restriction of uncontrolled access to the forest resource. The demand in Kenya for sawnwood was estimated at 200,000m ³ in 1985 projected to increase by 87% by the year 2000 and by 153% by the year 2010. The production of sawnwood from indigenous hardwood was estimated at 100,000m ³ /year (Kenya Forestry Department Annual Report, 1985).

b) Nithi Timber Cooperative Society Limited

From the information listed in Table 5.2, the elements of the negotiation strategy for the economic aspects of the enterprise can be summarized under the process level headings. The fundamental issue under Control of Access is that the resource be managed as outlined in the Timber Licence agreement so that the planning for the enterprise could be based on a known supply of timber. The main area requiring negotiation under Harvesting and Transport is that felling plans must be developed as outlined in the Licence. Overall, the Forest Department's responsibilities and the requirements of the enterprise must be coordinated. The logging equipment must be upgraded to meet the local conditions and appropriate road maintenance practices put in place.

In the sawmill process itself, a number of issues were identified as requiring attention during negotiations. Annual meetings for the membership and a popular forum such as a newsletter were required to facilitate input from the owners into the activities of the enterprise. There was a general need for the Forest Department to meet the terms and conditions of the Licence so that the enterprise could operate efficiently. Compensation from the government for the costs incurred by the enterprise due to non-compliance by the Forest Department to the Licence arrangements was required.

The management practices at the mill required changes such as better record-keeping, a preventative maintenance schedule and the implementation of more cost efficient milling techniques. Improvements in the value-added aspects of the enterprise could be achieved through the implementation of basic post-production activities such as better storage and handling, grading, monitoring for adherence to standard timber dimension tolerances and using mill run production methods. A cost analysis of other value-added techniques, such as planing and shaping, the treatment of available timber species that are prone to insect or fungal attack, final product production and sawmill waste conversion into marketable products would determine whether such activities are feasible.

Market studies would provide the perspective necessary to plan a better return on the original investment. For example, it would be useful to know what the potential market would be for a variety of wood-based products that could be manufactured by the enterprise from its mill outputs and for the export value of the timber compared to the domestic value. The identification of those traders involved in the uncontrolled market of indigenous forest timber products is required as a first step towards their removal from the market. The elimination of uncontrolled trade is a necessary prerequisite to

the survival of the case study enterprise as an operation that is fully accountable for all taxes and overhead. The enterprise must change its marketing methods. In particular it must end its contract with the sales agent and establish accountable in-house sales procedures.

5.5. Summary

Using the methodology developed in Chapter 2, information has been presented in this chapter for the Technical Limit and the Benchmark Situation of the the case study sawmill enterprise. This information provided a comprehensive list of criteria upon which the interventionist could be guided to determine what changes would be necessary to shift the existing system towards one that incorporates the concept of sustainable development within a decision-making framework perceived to be equitable. Negotiation Aims were developed for the Economic sphere based on a comparison of the information compiled for the Technical Limit and the Benchmark Situation for each case study. Step One of the IMA thus now has been applied systematically to the three spheres that describe the concept of sustainable development.

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In the next chapter the remaining steps of the IMA are applied to the case studies. The initial results of the intervention process are presented and the results of the interventionist's aim of incorporating the concept of sustainable development into the case study enterprises are assessed.

Chapter 6

Results of the Application of the IMA to the Case Studies

6.0 Introduction

The results of applying Step One of the IMA to the three case studies were presented in Chapters 3, 4 and 5. For Step One, criteria were developed to guide the interventionist in describing the Technical Limit, the Benchmark Situation and the Negotiation Aims for each of the case studies. The information collected was presented in a format based on the Biological, Social and Economic spheres comprising the conceptual model of sustainable development (Chapter 1). This format was chosen to emphasize the importance of the three constituent spheres in defining sustainable development.

The direction of analysis now changes to one of describing the results of the iterative IMA, flowing from the definition of the Negotiation Aims. Here, the spheres are merged (or optimized) with the ultimate aim of demonstrating the degree of conformity of the case studies to the sustainable development ideal. By focusing on the case study at this stage, the importance of *integrating the trade-offs* between the three spheres is emphasized. The IMA is applied a number of times to each case study during the relevant study period. In this chapter each case study will mark a major chapter subdivision, with each of the steps of the IMA treated in further subsections. The results of each iteration of the IMA during the study period is reported. A final summary provides a comparison of the results of the application of the IMA for each case study.

A Description of the Study Period for Each of the Case Studies

The study period for the three enterprise case studies used in this research varied. For the Nithi Timber Cooperative Society Limited, the study period took place for a period of two years, from May 1985 to June 1987, during which time the interventionist was on-site continuously. Four significant Roundtable sessions are identified for this case study. The Roundtable sessions are identified in chronological sequence as: (i) the Annual General Meeting (December, 1985), (ii) the Nithi Timber Commission Meeting held in the presence of the Embu Provincial Cooperative Officer (PCO) (December,

1985), (iii) the first meeting of the newly appointed Nithi Timber Management Commission (January 1986), and (iv) the meeting with the Minister of Natural Resources (June, 1986).

In the second and third case studies (Mingoyo Cooperative Sawmill and African Blackwood Enterprises), the approach to the interventions was based on the experiences gained by the interventionist with the Nithi Timber case study. This second study period comprised a four year time span (1987 to 1990), within which there were three periods of intervention of up to two months in length. Each of these intervention periods was marked by a Roundtable session. The first Roundtable was the intervention by Moore and Hall (1987), the second was by Hall (1988) and White (1988), and the third period was by Lamb and Hall during the years 1989 and 1990.

A restatement of the steps of the IMA, as proposed in Chapter 2 is presented in Table 6.1. These steps describe the sequence which will be followed in this chapter. This chapter is a synthesis of the data collected and subsequent Negotiation Aims developed during the application of the IMA.

Table 6.1: A Summary of the Steps of the IMA for the General Case (as described in Chapter 2).

1.	Collection of information to describe the system as it was intended to operate (the Technical Limit) and as it is found at the time of intervention (the Benchmark Situation). The development of Negotiation Aims for the interventionist based on the information collected. - (see <i>Appendices for Chapter 3, 4, and 5.</i>)
2.	Identification of the key stakeholders (internal, external, supportive and adversarial). -(see <i>Stakeholder Map</i>).
3.	Identification of stakeholder stakes. - (see <i>Stake chart</i>).
4.	Assessment of the effectiveness of the current strategies in meeting all stakeholders' perceived needs. - (see <i>Stake Effectiveness Chart - Post Intervention</i>).
5.	• Convening of Roundtable activities for the presentation of stakeholder claims and negotiation for the purpose of formulating goals and a new management strategy aimed at achieving sustained development. • Plans are developed by the stakeholders (Stakeholder Action Plans - SAPs) that include an internal monitoring function based on agreed terms and conditions (that include penalties for non-compliance). • SAPs are implemented.
6.	Review and evaluation of the effectiveness of the intervention process and the SAPs including notation of the achievements towards sustained development - (see <i>Appendices for Chapter 6: Criteria Rating - Post Intervention</i>). Updates and reiterations of SAPs as deemed necessary.

6.1 Application of the IMA to Case Study 1: Nithi Timber Cooperative Society Limited (NTCS)

6.1.1 Step One - Collection of Information for the Benchmark Situation and Technical Limit and the Development of the Negotiation Aims

The results of the application of Step One of the IMA to the Nithi Timber Cooperative Society Limited have been presented in Chapters 3, 4 and 5. The information collected for Step One of the IMA was framed under the three spheres of the conceptual model of sustainable development to emphasize the importance of this concept to the IMA. The data are listed in Appendices 3.2, 4.1 and 5.1 under the criteria that were developed to guide the interventionist in the application of the IMA. These criteria provided the foundation upon which the results of the application of the IMA are presented in this chapter.

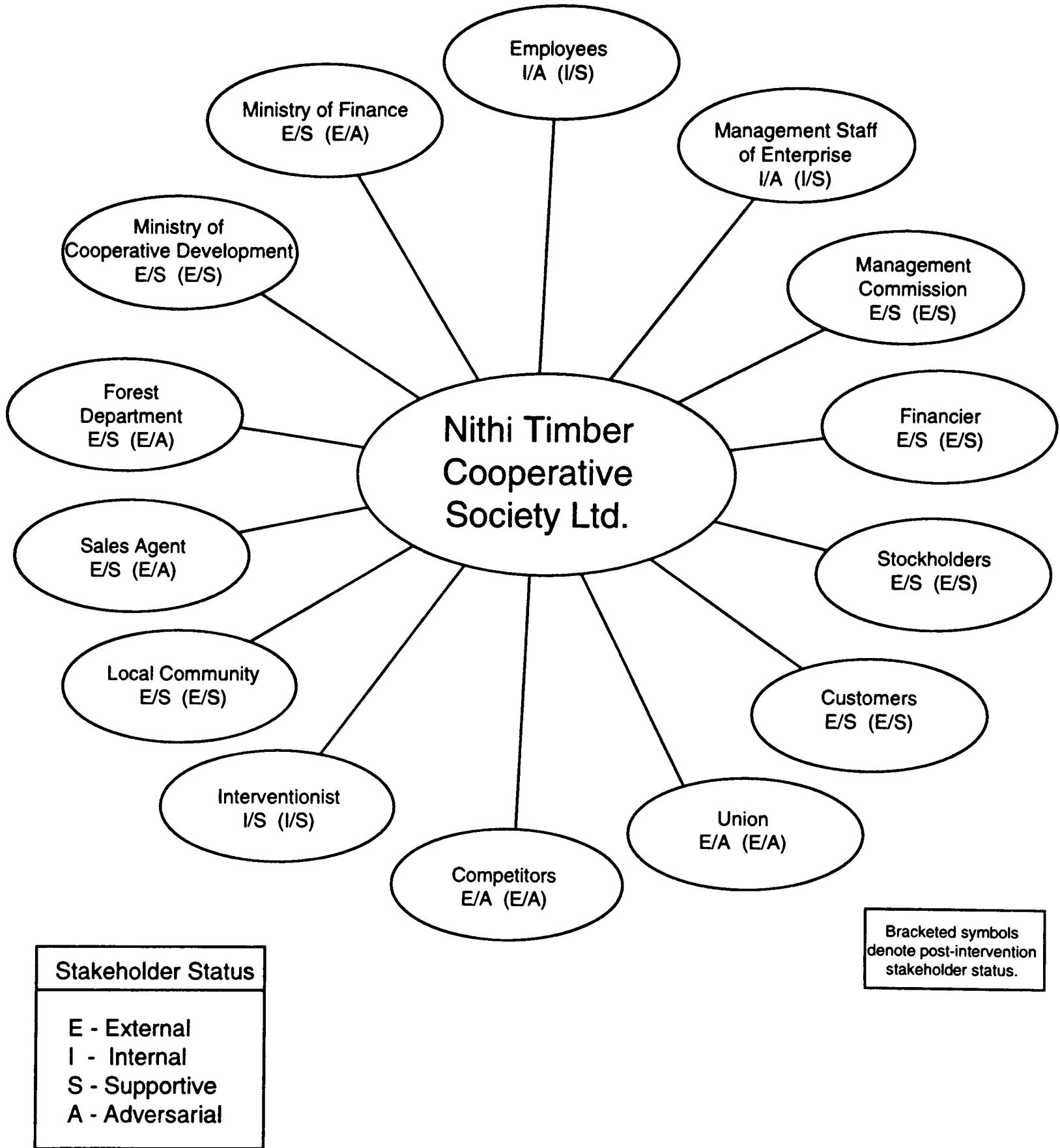
6.1.2 Step Two - Identification of the Key Stakeholders

In these case studies, stakeholders and their stakes were identified by the interventionist through exhaustive review of the management structure, of the case studies, internal files, correspondence, licenses, sales records, relevant government Acts and Regulations, and through interviews with internal and external officers having business relations and political or statutory responsibilities to the case study enterprises. The interventionist's preliminary conclusions were refined at the initial Roundtable session for each case study, in cooperation with the stakeholders present.

In Figure 6.1, the stakeholders for the NTCS are mapped. These stakeholders include those who were readily apparent to the interventionist as having influence on, or being influenced by, the activities defined by this case study. For each stakeholder on the map, notations clarify the interventionist's understanding of the stakeholder's position relative to the case study²⁶.

²⁶ As per the description in Section 2.7.2, the notations are E - external; I - internal; A - adversarial and S - supportive. The notations that appear without brackets are those ascribed to the Benchmark Situation and the notations within the brackets are those that describe the stakeholder's position at the end of the intervention period.

Figure 6.1: Stakeholder Map - Nithi Timber Cooperative Society Limited.



6.1.3 Step Three - Identification of Stakeholder Stakes

The stake(s) of each of the stakeholders was determined by the interventionist through a review of the Society's minutes, administration files and reports, contract documents and government documents such as the Acts and Regulations of the various ministries interacting formally with the case study. This approach was supplemented through personal communication with most of the stakeholders identified. In Table 6.2, the

stakes for the stakeholders are listed by stakeholder categories. The stake(s) of a given stakeholder category may change over time and the individual(s) that represent a stakeholder category may also change over time. These stakeholder categories and the associated stakes listed in Table 6.2 did not change throughout the study period, however, in some cases individuals within a stakeholder category did change over the study period. The relationship with the Forest Department is one example. At the beginning of the intervention period, the interventionist dealt with the local forest officer. As the study period progressed, the interventionist's contact point within the Forest Department shifted upwards through the ranks of the Forest Department. The final point of contact was the Minister of Natural Resources, the minister responsible for the Forest Department.

Table 6.2: Stakeholders and Stakes - Nithi Timber Cooperative Society Limited.

<u>Stakeholder</u>	<u>Stake</u>	<u>Stakeholder Identity:</u> <u>Benchmark Situation</u> Internal - I External - E Supportive - S Adversarial - -A	<u>Stakeholder Identity:</u> <u>Post Intervention</u> Internal - I External - E Supportive - S Adversarial - -A
Employees	job security	I A	I S
	job advancement		
Management of the Enterprise	job security	I A	I S
	firm's success		
	personal gain		
Management Commission	prestige	E S	E S
	personal gain		
Financier	successful investment	E S	E S
	profit on investment		
Stockholders	dividends	E S	E S
	capital value of stocks		
	increased control over local publicly owned resources		
Customers	reliable supply of quality goods	E S	E S
Union	revenue from members' dues	E A	E A
	well-being of membership		
	power		
Interventionist	the incorporation of the concept of sustainable development into the management of the enterprise	I S	I S
Local Community	stability	E S	E S
	revenues		
	employment		
	service sector		
Competitors	demise of enterprise	E A	E A
Sales Agent	personal gain	E S	E A
Forest Department	revenues from royalties	E S	E A
	management of forest resource		
Ministry of Cooperative Development	power	E S	E S
	employment		
	community and national development		
Ministry of Finance	tax revenue	E S	E S
Total 14	Total Stakeholder Stakes 29		

The **employees**²⁷ stakes were centered on *job security* and *job advancement*. Each employee was contracted subject to the union agreement that included formal job

²⁷ In this section terms adopted to describe stakeholders will be in bold print and terms adopted to describe stakes will be italicized.

protection arrangements and provisions for technical training. The **management of the enterprise** included non-union employees whose *job security* was linked to the *firm's success* and for whom *personal gain*, in terms of the outcome of an annual review of salary, depended on the success of the enterprise.

Membership on the Society's **Management Commission** was on a volunteer basis through appointment by the Commissioner of Cooperatives. Representatives of the enterprise's management staff and of the Ministry of Cooperative Development were members of the Management Commission as part of their normal duties and responsibilities. Appointment to the commission implied a high degree of social trust since the commission had decision-making power over a publicly owned enterprise that was significant at the local and national level (Githingi, 1985). An invitation to become a member of the Management Commission was viewed as a matter of *prestige* by those who accepted. Members of the commission were subject to scrutiny by the community on their business acumen and *personal gain* was expected by the members of the commission through improved reputation and increased social status with the success of the enterprise under their leadership (Githingi, 1985).

The **financier** was the Cooperative Bank of Kenya Limited. The mandate of this financial institution was to further the cooperative movement by providing financial services for cooperative members and through the support of *successful investment* into indigenous enterprises. The Bank was also expected to provide a *profit on its investments* for its shareholders (Mulli, 1985). The **stockholders** of the cases study enterprise expected profitable *dividends* on their investment and that the *capital value of their stocks* would increase or at least maintain their value over time. The majority of stockholders were local agriculturist landowners who were interested in *increasing their control over local areas of publicly owned resources* (NTCS/AGM Nov./85). In this case, the area in question was the Nithi Timber Licence area, which was not only potentially valuable as a source of timber resources, but also provided the watershed catchment area for much of the members' agricultural land holdings (NTCS/AGM Nov./85). The **customers** of the enterprise indicated that their main interest was for a *reliable supply* of a known quality and quantity of goods upon which they could base their own business plans (Singh, 1985; Clark, 1985; Kigoto, 1985; NTCS PM Report July/85).

The unionized employees of the enterprise belonged to the Kenya Timber and Woodworker's Union. The leadership of this **union** demonstrated that its stake in the enterprise was in the collection of *revenues from the membership dues* and for the *well-being of the membership* (Njagi, 1985). The union was also interested in establishing and

maintaining *power* over its members and consequently over the enterprise so that the union's position and effectiveness in negotiating its first two stakes would be enhanced (KTWU Agreement NTCS, June 1983).

In this case study, the **interventionist** had contracted to the Society to accept management responsibility for all aspects of the Society's operation. The interventionist, as Project Manager, was responsible for the activities that had influence on the condition of the forest and on the social and the fiscal aspects of the enterprise. Recognizing that there was a need to balance the trade-offs between the requirements of the three spheres under the benchmark circumstances, it was imperative for the interventionist to *incorporate the concept of sustainable development into the management of the enterprise* in order to achieve any degree of success for the Society.

The **local community** included the citizens within the Nithi Division. In their various capacities as community leaders, business owners and consumers, the benefits that were to be gained through the *stability* of the enterprise were recognized (NTCS/ AGM Nov./85). *Revenues* from the activities of the enterprise generated through the *employment* of local people and through the stimulation of the local *service sector* were valued by the local community (NTCS/ AGM Nov./85). In contrast the **sales agent** had contracted to the Society solely for *personal gain* and not for the mutual benefit of both parties (NTCS Sales Agent Contract, May 1984; NTCS, Auditor's Report 1983-84 & 1984-85).

The **Forest Department** licenced the Society as sole users of an area of the Mount Kenya Forest Reserve in exchange for *revenues from the royalties* paid by the Society for the removal of timber from the Licence area. The conditions of the Timber Licence also gave the Forest Department the opportunity to dictate the manner in which the forest was exploited and thereby expected to achieve some degree of *management of the forest resource* through its licenced association with the Society (Republic of Kenya, The Forests Act Cap. 385).

Through the Cooperative Societies Act of Kenya the **Ministry of Cooperative Development** was accountable to the government for the activities of all cooperatives and had the *power* to intervene in the activities of any cooperative societies in Kenya to promote *employment opportunities and community and national development*. The **Ministry of Finance** collected the *tax revenues* generated through the various taxable activities at the enterprise (Republic of Kenya, Finance Act, 1972). The Society's **competitors** were interested in the reduction of the level of competition in the

marketplace and in the improvement of their market position that could be gained through the *demise of the enterprise*.

6.1.4 Step Four - Assessment of the Effectiveness of the Current Management Strategies in Meeting All the Stakeholders' Perceived Needs

In this Step, the interventionist undertook an assessment of the effectiveness of the management strategy of the enterprise at each intervention, as modified by the application of the IMA, in meeting the perceived needs of the stakeholders. The interventionist also established the *Stakeholder Identity* (as described in Section 2.5.3 of this study) of each stakeholder identified. The important aspect of this exercise is to identify the stakeholders at an early stage so that participants in the Roundtable are clearly informed of the status of each stakeholder and their stakes in relation to the case study. The effectiveness of the management strategy at each intervention and the stakeholder identity is recorded for the Benchmark Situation and for the post intervention situation at the end of the study period for each stakeholder (see Table 6.3). As noted in Section 2.5.3, the external adversarial (E/ A) stakeholder presents the greatest challenge to the interventionist. The stake(s) of the E/ A stakeholder must be assessed. In cases where meeting the stake of the E/ A stakeholder is deemed to be of benefit to the enterprise, the focus of negotiations should be on developing a management strategy that helps to meet that stake. However, where meeting the stake of an E/ A stakeholder is found to not be of benefit to the enterprise, negotiations must focus on the stakeholder rather than on the stake. Efforts must first be made to minimize the negative influence that the E/ A stakeholder may exert on the enterprise while a strategy is being developed. To this end the interventionist may attempt to try a combination of the following: (i) change the status of the stakeholder from an external to internal, (ii) shift the stakeholder attitude from that of being adversarial to that of being supportive of the enterprise, or (iii) to change the stake of the stakeholder in question.

For this case study, an assessment was made for five stages beginning at the Benchmark Situation and repeated for each of the four iterations of the IMA. In Table 6.3, a rating of the effectiveness of the current management strategy in meeting the stakeholders' perceived needs is also presented. In this table, a rating of +1 indicates that the current management strategy is meeting the stakeholders perceived needs and a rating of -1 indicates that it is not.

Table 6.3: Stake Effectiveness Chart - Post Intervention - Nithi Timber Cooperative Society Limited.

Stakeholder	Stakeholder Identity: Benchmark Situation Internal - I External - E Supportive - S Adversarial - A	Stake	Effectiveness as found: - at Benchmark Situation	- at First Iteration of IMA	- at Second Iteration of IMA	- at Third Iteration of IMA	- at Fourth Iteration of IMA	Stakeholder Identity: Post Intervention Internal - I External - E Supportive - S Adversarial - A
Employees	I A	job security	-1	-1	+1	+1	-1	I S
		job advancement	-1	-1	-1	+1	-1	
Management of the Enterprise	I A	job security	-1	-1	+1	+1	-1	I S
		firm's success	-1	-1	-1	+1	-1	
		personal gain	-1	-1	+1	+1	-1	
Management Commission	E S	prestige	+1	+1	-1	+1	-1	E S
		personal gain	+1	+1	-1	+1	-1	
Financier	E S	successful investment	-1	-1	-1	-1	-1	E S
		profit on investment	-1	-1	-1	-1	-1	
Stockholders	E S	dividends	-1	-1	-1	-1	-1	E S
		capital value of stocks	-1	-1	-1	-1	-1	
		increased control over local publicly owned resources	-1	-1	+1	+1	-1	
Customers	E S	reliable supply of quality goods	-1	-1	-1	+1	-1	E S
Union	E A	revenue from members' dues	+1	-1	-1	-1	-1	E A
		well being of membership	-1	-1	-1	+1	-1	
		power	+1	+1	+1	+1	-1	
Interventionist	I S	the incorporation of the concept of sustainable development into the management of the enterprise	-1	-1	+1	+1	-1	I S
Local Community	E S	stability	-1	-1	-1	+1	-1	E S
		revenues	-1	-1	-1	+1	-1	
		employment	-1	-1	-1	+1	-1	
		service sector	-1	-1	-1	+1	-1	
Competitors	E A	demise of enterprise	+1	+1	-1	-1	+1	E A
Sales Agent	E S	personal gain	+1	+1	+1	+1	-1	E A
Forest Department	E S	revenues from royalties	-1	-1	-1	+1	-1	E A
		management of forest resource	-1	-1	-1	+1	-1	
Ministry of Cooperative Development	E S	power	+1	+1	+1	+1	-1	E S

		employment	+1	+1	+1	+1	-1	
		community and national development	-1	-1	+1	+1	-1	
Ministry of Finance	E S	tax revenue	-1	-1	-1	+1	-1	E A
Total: 14 Stakeholders		29 Stakes	8 / +1 21 / -1 (27%)	7 / +1 22 / -1 (24%)	10 / +1 19 / -1 (34%)	22 / +1 7 / -1 (76%)	1 / +1 28 / -1 (3%)	

The results of the assessment of the data collected under Step One of the IMA for the Biological, Social and Economic spheres (see Appendices 3.2, 4.1 and 5.1) in the previous three chapters (Sections 3.3, 4.3 and 5.3) indicated that this case study was not being managed to meet its Technical Limit. As shown in Table 6.3, the enterprise was not meeting most of the stakeholders' needs at the Benchmark Situation. At this stage the interventionist also ensured that the stakeholder identity was recorded for each stakeholder.

Of the twenty-eight stakes identified for this case study, eight were found to be fully realized at the Benchmark Situation. The **Management Commission** was in control of the operation and was maintaining the *prestige* of office and the opportunity for *personal gain* (Hemmingson, 1984; NTCS/PM Report July/85). Although the employees' **union** was able to maintain its *revenues* through the collection of dues from the employees and was, in appearance, maintaining its *power* within the case study operations, it had little actual impact on the *well-being of its membership* (NTCSmin31/85). The **competitors** were identified as E/A stakeholders with a stake that, if met, would not be of benefit to the case study. The **sales agent** held a contract with the enterprise whereby his stake of *personal gain* would be met from any sales that the enterprise made (NTCS/PM Report June 1985). This stakeholder was also identified as an E/A stakeholder with a stake that, if met, would not be of benefit to the case study. The stakes of the **Ministry of Cooperative Development** were to maintain a position of authority and *power* over the Society and to encourage *employment* opportunities. These stakes were being met at the Benchmark Situation.

First iteration of the IMA - Step Four, Case Study 1

The first iteration of the IMA was marked by the Annual General Meeting of the case study enterprise held in December 1985. This meeting was attended by representatives of the stockholders (200 members), members of the Management Commission and representatives of the Ministry of Cooperative Development. After this iteration, the ratings of one stake changed from the Benchmark Situation. The rating change was to

the negative for the employees' union. After the first iteration the union reported that it was no longer collecting revenues from its members at the enterprise (Njagi, 1985). The need for changes in the management of the enterprise had not been met after the first iteration which indicated the need for changes in management.

Second iteration of the IMA - Step Four, Case Study 1

The **second intervention** centred on the instructions of the Commissioner of Cooperative Development (CCD) that specific actions be taken at the Society. These instructions were developed as a result of the second Roundtable and led to nine changes in the effectiveness rating. The stake ratings changed to the positive for six stakes and to the negative for three stakes. For the changes to the positive, there was an increase in the confidence of *job security* for the Society's **management staff** and for the **employees** of the Society, and a renewal of the opportunity for the management staff at the Society to improve their *personal gains* as their authority to manage the enterprise was confirmed (Republic Of Kenya, Ministry Of Cooperative Development, CON/CS/1636/VOL.I/72). With the changes in management, the **stockholders'** position with respect to their Society *increasing the level of control over the local, publicly owned resource* improved (Republic Of Kenya, Ministry Of Cooperative Development, CON/CS/1636/VOL.I/72). With these changes, it also appeared that the **interventionist's** stake of *incorporating the concept of sustainable development into the management of the enterprise* was improving, as were the expectations of the **Ministry of Cooperative Development** in its successful promotion of *community and national development* (Githingi, 1985). Two of the changes to the negative were for the stakes of the **Management Commission**. Most of the members of the Society's Management Commission were relieved of their duties with the Society and were transferred out of the District, thereby losing their status as stakeholders (NTCS, 1977-1987, Ref.No.ST/2VOL.I/209; NTH/ST.3/VOL.II/250). The third change to the negative was the **competitors'** interest in the *demise of the enterprise* which, until this intervention, had appeared to be a distinct possibility (NTCSmin31/85).

Third iteration of the IMA- Step Four, Case Study 1

The **third intervention** was signaled by the dissolution of the existing Management Commission and by the appointment of a new Management Commission by the Minister of Cooperative Development (NTCSmin1/86). This action resulted in thirteen changes for the stake effectiveness ratings to the positive and one rating change to the negative. One example of positive change was that the **employees'** interest in *job advancement* was addressed by the new Management Commission (NTCSmin5/86, 13/86). The confidence of the Society's **management staff** in their opportunity to

contribute to the *firm's success* was improved with the confirmation of the appointment of an auditor for the Society (NTCSmin6/86) and with the pledge of the members of the new Management Commission to support the management staff and to allow the Project Manager the freedom to take independent action as deemed necessary for the benefit of the Society (NTCSmin12/86, 18/86, 28/86).

The appointment of the members of the new **Management Commission** came directly from the Minister of Cooperative Development (Kenya Times Jan. 19/86) and the members were *confident and positive* in accepting the responsibilities of their appointments. The Society's **customers** accepted that the Society's new sales policy of prepayment for deliveries would ensure they received a *reliable supply of goods* (NTCS Admin. 7/86; NTCSmin39/86). The **union's** concern for the *well-being of the members* was also met as the new commission addressed the need to negotiate the expired union agreement (NTCSmin14/86). The **local community's** stakes in the Society were also met as the stability of the operation improved, *employment* increased and the local *service sector* provided goods and services on account to the Society (Njage, 1986).

With the increase in confidence in the management of the Society, funds were to be requested from the **financier** to provide the *royalty revenues* owing to the **Forest Department** (NTCSmin21/86) and arrangements were authorized to increase the security deposit with the Forest Department for the purchase of logs (NTCSmin19/86). The Forest Department also outlined plans to achieve its *management goals* for the forest area through the forest activities of the Society (NTCSmin17/86, 35/86). The **Ministry of Finance** announced its intention to collect a seventeen percent *sales tax* from the Society (NTCSmin22/86). The **sales agent's** contract was reviewed and found not to be to the Society's advantage (NTCSmin23/86), however, until the contract was legally cancelled, the agent was invited to sell any timber of dimensions and grades not on order with the Society's sales office (NTCSmin40/86).

Fourth iteration of the IMA- Step Four, Case Study 1

The **fourth iteration** (and final) of the IMA to NTCS during the study period resulted in major changes to the operations. Without prior notification, the Forest Department unilaterally closed access to all users of the forest reserve (Republic of Kenya Legal Notice #89/1986). As a result, each of the positive changes gained in the previous iterations of the IMA reverted to negative ratings. Despite the assurances of the Minister of Natural Resources that the closure was intended to assist the Forest Department in reasserting its control over the Mount Kenya Forest Reserve and that this would be in the long-term interests of the Society, the confidence of the stakeholders in

the success of the enterprise was reduced. As the demise of the enterprise appeared imminent at this iteration, the only stake that was rated as positive was the Society's competition (PM Report June/86).

6.1.5 Step Five - Convening the Roundtable

In Step Five of the IMA, the Roundtable is convened to establish stakeholder claims, to negotiate and reach agreement on the Mission Statement and on the Stakeholder Action Plan (SAP) and to then implement the SAP. In this section, a summary of the Roundtable process, the Mission Statement and the SAP and its implementation for each of the iterations of the IMA to Nithi Timber Cooperative Society Limited are presented. In Table 6.4, the stakeholders are identified and the shaded areas indicate their direct participation in the Roundtable activities for each iteration of the IMA.

Table 6.4: Participation of Stakeholders in Roundtable Sessions - Post Intervention - Nithi Timber Cooperative Society Limited. - Case Study □1.

Stakeholder	Stakeholders Participating at the First Iteration of IMA	Stakeholders Participating at the Second Iteration of IMA	Stakeholders Participating at the Third Iteration of IMA	Stakeholders Participating at the Fourth Iteration of IMA	Stakeholder Identity: <u>Benchmark Situation</u> Internal - I External - E Supportive - S Adversarial - -A	Stakeholder Identity: <u>Post Intervention</u> Internal - I External - E Supportive - S Adversarial - -A
Employees					I A	I S
Management of the Enterprise					I A	I S
Management Commission					E S	E S
Financier					E S	E S
Stockholders					E S	E S
Customers					E S	E S
Union					E A	E A
Interventionist					I S	I S
Local Community					E S	E S
Competitors					E A	E A
Sales Agent					E S	E A
Forest Department					E S	E A
Ministry of Cooperative Development					E S	E S
Ministry of Finance					E S	E A
Total 14	7 (50%)	5 (36%)	11 (77%)	7 (50%)		

First iteration of the IMA - Step Five, Case Study 1

The focus of the Roundtable for the first iteration was the December 1985 Annual General Meeting (AGM) for the Nithi Timber Cooperative Society Limited. The stakeholders who attended that meeting are identified in Table 6.4. The Mission Statement and the SAP that were announced by the chairman of the commission were

not those that had been prepared by the commission members prior to the AGM. These statements had apparently been composed by the chairman unilaterally (NTCSAdmin.Corr.16/12/85). The Mission Statement that was tabled at the AGM called for the immediate removal of the interventionist as the Society's Project Manager and for the extrication of the financier from his involvement in the management of the Society (NTCS AGM Dec./85 Chairman's Report). The proposed SAP supported the supposition that it was in the Society's best interests to return to the management style that was in place before the arrival of the interventionist. The proposed SAP could not be implemented as this meeting was terminated by the Provincial Cooperative Officer (PCO) due to the lack of audited accounts (NTCS/AGM Dec./85, min4/85; Daily Nation, 16/12/85; Standard 17/12/85; Kenya Times 19/12/85). The PCO's concluding remarks at the AGM included the observation that the Management Commission had failed to meet its basic mandate to facilitate regular, external auditing of the Society's accounts and had not arranged for Annual General Meetings in accordance to the approved guidelines of the Ministry of Cooperative Development (NTCS/AGM Dec./85, min4/85).

Second iteration of the IMA- Step Five, Case Study 1

This outcome of the first Roundtable led to the direct involvement of the Commissioner of Cooperative Development and the General Manager of the Cooperative Bank of Kenya Limited in the affairs of this enterprise with the other stakeholders identified in Table 6.4 for the **second iteration**. The Mission Statement developed at this second Roundtable stated that the Nithi Timber Cooperative Society Limited was to be efficiently managed for the benefit of its members in accordance with the technical requirements of the business and under the regulations of the Ministry of Cooperative Development (Republic Of Kenya, Ministry Of Cooperative Development, CON/CS/1636/VOL1/72). The SAP also stated that the PCO was to ensure that the following steps were undertaken. First, the present Management Commission was to prepare for the immediate handing over of the Society's affairs. Second, a new Management Commission was to be appointed. Those appointed were to be local, respected citizens each having an excellent reputation of service to the community. Third, the services of the interventionist were to be maintained and the interventionist was to be empowered to manage all aspects of the enterprise and to be accountable to the new Management Commission (Republic Of Kenya, Ministry Of Cooperative Development, CON/CS/1636/VOL1/72). This SAP was implemented with the appointment of a new Management Commission for the case study enterprise (NTCSmin2/86).

Third iteration of the IMA- Step Five, Case Study 1

The third iteration of the IMA began with the meeting of the new Management Commission and the setting of their agenda (NTCSmin5/86). The members of the Management Commission included the six newly appointed local citizens and the District Forest Officer (DFO). The DFO was a member of the previous commission and was asked to remain a member of the new Management Commission because of the importance of a good relationship between the Society and the Forest Department regarding the supply of logs to the Society from the forest (NTCSmin4/86). The interventionist was appointed to the commission by the Society's members (NTCSmin10/86). Representatives from the Ministry of Cooperative Development and from the financier were welcome to the meetings in the role of observer. Other stakeholders involved in this iteration of the IMA are identified in Table 6.4.

The Mission Statement of the new Management Commission was that it was to manage the Society's affairs under strict business principles for the benefit of the membership, the employees and the community as a whole in cooperation with the various government agencies and businesses associated with the Society (NTCSmin83/86). The SAP included three main areas of concern: the log supply issue, the items identified in the auditor's report and employee/staff matters (NTCSmin5/86). The new commission was able to implement this SAP and achieved many of the targets required (NTCS PM Report Aug/86) through the concerted effort of the many of stakeholders. However, singular developments in Forest Department procedures led to a fourth iteration of the IMA which was the final one of the study period.

Fourth iteration of the IMA- Step Five, Case Study 1

The fourth iteration of the IMA was prompted by the closure of the Mount Kenya Forest Reserve by the Forest Department to all users. The Society's rights, as stipulated in the Ten Year Forest Licence, were annulled by this unexpected change in Forest Department procedures (NTCS PM Report June/86). A meeting of stakeholders was held to determine the future of the Society's operations. At this meeting, there was a change in the rank of representatives of the stakeholder categories from the local level to the highest rank. Present were the Minister of Natural Resources and the Chief Conservator of Forests, the General Manager of the Bank of Kenya Limited, the Permanent Secretary of the Ministry of Cooperative Development and the interventionist who represented the Society's Management Commission (NTCS PM Report May/86). The Mission Statement proffered by the Forest Department was that the Forest Department was interested in supporting the Society and other legitimate users of the Mount Kenya Forest Reserve in the long-term by respecting existing Licence

agreements, however, this support would only be possible within a context of immediate cessation of all uncontrolled use of the forest. The fulfillment of a two-part SAP was suggested as a prerequisite to the reinstatement of the Licence agreement. In the first part, the Society was to submit to the Minister's office detailed plans for further capital investment into a greatly expanded secondary wood processing industry at the sawmill site. The second part required that an independent inspection of the Society's forest operations would have to be made and the results would have to meet the Minister's approval. This SAP was implemented. However, during the remaining time of the study period, the status of the Society's Licence did not revert to the original terms and conditions as had been indicated at the Roundtable meeting (NTCS PM Report May /86).

6.1.6 Step Six - Internal Monitoring of the Progress of the SAP to Determine the Achievements of the IMA and/or the Need to Reapply the IMA

As an iterative methodology, the IMA requires a built-in evaluation process so that the effects of its application can be noted and that any lessons learned during one application are available for consideration during subsequent applications. For this step, any changes that occur to the criteria during an iteration of the IMA are described for each iteration. Also, each criterion is rated as suggested in Section 2.7.4 to provide a preliminary indication of the level of impact that each application of the IMA has on the case study. The results of the application of the IMA to the Nithi Timber Cooperative Society Limited case study and the post intervention rating for each of the criteria are recorded in fully referenced tables in Appendices 6.1.1, 6.1.2 and 6.1.3.

The post intervention ratings for the criteria of each of the three spheres that describe the conceptual model of sustainable development are summarized in Table 6.5. A graphic presentation of these values is shown in Figure 6.2. In this graph, the rating values drop significantly from the Technical Limit to the Benchmark Situation. The ratings then increase through the first three iterations, dropping again after the fourth iteration. A description of the Benchmark Situation for the three spheres of this case study is presented in Chapters 3, 4 and 5. In the following section, the changes to the criteria of this case study will be summarized from the information contained in Appendices 6.1.1, 6.1.2 and 6.1.3.

First iteration of the IMA - Step Six, Case Study 1

After the **first iteration** of the IMA, no changes were recorded for either the Social or the Economic spheres. There were changes in two ratings of forest management criteria. Some improvement in the perception of security of the tenure for the Society's Forest Licence area resulted from the demarcation of the forest reserve boundary on the ground through the establishment of the President's "Tea Belt"; a 100 metre wide swath cut along the forest boundary and planted with tea bushes (World Bank, 1987b). The interventionist successfully instated a comprehensive record-keeping system for the activities of the Society (NTCS PM Report July&Aug/85).

Second iteration of the IMA - Step Six, Case Study 1

There were changes in the ratings of some criteria of each sphere after the **second iteration** of the IMA. For the Biological sphere, the terms and conditions of the Society's Forest Licence were acknowledged by the District Forest Officer (DFO) and a limited single tree selection for felling was permitted. The DFO also confirmed that the location of the Licence boundaries should remain unchanged and agreed to review other changes to the Society's Forest Licence made unilaterally by the local forest authorities (NTCSmin41/85). Four criteria changed in the Social sphere. The members of the commission were changed (NTCSmin 44/85) and former members of the Management Commission were transferred from the Nithi District (Republic Of Kenya, Ministry Of Cooperative Development: Cooperative Officer ST/2/Vol I /(209); District Officer NTH/ST.3/VOL.II/250). Management goals and responsibilities were clearly outlined by the Commissioner of Cooperative Development (Republic Of Kenya, Ministry Of Cooperative Development, CON/CS/1636/Vol.7/72). The Project Manager's analysis of timber pricing was accepted at this Roundtable and the tender to supply timber to the Kenya Prisons Department (the major customer of the enterprise) was secured (NTCSmin50/85).

Changes to seven of the Economic sphere criteria were recorded for this iteration. The DFO agreed to investigate the opportunity to improve the quality of trees selected for the Society by the Forest Department representatives (NTCSmin41/85). The interventionist established a system for logs to be stored by grade in the log yard (NTCSAdmin.Memo Oct7/85) and actualized improvements to most of the value-added operations at the mill (including grading, end trimming, cutting to order, resawing/edging, and planing and shaping timber) (NTCS Admin.Memo.15/12/85, 20/12/85).

Third iteration of the IMA - Step Six, Case Study 1

For the **third iteration**, there were four criteria ratings that changed in the Biological sphere. The Project Manager's report with recommendations entitled "Timber Production Costs vs. Selling Prices" was accepted (NTCSmin22/86) and this led to the setting of price increases for prime grade that were accepted in the market. The first increase was 50% of the benchmark price (NTCSmin39/86), which was followed by a 72% increase in the benchmark price (NTCSmin88/86). The DFO complied with a NTCS Commission request for the removal of all other timber extractors from the Society's Forest Licence area and the DFO informed the Management Commission that a two-year logging plan was imminent (NTCSmin16/86). The forest access roads were successfully closed to vehicular traffic during rains and the Project Manager's suggested "Planned Logging Schedule" (see Appendix 5.1.2) was implemented (NTCSMemo Feb14/86). The annual production and distribution of indigenous forest tree seedlings at the sawmill forest tree nursery was increased by 400% to 40,000 seedlings (NTCS PM Report June/87).

For the Social sphere, thirteen criteria were recorded as changing after the third iteration. Relevant government authorities were instructed to abide by their duties (Republic Of Kenya, Ministry Of Cooperative Development: Commissioner of Cooperative Development CON/CS/1636/Vol.7/72) and audits for the previous two years were initiated (NTCSmin6/86). A new commission of local residents with management experience and of high repute was appointed by the Commissioner of Cooperative Development (NTCSmin5/86). The management responsibilities were to be monitored by the newly appointed local Cooperative officer (Republic Of Kenya, Ministry Of Cooperative Development, CON/CS/1636/Vol.7/72).

The interventionist undertook and reported the results of a cost/benefit study of the Society's membership in the Kenya Timber Woodworker Employers' Association (KTWEA) to the Management Commission (PM Report Mar/86). The development of a policy manual for NTCS (as suggested in PM Report July/85) was initiated by the interventionist in cooperation with representatives from the Ministry of Cooperative Development, the Ministry of Labour and the Woodworkers' Union (NTCS Admin. Memo Feb. 14/86). The lines of reporting, job descriptions and the organization chart were redrafted on the instructions of the Management Commission (NTCS min 12/86, 41/86, 47/86, 47/86, 55/86; PM Report July/86). A training program was initiated for employees to manage an external sales outlet (NTCS min40/86).

The manufacture of new value-added products at the Society for sale at the Nairobi market was successfully initiated (NTCS PM Memo Jan. 27/86). Consultations with employees and the Union Steward for input into a policy and procedures manual were initiated by the interventionist (NTCS Admin. Rec. March/86). The interventionist was given authority to use discretionary funds (as directed by the Commissioner of Cooperative Development, Nov./85) for purchasing essential supplies and services established by the Management Commission (NTCSmin 81/86). A report on the technical needs of the Society was prepared for the chairman of the Management Commission and the financier to be implemented once the log supply issue was resolved (Cooperative Bank of Kenya Limited C.B.K. Memo March/86).

A bonus payment system was developed based on extra payment to teams of employees in the logging and manufacturing sections when daily quotas were exceeded. The system relied on inputs from the employees and was implemented by the management. A similar bonus system was developed for the production section, but was kept on hold until the log supply issue was resolved (NTCS min 28/86). The feasibility of establishing a treatment facility was investigated and reported (NTCS PM Report March/86). A local school residence for disabled students was supplied with fuelwood at no cost by the Society from the off cuts produced at the sawmill (NTCSmin93/86). New commission members with local knowledge of possible sources of negative influence over the enterprise were chosen to lead the Society on behalf of the members until such time as members could be elected to the management positions of the Society (Kenya Times 19/1/86). The DFO assured the Management Commission that the NTCS Forest Licence regulations were in effect and that the Society had exclusive rights to the timber resource in the Licence area (NTCS min7/86).

For the third iteration twenty-four changes were recorded for the criteria that describe the Economic sphere of this case study. The concern of the Management Commission that the degree of access to the Licence area was being unilaterally compromised by the Forest Department representatives was reduced by the DFO when he agreed to remove all other timber extractors from the NTCS Licence area (NTCSmin7/86). The Management Commission was also expected to work with the two-year lead time contracted with the Forest Department for harvesting activities. The DFO informed the commission that the two-year logging plan was to be made available soon (NTCSmin16/86). The question of establishing the true record of ownership of the Society was expected to be answered with the input of local knowledge from the membership of the new commission (being long time local residents). This record

would also be improved through information forthcoming from the independent audits of the previous two-year period (NTCSmin5/86, 6/86).

The improvement and efficient maintenance of the physical plant was expected as funding for the maintenance needs of the enterprise was secured and the Project Manager was empowered by the Commission to make the necessary expenditures (NTCSmin28/86). As an alternative to diesel-generated electric power for the enterprise, inquiries into the cost of connecting the Society with the national power grid were made and reported (NTCS/Corr/ PM/ Feb. 7/86). A full review of the state of the Society's financial record was initiated and included official audits of the previous two years and an in-house review by the commission members (NTCSmin5/86, 6/86). A clear understanding of efficient levels of log input rates, production of timber by species, sales by species and production costs was expected when the DFO complied with NTCS Commission request to remove all other timber extractors from the NTCS Licence area. The DFO also promised that a two-year logging plan would be ready soon (NTCSmin16/86). Concurrent with this expectation, a preventative maintenance program was initiated at the mill to ensure efficient production levels once the log supply materialized (NTCS PM Report July/85, Aug/86) and the reorganization of reporting structure and of job-site descriptions was completed following instructions from the Management Commission (NTCS min28/86).

The reporting structure was reorganized (NTCSmin.12/86). To achieve efficient operating levels, the interventionist (Project Manager) was empowered by the Management Commission to undertake actions as and when required and to then report these actions to the commission rather than request permission in advance before taking action. Also the interventionist was responsible for purchasing essential equipment and supplies for efficient operation of the enterprise (NTCSmin12/86).

Production methods were changed to improve efficiency. Cutting to order was to be done only with the Project Manager's authorization and logs would be stored by grade, sawing was to be mill-run and sawn timber was to be stored by grade and dimension in the timber yard (NTCS PM Memo Jan. 20/86). To increase available operating time, a preventive maintenance program was developed (NTCS PMReport July/85) and was implemented (NTCS PMReport Aug/86). An investigation into the feasibility of establishing a value-added facility where some timber species available to the Society would be treated with preservatives was undertaken (NTCS PMReport March/86). To improve the level of utilization of the low grade timber and mill waste in furniture and

housing components, a bonus payment system was introduced as an incentive for the Society's carpenters and craftsmen (NTCS Admin. Memo 13/1/86).

A report to determine the end-products that could be successfully introduced by the Society was initiated Jan. 20, 1986 (NTCS PM Report Aug. 86). The Society's main competitors were unlicensed timber extractors operating in the forest reserve. These competitors were expected to be reduced when the DFO assured the members of the commission that NTCS Forest Licence regulations were in effect and that the NTCS had exclusive rights to the timber resource in the Licence area (NTCS min7/86). The sales method at the Society was found to be to the disadvantage of the Society. Therefore, procedures to cancel the sales agent's contract were initiated (NTCS min33/86, 40/86, 54/86; Auditor's Report 1986) and the sales procedures recommended by the Project Manager aimed at the improvement of customer relations (PM Report-July/85, Aug./85, Nov./85; NTCS min11/86) were accepted for implementation by the Management Commission (NTCS min 22/86).

Fourth iteration of the IMA - Step Six, Case Study 1

The unexpected closure of the Mount Kenya Forest Reserve for an indefinite period by the Ministry of Natural Resources (Republic of Kenya, Legal Notice #89, 1986) was the major factor that affected the ratings of the criteria for this enterprise after the fourth iteration. Five forest management criteria that had shifted to the positive in previous iterations reverted back to negative ratings after this iteration.

While the traditional threat to the Society's tenure arrangements had been from other users exploiting the area, the security of tenure over the Licence area was abruptly lost through the closure of the forest. The Society was not permitted to enter the forest and there was no tree selection or felling permitted (Republic of Kenya Legal Notice #89, 1986). The Chief Conservator indicated that if any logs were to be removed by the Society in the future then only logs previously felled would be allocated (NTCS/PM Report June/86). The Licence clauses regarding the distribution of tree age, size, and volume and the quality of logs the Society was to be allocated was therefore skewed. The previously felled logs left behind from users of the forest in the time prior to the Licence being signed were of very poor quality and many were beyond the limits of accessibility by the Society's logging equipment (NTCS/PMReport June/86). The required two-year work plans, not yet developed by the Forest Department, were again postponed due to the forest closure (NTCSmin86/76).

The forest closure did cause the market price for the Society's timber stocks to continue to increase as the effects of the successful forest closure reduced the availability of timber in the market (NTCS/PM Report June/87). The non-licenced operators were also forced out of the Forest Reserve and the non-licenced harvest rate and timber supply to the market was reduced. The forest closure remained in effect for over one year for all those licenced operators that did not satisfy a Forest Department audit of all licensee forest operations (NTCS/PM Report May/86). The Nithi Timber Cooperative Society Limited did satisfy the Forest Department audit (Republic Of Kenya, Ministry Of Cooperative Development, CCF.Memo.Oct. 31/86) and the Society was subsequently, six months after the forest was closed, allowed to remove and process the logs that had been prepared in the forest at the time of closure. No further trees were allowed to be felled and no other logs were allowed to be removed (NTCSmin110/86).

The fourth iteration of the IMA for this case study was prompted by the closure of the Mount Kenya Forest Reserve (NTCS/PMReport June/86). In summary, the changes to the criteria of the Social sphere of Nithi Timber Cooperative Society Limited for this iteration were reported as four changes to the negative, one change to the positive and the reinforcement of five positive ratings (see Appendix 6.2).

The closure of the forest reserve indicated that the government was unable to recognize the rights of the NTCS as a legitimate licensee despite excellent post closure forest inspection reports of NTCS operations (NTCS/PM Report June 11/86). The forest closure also meant that the Management Commission had to postpone its decision to join the Kenya Timber Woodworkers Employers Association (KTWEA) (NTCSmin83/86) although the Management Commission did eventually instruct the Society to join the KTWEA based on the strength of a promise made by the Minister of Natural Resources during his visit to the mill site late in the study period of an immediate resumption of log supply (NTCSmin/10/87). The closure of the forest also resulted in a severe reduction in the confidence of the fiscal viability of the enterprise. Although it had been shown that the enterprise was a viable operation on a technical basis (Hemmingson, 1984; NTCS/PM Report.Aug/86), the future action of the government was unpredictable. The Management Commission canceled its plans to expand operations into value-added activities and employees were laid off for an indeterminate period of time (NTCSmin122/86).

Although the closure of the forest had some extremely negative repercussions for the NTCS operation, the positive ratings of some social criteria were recorded as being reinforced after this iteration of the IMA. The policy manual was prepared for review by

the NTCS Management Commission (NTCS/PM Report Aug/86). The reorganized reporting structure and the new job-site descriptions were implemented on the instructions of the Management Commission (NTCSmin28/86, 91/86). The Minister of Cooperative Development conducted a special investigation to thoroughly review and report on the situation at the NTCS (Min. Coop.Dev Report on NTCS March/87).

The closure of the Mount Kenya Forest Reserve to logging operations for an indefinite period of time (Republic of Kenya Legal Notice #89, 1986) resulted in the ratings of five of the criteria for the Economic sphere of the NTCS case study to change to the negative. The degree of access to the resource for the NTCS was made changed by the Minister's closure of the forest reserve. This amendment of the Forest Licence held by the NTCS was made with no consultation or forewarning (Republic of Kenya Legal Notice #89, 1986). The plan to upgrade the logging equipment of the NTCS was canceled by the Management Commission (NTCSmin103/86).

In the aftermath of this fourth iteration, the positive rating of a number of criteria was reinforced. The Minister of Cooperative Development initiated an investigation with a full report by his Headquarter's staff to determine the problems, their causes and possible solutions for the NTCS (Ministry of Cooperative Development Report to the Minister-NTCS Ltd. March 1987) The resulting report focused on the irregular supply of logs as being a major contributing factor to the poor return on net assets at this Society and summarized the many improvements that had been implemented during the eighteen month period prior to the investigation. The sales agent contract, found to be a disadvantage to the Society in the law courts, was canceled (NTCSmin 11/87). Premium prices were set and accepted in the market for milling custom orders (NTCSmin 112/86).

With the outcome of the fourth iteration of the IMA for this case study, the reluctance of the Forest Department to meet the Technical Limit of the enterprise became clearly evident (see Appendix 6.1.1). All stakeholders, with the exception of the Forest Department, agreed that a further application of the IMA was required that would include the full participation of all stakeholders. The Forest Department did not agree to participate in any further discussions during the study period despite repeated encouragement from the Minister of Cooperative Development, the members of the Management Commission and the Chairman of the Cooperative Bank of Kenya (NTCSmin 58/87, 71/87).

6.2 Application of the IMA to Case Study 2

Mingoyo Cooperative Sawmill

6.2.1 Step One - Collection of Information for the Benchmark Situation and Technical Limit and the Development of the Negotiation Aims

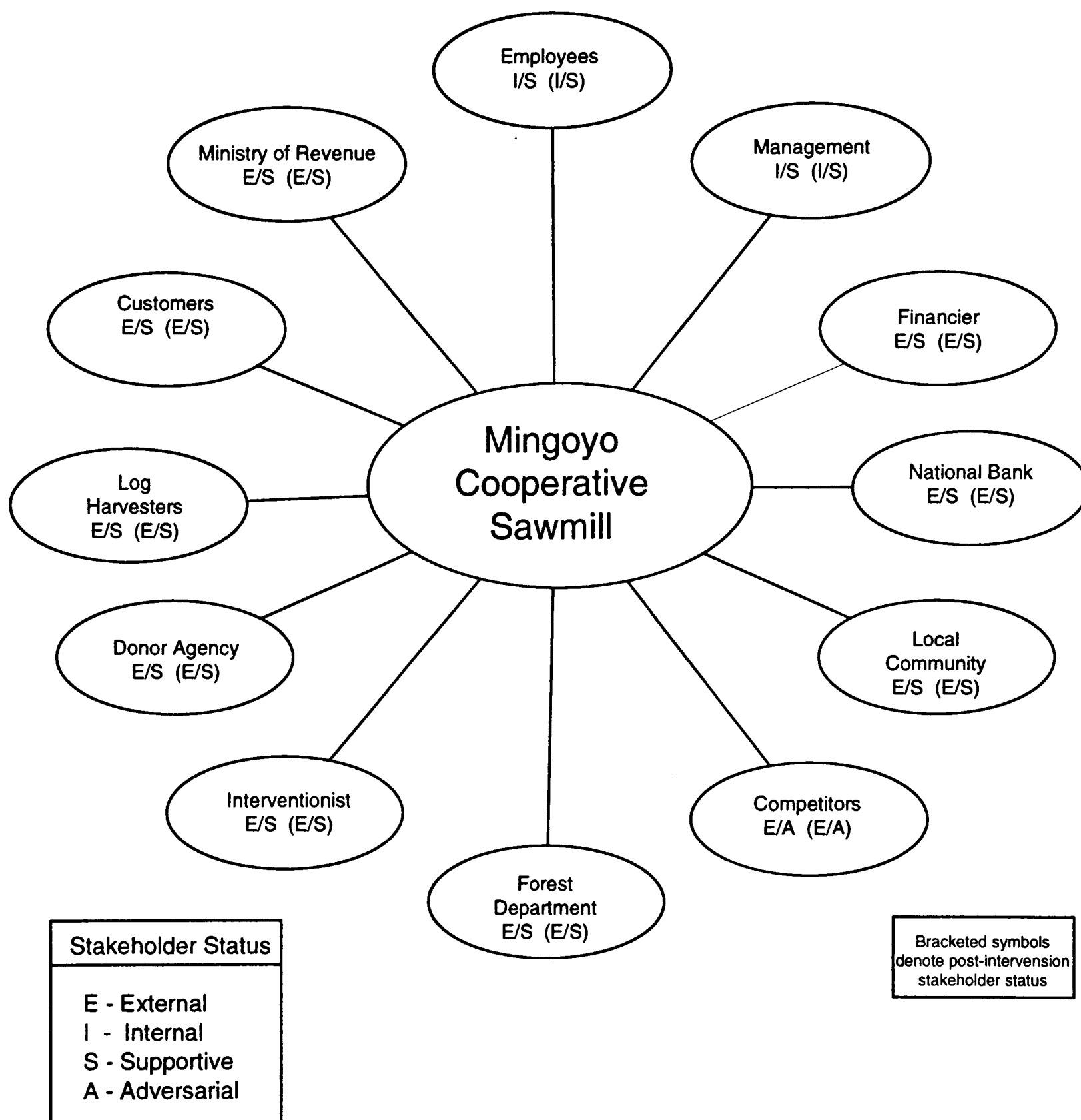
The results of the application of Step One of the IMA to the Mingoyo Cooperative Sawmill are presented in Appendix 1; Sections 1, 2 and 3 of this study. The presentation of the data collected for Step One of the IMA was framed under the headings of the Biological, Social and Economic spheres to emphasize the importance of these three spheres to the conceptual model of sustainable development and to the IMA. The data are listed in Appendices 3.3, 4.2 and 5.2 of this study, under the criteria that were developed to guide the interventionist in the application of the IMA. These criteria provided the foundation upon which the results of the application of the IMA are presented in this chapter.

6.2.2 Step Two - Identification of the Key Stakeholders

In Figure 6.3, the stakeholders for the Mingoyo Cooperative Sawmill case study are mapped. These stakeholders include those who were readily apparent to the interventionist as having influence on, or being influenced by, the activities defined by this case study. For each stakeholder on the map, notations clarify the interventionist's understanding of the stakeholder's position relative to the case study²⁸.

²⁸ As per the description in Section 2.7.2, the notations are E - external, I - internal, A - adversarial and S - supportive. The notations that appear without brackets are those ascribed to the Benchmark Situation and the notations within the brackets are those that describe the stakeholder's position at the end of the intervention period.

Figure 6.3: Stakeholder Map - Mingoyo Cooperative Sawmill



6.2.3 Step Three - Identification of Stakeholder Stakes

The stakes for each of the stakeholders were determined by the interventionist through a review of the enterprise's administration files and reports, contract documents and government documents such as the Acts and Regulations of the various ministries that were interacting formally with the case study and through personal communication on-site. In Table 6.6, the stakes that were identified for each stakeholder category are listed. For this case study, the stakeholder categories and the associated stakes remained unchanged throughout the study period. The stake(s) of a given stakeholder category may change over time and the individual(s) that represent a stakeholder category may also change over time.

Table 6.6: Stakeholders and Stakes - Mingoyo Cooperative Sawmill.

<u>Stakeholder</u>	<u>Stake</u>	<u>Stakeholder Identity:</u> <u>Benchmark Situation</u> Internal - I External - E Supportive - S Adversarial - -A	<u>Stakeholder Identity:</u> <u>Post Intervention</u> Internal - I External - E Supportive - S Adversarial - -A
Employees	job security	I S	I S
	job advancement		
Management: (includes: Local, Headquarters & Government Reps.)	job security	I S	I S
	firm's success		
Financier:	successful investment	E S	E S
	economic development		
National Bank	foreign exchange	E S	E S
	tax revenue		
Local Community	revenue	E S	E S
	service sector opportunities		
Forest Department	revenues from royalty	E S	E S
	job satisfaction		
	forest-based economic development		
Interventionist	the incorporation of the concept of sustainable development into the management of the enterprise	E S	E S
Donor Agency	fulfill agency mandate	E S	E S
	the incorporation of the concept of sustainable development into the management of the enterprise		
Log Harvesters	employment	E S	E S
Customers	reliable supply of quality goods	E S	E S
Competitors	market share	E A	E A
	critical mass of product to maintain market interest		
TOTAL 11	20		

The **employees**²⁹ stakes were centered on *job security* and *job advancement*. Employees were not contracted subject to a union agreement and there was no formal job protection arrangements or any provisions for formal technical training. The **management of the enterprise** included the staff members at the enterprise site and at the TWICO headquarters. There were also a number of bureaucrats within the government that were responsible for the management of the TWICO parastatal organization. The *job security* of the managers on-site was linked to the *firm's success*, and the *personal gain* of these managers, in terms of continued employment and changes in salary level, was dependent on the outcome of an annual evaluation of the success of the enterprise by headquarters' staff. The stakes of the headquarters' staff and the government bureaucrats were linked to the success of the enterprise, but not as intimately as the on-site managers.

The **financier** of this case study was the government of Tanzania, through the offices of TWICO. Part of the mandate of the government was to make *successful investments* through the provision of financial and management support to help improve those indigenous parastatal industries that would provide for *economic development* and benefit the people of Tanzania (Mongala, 1987). On behalf of the government the National Bank of Tanzania managed the *foreign exchange* generated by the export sales of the case study enterprise and also managed the collection of *taxes* based on this trade (Moyo, 1987; Mongala, 1987). The **local community**, as represented by the District Councils where the sawmill was located and where the log harvesting was done, expected to receive *revenues* from log harvesting royalties and from property taxation of the enterprise. The District Councils had also some *service sector opportunities* for their communities based on the enterprise (Miriki, 1987). The **Forest Department** expected to collect *revenues* from royalty rates set on log harvesting. The Forest Department employees also had a stake in achieving some degree of *job satisfaction* in successfully meeting their mandate of managing the forest resource to provide for *forest-based economic development* in Tanzania (Mongala, 1987).

In this case study, the **interventionist** was contracted to a development agency that had agreed to provide support to the government of Tanzania to investigate the potential for establishing a strategy for the *sustainable development* of the mpingo resource. The **donor agency** stakes were to *fulfill the agency's mandate* of promoting conservation and the wise use of resources and to assist nations in their quest to achieve *sustainable development*

²⁹ In this section terms adopted to describe stakeholders will be in bold print and terms adopted to describe stakes will be italicized.

(Zentilli, 1987). The **log harvesters** associated with this enterprise gain *employment* by felling trees and preparing logs for the sawmill foreman to inspect knowing that only those logs that meet the foreman's quality standards are purchased. The **customers** of the sawmill are seeking a *reliable supply of quality goods* upon which to base their manufacturing and marketing strategies (Schmidt, 1987). The **competitors** of the case study enterprise are seeking to increase their *market share* and to ensure that there is a *critical mass of product to maintain market interest* (Nagel, 1987).

6.2.4 Step Four - Assessment of the Effectiveness of the Current Management Strategies in Meeting All the Stakeholders' Perceived Needs

In this step, the interventionist undertook to assess the effectiveness of the current management strategies, as modified by the application of the IMA, in meeting the perceived needs of the stakeholders. For this case study an assessment was made for four stages beginning with the Benchmark Situation and repeated for each of three iterations of the IMA. In Table 6.7, a rating of the effectiveness of the current management strategy in meeting the stakeholders' perceived needs is presented. In this table, a rating of +1 indicates that the current management strategy is meeting the stakeholders perceived needs and a rating of -1 indicates that it is not.

Table 6.7: Stake Effectiveness Chart - Post Intervention - Mingoyo Cooperative Sawmill.

Stakeholder	Stakeholder Identity: Benchmark Situation Internal - I External - E Supportive - S Adversarial - A	Stake	Effectiveness as found : - at Benchmark Situation	- at the First Iteration of the MA	- at the Second Iteration of the IMA	- at the Third Iteration of the IMA	Stakeholder Identity: Post Intervention Internal - I External - E Supportive - S Adversarial - A
Employees	I S	job security	+1	+1	+1	+1	I S
		job advancement	-1	-1	-1	-1	
Management: (includes: Local, Headquarters & Government Reps.)	I S	job security	+1	+1	+1	+1	I S
		firm's success	-1	-1	+1	+1	
Financier: National Government through TWICO	E S	successful investment	-1	-1	+1	+1	E S
		economic development	-1	-1	+1	+1	
National Bank	E S	foreign exchange	+1	+1	+1	+1	E S
		tax revenues	+1	+1	+1	+1	
Local Community	E S	revenue	-1	-1	+1	+1	E S
		service sector opportunities	+1	+1	+1	+1	
Forest Department	E S	revenues from royalty	-1	-1	-1	+1	E S
		job satisfaction	-1	-1	+1	+1	
		forest-based economic development	-1	-1	+1	+1	
Interventionist	E S	the incorporation of the concept of sustainable development into the management of the enterprise	-1	-1	-1	+1	E S
Donor Agency	E S	fulfill agency mandate	-1	+1	+1	+1	E S
		the incorporation of the concept of sustainable development into the management of the enterprise	-1	-1	-1	+1	
Log Harvesters	E S	employment	+1	+1	+1	+1	E S
Customers	E S	reliable supply of quality goods	-1	-1	+1	+1	E S
Competitors	E A	market share	+1	+1	+1	+1	E A
		critical mass of product to maintain market interest	-1	-1	+1	+1	
TOTAL 11		20	7 / +1 (35%)	8 +1 (18%)	16 / +1 (80%)	19 /+1 (95%)	

The data collected under Step One of the IMA for the Biological, Social and Economic spheres (see Appendices 3.2, 4.1 and 5.1) indicated that this case study was not being managed to effectively meet its Technical Limit. As a result, this case study was found to not be effective in meeting most of the stakeholders' needs at the Benchmark Situation.

Of the twenty stakes identified for this case study, only seven were rated as being achieved at the Benchmark Situation. The **employees' job security** was not reported to be in jeopardy as skilled saw operators were not readily available in the area (Moore and Hall, 1987). The **management staffs' job security** was not in doubt as all managers at the enterprise had been trained within the TWICO organization and had long records of experience within the organization (Moyo, 1987). The **National Bank of Tanzania** stakes of securing *foreign exchange* and *taxes* from the activities of this enterprise were met since the export market was the only market for the enterprise's products and the industry was a government operated parastatal and was fully accountable to the government and all its rules and regulations (Mongella, 1987).

First iteration of the IMA - Step Four, Case Study 2

The **first iteration** of the IMA was marked by the comprehensive review of the Tanzanian mpingo sawmilling sector conducted under the auspices of the United Nations Environment Programme (UNEP). This initial iteration provided the foundation for subsequent interventions. After this intervention, one stake changed to the positive as the **financier** gained a greater confidence that the enterprise was a successful investment (Holmes, 1988) and because the managers were given autonomy in managing the enterprise (Mbonde, 1987).

Second iteration of the IMA - Step Four, Case Study 2

The **second intervention** took place approximately one year after the initial intervention and was based on the recommendations that were made from the first intervention. There were two main areas of interest addressed in this intervention. One focus was aimed at more fully developing strategies to improve the management practices of the mpingo resource and the second was focused on the analysis of the processing and marketing activities of the mpingo. There were eight stake ratings that were reported to have changed to the positive with this iteration of the IMA. There was an increase in the confidence of the *firm's success* by the **management** of the enterprise as the production rates approached the planned targets and market demand continued to exceed supply (Moyo, 1988). The **financier** (the National Government) was confident that the enterprise was a *successful investment* for two reasons. The first was that the records that were initiated at the enterprise as a result of the first iteration indicated that the return on the investment was favourable (Holmes, 1988). The second was that the management practices at the enterprise had been streamlined, giving the enterprise management greater autonomy resulting in a more efficient operation (Mbonde, 1988). Based on this confidence of a successful enterprise, the government's stake in promoting *economic development* was also considered to have been met (Mbonde, 1988). The **local**

community's stake of receiving *revenue* from the enterprise was met as the District Council had begun to work with the Forest Department in monitoring the harvesting activities of the enterprise after the first intervention and was receiving royalty payments for timber harvested from the public lands (Nyaki, 1988). Although the **Forest Department** was not yet receiving royalties for the harvested mpingo, a greater degree of *job satisfaction* among the employees was reported to have resulted from the intervention process as many Forest Department employees' experience and enthusiasm for forest management was incorporated into the development of proposed strategies and projects (Nyaki, 1988). The Forest Department's stake in the promotion of forest-based development was in part being met with the increase in production capacity and in employment opportunities (Hall, 1988) and, based on the planned forest management activities (White, 1988), the expectations that the yield of commercially acceptable mpingo from the forest resource would be maintained into the future were supported (Nyaki, 1988). The **customers'** expectations that there would be a *reliable supply of quality goods* were improved as the national production capacity increased and because the producers had more ready access to foreign exchange which allowed them to obtain necessary parts and supplies from foreign sources, however, customers expressed no confidence in predicting the supply situation beyond a period of ten years (Hall, 1988b). The **competitors** of this enterprise were confident that a sufficient amount of product would be produced over time to maintain the *critical mass of product required to maintain market interest* in the species and the Tanzanian supply of mpingo (Hall, 1988b).

Third iteration of the IMA - Step Four, Case Study 2

The **third intervention** (and final iteration for the study period) was defined by an ambitious agenda to encourage the major external stakeholders to support the process of developing a strategy for the sustainable development of the mpingo resource. These stakeholders, identified as the *customers* of the mpingo wood, included the musical instrument manufacturers and retailers, the musicians and the music consumers. Most of these stakeholders do not live in Tanzania and are found around the world. This intervention had two main parts. The first involved contacting the manufacturers and retailers of the musical instruments and the North American Musicians Federation (NAMF) in New York (U.S.A.). Since this is a relatively small number of organizations found in Europe, Japan and the American Federation of Musicians, personal contacts with their representatives was the method employed to educate these users about the objectives of this intervention in the mpingo sector (Lamb, 1990).

The second part of this intervention was aimed at informing the music consumers of the linkages between the music and the source of the wood to manufacture the instruments

they enjoyed listening to. For this part of the third intervention, a documentary television programme (*Mpingo, the tree that makes music*) that outlined the direct linkages between the resource, its management and the end-products was produced (Jones, 1991). The second part of this intervention was supported by the manufacturers, the donor agency, the musicians' federation and the television production company.

Three stake ratings were reported to have changed to the positive during this intervention period. The first was that the **Forest Department** began to collect *royalties* for the harvest of mpingo on public lands (Nyaki, 1990). The second and third change in stake effectiveness rating changes were to a positive rating for the stake of *sustainable development* of the mpingo resource that was held by both the **interventionist** and the **donor agency**. There was an increasingly positive attitude towards sustainable development among most of the stakeholders (Zentilli, 1990). The proposed program of technical projects to incorporate the concept of sustainable development into the management of the mpingo resource was receiving support, and efforts to generate funds to initiate these projects, such as special musical concerts, in Europe were ongoing (Lamb, 1991).

6.2.5 Step Five - Convening the Roundtable

In Step Five of the IMA the interventionist convened the Roundtable to establish stakeholder claims, to negotiate and reach agreement on a Mission Statement and to develop a Stakeholder Action Plan (SAP) for implementation. In this section, a summary of the Roundtable process, the Mission Statement and the SAP and its implementation for each of the iterations of the IMA to the Mingoyo Cooperative Sawmill case study will be presented. In Table 6.8, the stakeholders for this case study are identified and for each iteration of the IMA a shaded area indicates that the corresponding stakeholder was a participant in the Roundtable.

Table 6.8: Participation of Stakeholders in Roundtable Sessions - Post Intervention - Mingoyo Cooperative Sawmill.

<u>Stakeholder</u>	Stakeholders Participating at First Iteration of IMA	Stakeholders Participating at Second Iteration of IMA	Stakeholders Participating at Third Iteration of IMA	<u>Stakeholder Identity:</u> <u>Benchmark Situation</u> Internal - I External - E Supportive - S Adversarial - -A	<u>Stakeholder Identity:</u> <u>Post Intervention</u> Internal - I External - E Supportive - S Adversarial - -A
Employees				I S	I S
Management: (includes: Local, Headquarters & Government Reps.)				I S	I S
Financier: National Government through TWICO				E S	E S
National Bank				E S	E S
Local Community				E S	E S
Forest Department				E S	E S
Interventionist				E S	E S
Donor Agency				E S	E S
Log Harvesters				E S	E S
Customer				E S	E S
Competitors				E A	E A
TOTAL 11	6 (55%)	11 (100%)	6 (55%)		

First iteration of the IMA - Step Five, Case Study 2

The Roundtable for the first iteration was defined by a comprehensive field review of the mpingo sector in Tanzania undertaken in August 1987 (Moore and Hall, 1987). Of the eleven stakeholders identified for this case study, inputs from six were included in the development of the SAP in this iteration. At this stage a Mission Statement was developed that defined the objectives of this intervention. The objectives defined were

to describe the current state of the mpingo resource and its management and, with input from the stakeholders, to develop projects that would improve management of the mpingo resource in the future (Moore and Hall, 1987).

In the SAP that was developed, a need to address this enterprise at two levels was identified. Activities within the Level One category were aimed at long-term, large scale issues that would impact on the overall level of management of the mpingo resource. Two distinct but interdependent sets of action items were identified at this level (see Table 6.9: Level One, Parts A & B). The first set of action items (Level One, Part A) was directed at the improvement of some of the in-house activities of the Forest Department and would require little outside assistance. The second set (Level One, Part B) of the first level was aimed at general forest management needs in Tanzania and would require outside assistance. At Level Two, activities were identified that were aimed at shorter term issues where an immediate impact was considered possible and included a number of short-term operations that focused on the mpingo processing enterprises (see Table 6.9: Level Two). This focus was chosen to direct action to where the pressures on the resource base appeared to be the greatest and to where the best improvements, in the short-term, could be expected in reducing the level of demand on the resource while concurrently improving the marketing opportunities for this case study (Moore and Hall, 1987). Some international expertise and funding was planned to help these activities succeed. These activities were developed to be consistent with the overall, long-term management needs of the mpingo resource and were to provide pilot projects to guide further intervention in this sector (Moore and Hall, 1987).

Table 6.9: SAP Action Items Identified During the First Iteration of the IMA on the Mingoyo Cooperative Sawmill.

Level One - Part A
1) To re-organize the Forest Division line of authority so that Director of Forests is in direct authority over Regional, District and Divisional forest officers. 2) To centralize the issuing of the licence to cut and remove forest products by making it the responsibility of the Regional Forest Officer. The licence should specify the precise locations of harvest, the volumes to be removed and set a time limit for removal. 3) To appoint local, respected individuals to act as "Forest Guardians" with designated areas for patrol in all areas of harvesting pressure. They should be provided with a reasonably quick method for communication with the Forest Division and be assisted if problems arise. They should be subject to supervisory inspections of their areas from time to time. 4). To develop, publish and distribute harvesting standards compatible with minimum waste of the resource. 5) To investigate the feasibility of creating a harvesting company or agency under the direction of the Forest Division to harvest and transport all potentially utilizable pieces of mpingo to a central location for auctioning to saw-millers and carvers in Dar es Salaam. If implemented, all other felling or removal of mpingo would be illegal. 6) To designate a forest officer to inspect and monitor the mpingo sawmilling practices to ensure proper storage of logs, processing and end product treatment. 7) To develop mpingo demonstration plots near forestry offices where various establishment techniques can be implemented and regular weeding, pruning and fire protection can effectively be carried out. Encourage the District and Division Forest Officers to monitor growth and performance of seedlings and to develop workable techniques for extension forestry in their areas. 8) To develop a list of the highest priority Forest Reserve areas for fire protection and, with the limited funds available, begin to implement fire protection measures on reserve lands. 9) To consider methods to make harvesters responsible for regeneration in areas where they harvest mpingo.
Level One - Part B:
1) To identify and delineate concentrations of mpingo for inclusion into Forest Reserves. 2) To undertake an inventory of mpingo in the Reserves so that an appropriate harvesting schedule can be determined. 3) To develop a harvesting and marketing system so that one agency of government or one company would be licenced to harvest all mpingo and transport all potentially usable pieces, including limbs and branches to a central location for auction to various users. 4) To establish demonstration areas within the Reserves to apply silviculture and fire protection techniques to regenerate and grow mpingo. 5) To initiate a study to investigate the extent of man-caused fires and to document the effects of fires on the mpingo in its natural range. This study should suggest appropriate methods for reducing fire impacts on the mpingo resource.
Level Two
1) To conduct a technical review and assessment of the mpingo sawmills and develop an advisory program to upgrade processing and storage techniques, selection and use of equipment, and saw maintenance. This advisory program would best be developed in conjunction with a market and end-products development project. 2) To conduct a survey to determine possible waste or by-product material sources in both the sawmilling and carving industries which could be used in new product development or new applications of mpingo wood. 3) To survey the overseas markets to find new potential uses for mpingo wood. Those uses would emphasize the fine qualities of the wood and would focus on both industrial products such as flooring and handmade products such as bowls, buttons, jewelry and cutlery. Once new products had been identified, training of artisans would be necessary to ensure that foreign market standards are met. The production of new products within the industry must be promoted and encouraged along with marketing assistance.

This SAP was reviewed by the donor agency and the Tanzanian Forest Department. These stakeholders agreed on this SAP. Part A of Level One of this SAP was the responsibility of the Tanzanian Forest Department to implement. Funding was secured by the donor agency for the development of the long-term activities (Table 6.9: Level One, Part B) and for the implementation of the short-term activities (Table 6.9: Level Two). The implementation of this SAP began less than one year after the first iteration was completed.

Second iteration of the IMA - Step Five, Case Study 2

The second intervention in this case study was focused on the funded portion of the SAP. All stakeholders were reported to have been involved in the development of a SAP in this iteration (see Table 6.8). The Mission Statement for this iteration recognized that there was a need for a SAP that included two approaches. For Level One, the mission was to develop detailed plans for the improved management of the mpingo resource over the long-term that could be funded by donor agencies. These plans were to include as much local input as possible (White, 1988). The mission for Level Two was to analyse the sawmilling practices of the case study sawmill and to survey potential export markets for mpingo by-products from current billet production for the benefit both of the case study enterprise and of the resource (Hall, 1988a,b). Additional technical information was required by the interventionists for both levels.

For Level One, the interventionist undertook a field assessment that incorporated on-site advice from stakeholders at the local level and the national level. This information provided the foundation for the development of a comprehensive plan of forest management activities (see Appendix 6.2.4) that were developed specifically for implementation at the local level with the minimum of outside involvement. This approach was also aimed at providing a greater definition to mpingo needs in a national forest management strategy that appeared to be necessary due to the lack of forest reserves that encompass mpingo habitat, the absence of harvesting standards and the absence of protection of mpingo habitat from fire (Moore and Hall, 1987). To guide in the development of the SAP, a number of principles were chosen: 1) to provide a comprehensive plan for the improved management of the mpingo resource comprised of a suite of elements that could either stand alone or function in combination, 2) to involve the local administration, industries and labour force, 3) to emphasize self sufficiency by encouraging the use of local technology and equipment in these projects, and 4) to link these activities with other forest management initiatives, where possible.

For Level Two the interventionist undertook two detailed surveys to obtain more specific information regarding: a) the processing practices (Hall, 1988a) and b) the potential export markets for the by-products of mpingo billet production of the case study (Hall, 1988b). The results of the first survey indicated that the cost of inefficiencies in the harvesting, processing and marketing of mpingo was transferred to the forest resource. For example, the harvesting of the mpingo trees was done by private individuals who, in most cases, attempted to maximize their opportunities for log sales by preparing as many logs as possible for the inspection of the log buyer from the sawmill. The only constraint on the number of trees harvested were those that were self-imposed by the log harvester. The log buyer was responsible to supply the sawmill with logs from various distant locations. The only vehicle available for log transport was in a poor state of repair and unreliable. Because log transport was unreliable, only the very best quality logs were selected by the log buyer. The rest of the logs were left in the forest and not utilized at all. The absence of reliable log transport was identified as the most crucial limiting factor in this case study operation (Moyo, 1988). In the sawmill, the poor condition of the equipment contributed to excessive waste through inaccurate cutting and excessive saw kerf widths (Moyo, 1987).

Marketing practices at the enterprise were found to be inefficient because of the exporting regulations of the central government (Mongi, 1987). Direct marketing was therefore difficult and an informal cartel had formed for the purchasing of the billets (Moyo, 1987). This resulted in less competitive market conditions and also in poor feedback mechanisms on quality control from the manufacturers to the producers. A SAP was developed that consisted of "one-time-only" projects (Appendix 6.2.5) that could be funded by end-users of mpingo (for example, manufactures, musicians and concert goers). These projects were to help reduce specific inefficiencies in the case study processes in the short-term, while the long-term forest management and industrial monitoring practices were improved. End-users were to be invited to participate in supporting activities with the understanding that, if successfully implemented, a reduction in the current rate of harvest and an improvement in the long-term outlook for sustainable development of the mpingo resource would result.

Also, detailed information was collected on the quantity and quality of the by-product material by the interventionist (Hall, 1988b). This information was used in the international survey of potential export markets for mpingo by-products. The completed market survey was made available to all stakeholders to serve as a catalyst for the improvement of the marketing strategies, thereby improving the level of utilization of the logs processed at this case study sawmill.

Both the Level One, Part B and Level Two SAP were approved by the stakeholders. Funding for Level One, Part B activities was identified, however, the Tanzanian representatives indicated that it was their intention to integrate the mpingo forest management plans into the national forest management strategy being developed under the Tropical Forest Action Plan (TFAP) (Zentilli, 1989). The Level Two projects were also accepted by the stakeholders and a strategy to incorporate the end-users was initiated by the lead donor agency (Lamb, 1989).

Third iteration of the IMA - Step Five, Case Study 2

The **third intervention** in this case study focused on an effort to encourage the end-users of mpingo to participate in the management of the mpingo resource. The end-users targeted in this intervention included stakeholders classified as *customers* in the broadest sense, such as the manufacturers of musical instruments that are made from mpingo billets, musicians and consumers of music such as concert attendees in North America and Europe. The Mission Statement for this intervention was to directly involve mpingo consumers in the management strategy for the sustainable development of the mpingo resource. This Mission Statement led to the development of a SAP for this intervention that had three initiatives. The first initiative was to gather support for the need to link the management of the mpingo resource to the end-users who generate the demand for it through a financial commitment by the users to the mpingo forest management program. This effort was directed at the organization representing the professional musicians of North America (Federation of North American Musicians, FNAM). The second initiative was to improve public awareness of the linkage between the forest resource, such as the mpingo, and end-users through the production of a television documentary tracing the linkages defined by mpingo from the forest to the concert hall. The third initiative was to use the funds from the end-users to implement the short-term projects that were developed as part of the Level Two of second intervention (Lamb, 1989).

Funding to support the three initiatives of this SAP were identified by the lead donor agency (Zentilli, 1989), however, a series of complications that included unexpected changes in key personnel within the donor agency led to a delay in the disbursement of these funds for the first initiative (Brevik, 1990). The preparations for the second initiative (the documentary) were not impeded by the delay in funding. When the funds did become available, the timing was such that the documentary was completed within the planned time frame (Lamb, 1991). The planned level of activity for the first part of this intervention was not possible to arrange (Brevik, 1991), however, with the

success of the documentary, new plans to revitalize this action plan were being developed by the donor agency (Fontigny, 1992).

6.2.6 Step Six - Internal Monitoring of the Progress of the SAP to Determine the Achievements of the IMA and/or the Need to Reapply the IMA

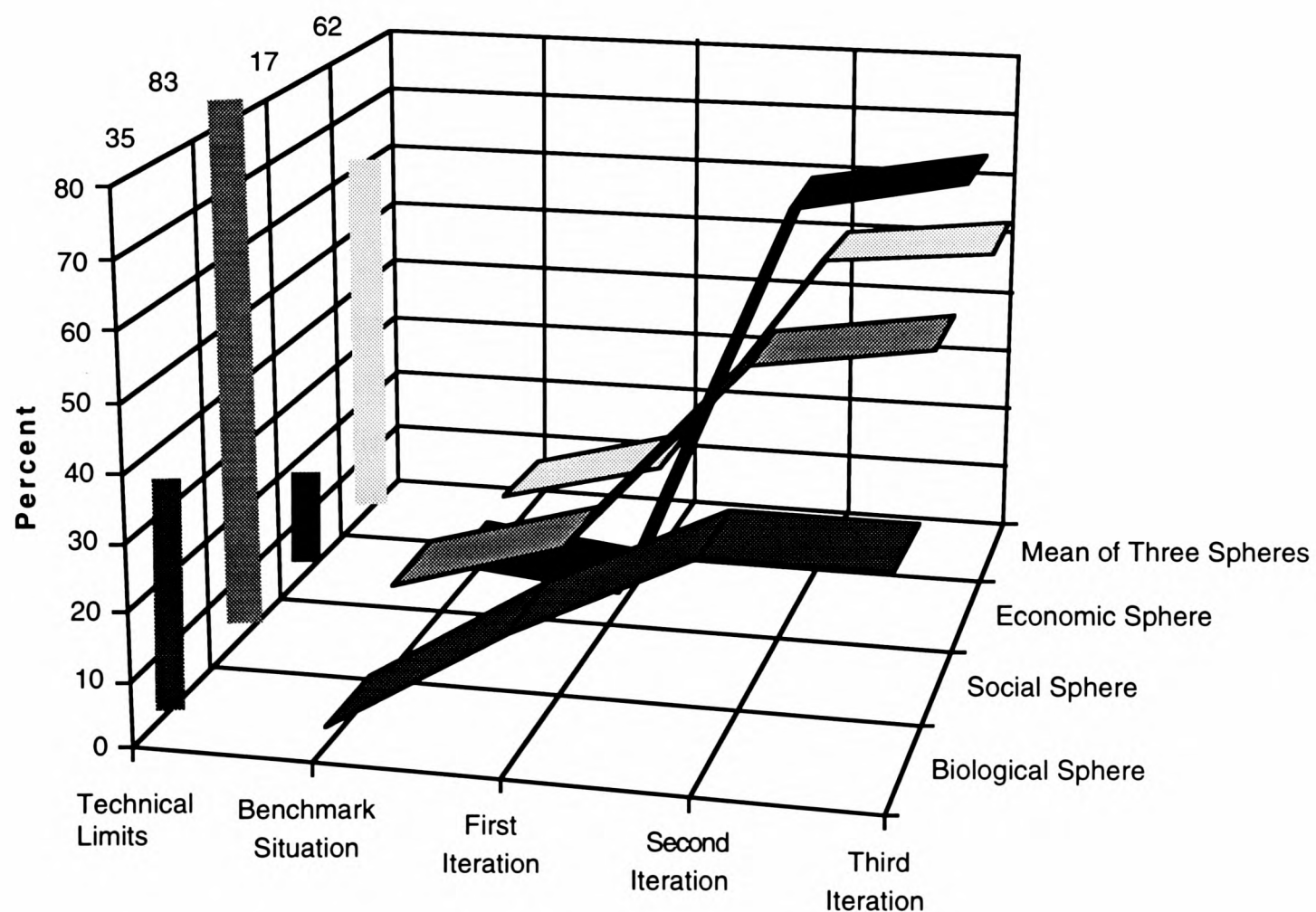
The IMA is an iterative process; therefore a post-application evaluation of the effects of its application to the case study is required after each iteration so that subsequent applications are improved. In this step of the IMA, the changes to the criteria of the three spheres of the conceptual model of sustainable development are recorded for each iteration. Each criteria is also rated, as suggested in Section 2.7.4, to provide a preliminary indication of the level of impact each application of the IMA has on the case study. The results of the application of the IMA to the Mingoyo Cooperative Sawmill case study and the post intervention rating for each criteria are recorded in fully referenced tables in Appendices 6.2.1, 6.2.2 and 6.2.3.

The post intervention ratings for the criteria of each of the three spheres that describe the conceptual model of sustainable development are summarized in Table 6.10 . A graphic presentation of these values is shown in Figure 6.4. The rating values of the Benchmark Situation are much lower than the values for the Technical Limit. The rating values increase as the IMA is applied over three iterations. The Benchmark Situation for the three spheres of this case study is presented in Chapters 3, 4 and 5. In the following section, the changes to the criteria of the Mingoyo Cooperative Sawmill case study will be summarized from the information in Appendices 6.2.1, 6.2.2 and 6.2.3.

Table 6.10: Summary of Criteria Ratings - Mingoyo Cooperative Sawmill.

Phase of IMA:	Technical Limit		Benchmark Situation		Intervention 1		Intervention 2		Intervention 3	
Sphere:	# of ratings +1	%	# of ratings +1	%	# of ratings +1	%	# of ratings +1	%	# of ratings +1	%
Biological (31 criteria)	11	35	1	3	6	19	10	32	10	32
Social (24 criteria)	20	83	3	13	5	21	12	50	13	54
Economic (35 criteria)	25	17	2	6	1	3	23	66	25	71
Total (90 criteria)	56	62	6	7	12	14	45	50	48	53

Note: the number of criteria having a positive one (+1) rating at each iteration for each sphere is expressed as a percentage of the total number of criteria that were assigned to each sphere (and the total of all three spheres for the case study).

Figure 6.4: Criteria Rating Summary - Mingoyo Cooperative Sawmill.

The assessment that followed the first iteration of the IMA indicated that there were six changes to the positive and one change to the negative in the forest management criteria

ratings (Appendix 6.2.1). The threat of the felling of mpingo trees growing on public lands likely to be cleared for agriculture was reduced. The District Councils that held jurisdiction over the harvesting areas of this enterprise agreed to initiate a ban on felling mpingo trees on lands that were to be cleared for agriculture (Nyaki, 1987). Based on the results of the compilation of data from all "known-age" mpingo trees, the Tanzanian Forest Department confirmed that action was needed to determine and regulate appropriate cutting levels for mpingo (Mzina, 1988). A project to provide more detailed inventory information that would be specific to determining the location and distribution of commercially viable mpingo resources was developed and funded (Zentilli, 1987; Mzina, 1987). The Tanzanian Forest Department accepted the recommendation of Moore and Hall (1987) to set and specify harvest standards for mpingo (Nyaki, 1987).

Silvicultural treatments to promote the regeneration of mpingo trees that could be integrated into current harvesting practices were developed (Moore and Hall, 1987) and the Forest Department, sawmillers and logging foreman were informed of these techniques (Nyaki, 1987). *Costings* was the one criterion that changed to the negative because the expected increase in the proportion of the selling price of mpingo that was allocated to mpingo forest management did not materialize (Nyaki, 1987).

First iteration of the IMA - Step Six, Case Study 2

There were three Social sphere criteria ratings that were reported to have changed to the positive after the first iteration of the IMA on the Mingoyo Cooperative Sawmill case study and one criterion rating that changed to the negative (Appendix 6.2.2). Positive changes resulted from plans to reduce government requirements for exporting to allow enterprises a greater degree of flexibility and freer access to portions of the foreign exchange earned through export sales (Holmes, 1987). A mechanism to improve management and employee dialogue through meetings to be facilitated by the District Forester was suggested and agreed to by local stakeholders (Moore and Hall, 1987). Restrictions on the manager of the enterprise in importing essential supplies that would improve the level of efficiency of the enterprise were documented and assessed to support suggestions for change (Moore and Hall, 1987). The criterion rating for the positive international externalities of this enterprise changed to the negative because the high degree of positive value that was recognized as an outcome of the end-use of the mpingo resource at the international level were not linked by the end-users to current, unsustainable mpingo forest management and exploitation practices (Moore and Hall, 1987).

Second iteration of the IMA - Step Six, Case Study 2

There were changes to some of the criteria ratings of each sphere after the second iteration of the IMA to this case study. The number of reported criteria ratings that changed to the positive were three in the Biological sphere, seven in the Social sphere and twenty-three in the Economic sphere (Appendices 6.2.1, 6.2.2, 6.2.3). In the Biological sphere, improved information on the species composition of the ecosystems where mpingo is found was expected through an inventory project that would include, for the first time, commercial specifications for the mpingo (White, 1988). A comprehensive plan for the protection of the mpingo species within a sustainable development strategy for Tanzania was developed (Zentilli, 1988). Improvements were also expected to be made in the setting of felling cycles for sustained yield of commercially acceptable mpingo trees through the development of a strategy for the sustained yield of commercially acceptable mpingo. This was the objective of the UNEP sponsored project "Inventory and Reserve Programme for South-East Tanzania" (White, 1988).

In the second iteration, the ratings of seven criteria for the Social sphere of this case study changed to the positive. Documented policy and procedures were drafted and both the management and the employees of the case study reported that communication at the mill had improved (Moyo, 1988). The lines of reporting had been redefined and the respective roles of the staff at TWICO headquarters and at the Mingoyo sawmill had been determined and the greater autonomy of the local managers was formalized (Holmes, 1988). Marketing was also improved as the management of the enterprise was given greater autonomy (Mbonde, 1988), which also led to discussions with the Central Bank of Tanzania regarding the streamlining of the mechanism for the purchase of billets by foreign customers (Nyaki, 1989). A mechanism was developed within a proposed project "Forest Reserve Boundary Demarcation and Firebreak Construction South-East Tanzania" (White, 1988) to enable the local community to receive a direct share of the profits from the export of mpingo.

To support the development of activities that could potentially increase the number and quality of local positive externalities from the enterprise, a survey of the Mingoyo Cooperative Sawmill was conducted to identify the quality and the quantity of mpingo production of billets and by-product materials (Hall, 1988a). Suggested measures that were to increase the number and to improve the quality of positive externalities at the national level were based on the results of the survey of mpingo end-users that outlined the improved opportunities for the direct sales of billet and billet production by-product material (Hall, 1988b). A research scholarship fund for mpingo by-product conversion

was also suggested to provide further positive externalities from the mpingo-based economic activities through improving the management of the resource, increasing domestic mpingo related research and improving the utilization of felled trees (Hall, 1988b). Improvements to international positive externalities were promoted by the launching of a campaign by UNEP (and funded by the Finnish International Development Agency, FINNIDA) to improve the chances of sustainable development of the mpingo resource and to promote its wise use from the forest to the concert hall (Zentilli, 1988).

Local negative externalities of mpingo production included low standards of worker safety and health in the mill. A small grant proposal that was aimed at initiating a pilot programme to improve the safety of mill workers was developed and supported by UNEP (Hall, 1988b).

The ratings of twenty-two criteria were recorded as having changed to the positive in the Economic sphere of this case study after the second application of the IMA. (Appendix 6.2.3). Planned increases in the level of control over the access to the mpingo resource were expected to be facilitated through the development of pilot projects sponsored through UNEP, called the "Provision of Central Selling Facility to Mpingo Merchants in Dar es Salaam" and "Inventory and Reserve Programme South East Tanzania" (White, 1988). Knowledge of the total available volume of commercially acceptable mpingo trees was improved through the amalgamation of existing survey work on mpingo through a project sponsored by UNEP and FINNIDA (Moore and Hall, 1987). Future available volumes were planned through the development of two projects entitled "Forest Inventory and Forest Reserve Programme in South East Tanzania" and a "Forest Reserve Boundary and Firebreak Construction South East Tanzania" (White, 1988). Logging equipment and log transport equipment was to be improved through the development of a small grant proposal for the upgrade of log transport methods at a pilot sawmill to demonstrate that log transport was the dependent variable in tree felling rates.

A proposal that would reduce the ratio of trees felled to trees brought to the mill for processing that would be funded by end-users of mpingo received positive reaction both from the lead donor agency and from end-users (Zentilli, 1988). The ownership of the enterprise remained with the government of Tanzania; however, the management of this enterprise was given greater autonomy by TWICO, its governing parastatal (Mbonde, 1988). The enterprise initiated a records system for its mpingo production that was separate from the rest of the enterprise activities to enable more accurate

accounting of the net return on assets, overhead and depreciation and production costs (Holmes, 1988).

An analysis of the sawmill production practices was conducted to determine the quality and quantity of mpingo billets and billet production by-product materials as a basis upon which to determine sawnwood production per shift, average timber recovery rate, quality control, material handling practices and opportunities for resawing by-product material for export (Hall, 1988a). Correct seasoning of the billets was a crucial operation that effected the suitability of the mpingo billets in musical instrument manufacturing (Nagel, 1988). To improve the opportunity for feedback on billet quality from the manufacturer to the sawmiller, the management initiated a system to identify production lots by date and to improve shipping methods that were aimed at reducing degrade during the shipment of billets (Mbonde, 1988). Grading practices were to be improved through the initiation of a system that used 0.25 cubic metre wooden crates, identified by production date, to store and ship graded billets (Mbonde, 1988). An international survey of end-users resulted in their unanimous rejection of the proposal that the case study enterprise be involved in the processing of mpingo beyond the billet stage (Hall, 1988b). The end-users surveyed however, endorsed an increase in the direct sales of the billet production by-product material (Hall, 1988b). A survey was undertaken by the interventionist to identify existing and potential competitors to the case study sawmill, to locate and estimate available volumes of alternate sources of mpingo and to estimate current and future sawmill production capacity to produce billets (Hall 1988a,b).

To help improve the productivity of the enterprise and its efficiency, an innovative collaboration with donor agencies aimed at specific activities within the enterprise was developed by the stakeholders (Hall 1988a). To reduce overhead and delays in management decision-making caused by centralized decision-making arrangements, the management of this TWICO affiliate enterprise was given greater autonomy and responsibility (Mbonde, 1988). The results of information collected on direct sales of billet production by-products (Hall, 1988b) led to further discussions between TWICO and the Central Bank of Tanzania regarding the streamlining of purchasing arrangements for foreign buyers to encourage direct sales and a more competitive market (Nyaki, 1989). Existing export records were traced and evaluated against field records. The resulting assessment of these records led to a recognition of the need for central record-keeping of exports and production to provide a benchmark on prices and a standard measure of the number of billets in a cubic metre (Saria, 1988). An investigation, funded by UNEP, was undertaken to identify the advantages of direct

marketing and of improved customer relations to the producers and to identify the necessary steps to successfully implement these changes (Hall, 1988b).

Third iteration of the IMA - Step Six, Case Study 2

The third iteration of the IMA to this case study was focused on the end-users (customers) of the mpingo resource. Action was taken for only one criterion in the Biological sphere. An initial investigation was made into the applicability of microscopic crystal deposition in mpingo wood in determining its growth rate (Gourlay, 1991). As this was a prefatory investigation, the rating for the criterion growth rates was not changed to the positive and so, for the third iteration, the ratings in the Biological sphere did not change (Appendix 6.2.1). For the Social sphere, there were three ratings that changed to the positive and two ratings that changed to the negative as a result of the third application of the IMA to the Mingoyo Cooperative Sawmill case study (Appendix 6.2.2).

Although the proposed "Mpingo Cooperative Sawmill Equipment Upgrade Project" did not receive funding the mill management was able to improve blade supply and maintenance through greater access to foreign exchange and through the recognition that improved planning for expected needs was an essential component for improved efficiency (Holmes, 1989). A positive attitude developed among the producers of mpingo billets and the managers of the mpingo resource towards a common objective of improving the management of the resource for the benefit of the nation (Nyaki, 1990). The North American Musicians Federation (NAMF) and a number of North American and European musicians and musical instrument manufacturers contributed funds for the production of a television documentary that was shown in over 40 countries. This treatment was aimed at increasing the awareness in the developed world of the needs and opportunities for improving the management of the mpingo resource and to emphasize the direct linkages between the producers and the end-users of mpingo. The message of a need for equitable participation in the management of the resource was also emphasized (Jones, 1991; Lamb, 1991). A third positive outcome of this intervention has been the whetting of the IMA as a mechanism to facilitate the introduction of local, national and international values into the system of mpingo management.

Two criteria ratings of the Economic sphere of this case study were reported to have changed to the negative in the third iteration of the IMA. The planned improvements in the logging equipment through the suggested one-time-only infusion of capital were not followed through because staff changes at main coordinating institution (UNEP)

resulted in delays in action being taken and in the implementation of this proposal. Funds that had been allocated were lost as the period of the lead donor agency's fiscal commitment lapsed (Zentilli, 1989).

At the conclusion of the study period, it was increasingly apparent that the momentum generated during the study period was being compromised because the intervention process within the lead donor agency had not been successfully institutionalized. Much of the initiative taken after the second intervention was generated by the interventionist without the active support from within the lead donor agency. There was an unexpected turnover of personnel soon after the second intervention (Zentilli, 1990). More recently, however, personnel at the lead donor agency are revisiting this process and further interventions are anticipated (Fontigny, 1992).

6.3 Application of the IMA to Case Study 3: African Blackwood Enterprises

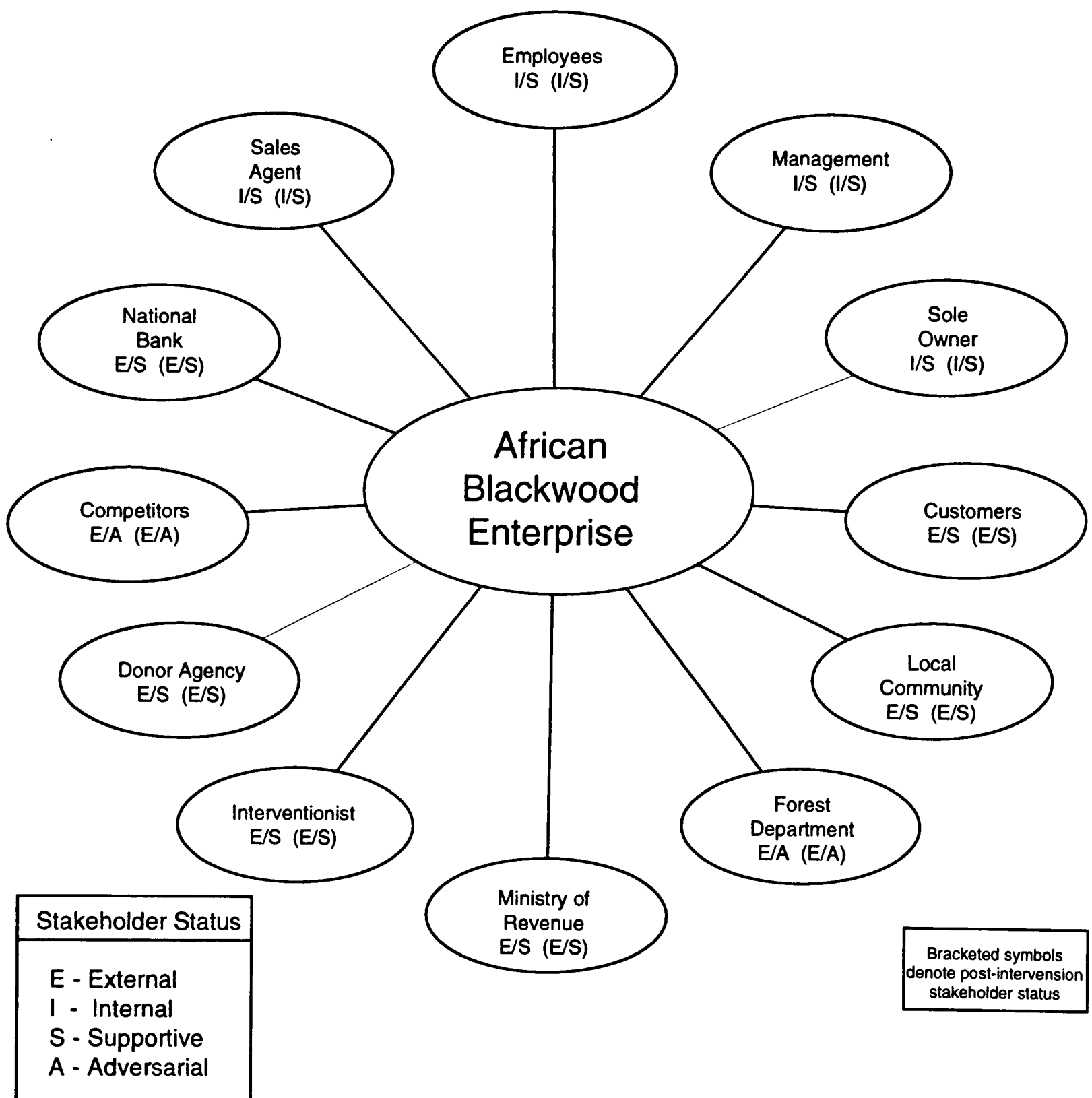
6.3.1 Step One - Collection of Information for the Benchmark Situation and Technical Limit and the Development of the Negotiation Aims

The results of applying Step One of the IMA to African Blackwood Enterprises are presented in Appendix 1; Sections 1, 2 and 3 of this study. The information collected is listed in Appendices 3.3, 4.2 and 5.2 of this study and provides the basis for the presentation of the results of the application of the IMA. The presentation of the data collected for Step One of the IMA is framed under the headings of Biological, Social and Economic to emphasize the importance of the three spheres comprising the conceptual model of sustainable development (Chapter 1). The application of the IMA to this case study was concurrent with that of Case Study 2. The main difference between the two case studies, identified at the outset, is that Case Study 3 is managed by its owner (Moore and Hall, 1987). Government sanctioned private enterprise was introduced to independent Tanzania about one year prior to the application of the IMA to this case study (Mongella, 1987). The government of Tanzania, the donor agencies, the interventionist and the management of Case Study 2 were interested in assessing this new format of stakeholder in the mpingo sector (Moore and Hall, 1987).

6.3.2 Step Two - Identification of the Key Stakeholders

In Figure 6.5, the stakeholders for the African Blackwood Enterprises case study are mapped. Those stakeholders that are mapped are those that were readily apparent to the interventionist as having influence on or as being influenced by the activities associated with this case study. For each stakeholder on the map, there are notations that indicate the interventionist's understanding of that stakeholder's position relative to the case study (as per the description in Section 2.7.2)³⁰.

³⁰ As per the description in Section 2.7.2, the notations are E - external, I - internal, A - adversarial and S - supportive. The notations that appear without brackets are those ascribed to the Benchmark Situation and the notations within the brackets are those that describe the stakeholder's position at the end of the intervention period.

Figure 6.5: Stakeholder Map - African Blackwood Enterprises.

6.3.3 Step Three - Identification of Stakeholder Stakes

The stakes for each of the stakeholders were determined by the interventionist through a review of the enterprise's administration files and reports, contract documents and government documents such as the Acts and Regulations of the various ministries interacting formally with the case study and through personal communication on-site. In Table 6.11, stakes that were identified for each stakeholder category are listed. In most cases, these stakeholder categories and the associated listed stakes remained unchanged throughout the study period, however it is possible that both the individuals in the stakeholder category and the stakes may change over time. The notations that are without brackets indicate the stakeholder's position at the Benchmark Situation and the notations within the brackets are for the stakeholder's position at the end of the study period.

Table 6.11: Stakeholders and Stakes - African Blackwood Enterprises.

Stakeholder	Stake	Stakeholder Identity <i>Benchmark</i> Internal - I External - E Supportive - S Adversarial - -A	Stakeholder Identity <i>Post Intervention</i> Internal - I External - E Supportive - S Adversarial - -A
Employees	job security	I S	I S
	job advancement		
Management	job security	I S	I S
	personal gain		
	firm's success		
Sole Owner	successful investment	I S	I S
	job satisfaction		
	personal gain		
Customers	reliable supply of quality goods	E S	E S
Local Community	service opportunities	E S	E S
	stable employment		
	revenues		
Forest Department	revenues from royalties	E A	E A
	forest-based economic development		
	job satisfaction		
Interventionist	the incorporation of the concept of sustainable development into the management of the enterprise	E S	E S
Donor Agency	fulfill agency mandate	E S	E S
	the incorporation of the concept of sustainable development into the management of the enterprise		
Competitors	critical mass of product to maintain market interest	E A	E A
	market share		
National Bank	foreign exchange	E S	E S
Ministry of Revenue	tax revenues		
Sales Agent	supply of product	I S	I S
TOTAL 11	23		

The **employees**³¹ stakes were centered on *job security* and *job advancement*. Employees were not contracted subject to a union agreement and there was no formal job protection arrangements or any provisions for formal technical training. The **management of the enterprise** included the staff employees at the enterprise site. The

³¹ In this section terms adopted to describe stakeholders will be in bold print and terms adopted to describe stakes will be italicized.

job security of these managers was linked to the *firm's success* and the *personal gain* of these managers, in terms of continued employment and changes in salary level, was dependent solely on the decision of the owner of the enterprise (Amin, 1987).

The **sole owner** of this case study was also the manager on-site (Amin, 1987). The owner's stated intention for the enterprise was to make a *successful investment* and through providing financial and management inputs achieve *job satisfaction* and improve his own *personal gain* from the enterprise (Amin, 1987). The **customers** of this enterprise were seeking a *reliable supply of quality goods* upon which to base their manufacturing and marketing strategies (Schreiber, 1987). The **local community**, as represented by the District Councils where the sawmill was located and where the log harvesting was done, expected to receive *revenues* from log harvesting royalties and from property taxation of the enterprise. The District Councils also anticipated some *service sector opportunities* for their communities based on the enterprise (Miriki, 1987). The **Forest Department** expected to collect *revenues* from royalty rates set on log harvesting. The Forest Department employees also had a stake in achieving some degree of *job satisfaction* in successfully meeting their mandate of managing the forest resource to provide for *forest-based economic development* in Tanzania (Mongala, 1987).

In this case study, the **interventionist** was contracted to a development agency that had agreed to provide support to the government of Tanzania to investigate the potential for establishing a strategy for the *sustainable development* of the mpingo resource. The **donor agency** stakes were to *fulfill the agency's mandate* of promoting conservation and the wise use of resources and to assist the nation in its quest to achieve *sustainable development* (Zentilli, 1987). The **competitors** of the case study enterprise are seeking to increase their *market share* and to ensure that there is a *critical mass of product to maintain market interest* (Nagel, 1987). On behalf of the Ministry of Revenue of the Government of Tanzania, the **National Bank** expected to receive *foreign exchange* and *tax revenues* from the activities of this enterprise (Amin, 1987; Mongala, 1987). The stake of the **sales agent** that was connected with this enterprise was a *supply of product* (Amin, 1987).

6.3.4 Step Four - Assessment of the Effectiveness of the Current Management Strategies in Meeting All the Stakeholders' Perceived Needs

In this Step, the interventionist undertook to assess the effectiveness of the management strategies, that had been modified by the application of the IMA, in meeting the perceived needs of the stakeholders. In this case study, an assessment was made for four stages beginning at the Benchmark Situation and repeated for each of three iterations of the IMA. A rating of the effectiveness of the current management strategy in meeting the stakeholders' perceived needs is presented in Table 6.12. In this table, a rating of +1 indicates that the current management strategy is meeting the stakeholders' perceived needs and a rating of -1 indicates that it is not.

Table 6.12: Stake Effectiveness Chart - Post intervention - African Blackwood Enterprises.

Stakeholder	Stakeholder Identity: <u>Benchmark Situation</u> Internal - I External - E Supportive - S Adversarial - A	Stake	Effectiveness as found : - at Benchmark Situation	- at First Iteration of IMA	- at Second Iteration of IMA	- at Third Iteration of IMA	Stakeholder Identity: <u>Post Intervention</u> Internal - I External - E Supportive - S Adversarial - A
Employees	I S	job security	+1	+1	+1	+1	I S
		job advancement	-1	-1	-1	-1	
Management	I S	job security	+1	+1	+1	+1	I S
		personal gain	+1	+1	+1	+1	
		firm's success	+1	+1	+1	+1	
Sole Owner	I S	successful investment	+1	+1	+1	+1	I S
		job satisfaction	+1	+1	+1	+1	
		personal gains	+1	+1	+1	+1	
Customers	E S	reliable supply of quality goods	+1	+1	+1	+1	E S
Local Community	E S	service opportunities	+1	+1	+1	+1	E S
		stable employment	-1	+1	+1	+1	
		revenues	-1	-1	+1	+1	
Forest Department	E A	revenues from royalties	-1	-1	+1	+1	E A
		forest-based economic development	-1	+1	+1	+1	
		job satisfaction	-1	-1	+1	+1	
Interventionist	E S	the incorporation of the concept of sustainable development into the management of the enterprise	-1	-1	-1	+1	E S
Donor Agency	E S	fulfill agency mandate	-1	-1	+1	+1	E S

		the incorporation of the concept of sustainable development into the management of the enterprise	-1	-1	-1	+1	
Competitors	E A	critical mass of product to maintain market interest	+1	+1	+1	+1	E A
		market share	+1	+1	+1	+1	
National Bank	E S	foreign exchange	+1	+1	+1	+1	E S
Ministry of Revenue		tax revenues	+1	+1	+1	+1	
Sales Agent	I S	supply of product	+1	+1	+1	+1	I S
TOTAL	23		15 / +1 8 / -1 (65%)	16 / +1 7 / -1 (70%)	20 / +1 3 / -1 (87%)	22 / +1 1 / -1 (96%)	

In the previous three chapters, the data collected under Step One of the IMA for the Biological, Social and Economic spheres (see Appendices 3.2, 4.1 and 5.1) indicated that the case study was not being managed to effectively meet its Technical Limit. As a result, this case study was found to not be effective in meeting many of the stakeholders' needs at the Benchmark Situation. Of the twenty-three stakes identified for this case study, fifteen were rated as having been achieved at the Benchmark Situation.

The **employees' job security** was not reported to be in jeopardy as skilled saw operators were not readily available in the area (Moore and Hall, 1987). The **management staff** were confident in their *job security*, and in their opportunities for *personal gain* and in the *firm's success* as they had prior experience working for the owner in other successful businesses (Amin, 1987). The **sole owner** reported that he was confident that this enterprise would be a *successful investment* through which he expected to acquire significant *personal gains* and *job satisfaction* (Amin, 1987). The **customers** of this enterprise were confident that the enterprise would be a *reliable supplier of quality goods* (Nagel, 1987; Schrieber, 1987). With the establishment of this new enterprise that directly employed over 40 people, the **local community** was able to increase its *service opportunities* (Miriki, 1987). This enterprise had established a reputation among its

competitors that it would be able to contribute to maintaining a *critical mass of product to maintain the market base* for Tanzanian producers (Moyo, 1987).

Although the various producers of mpingo billets in Tanzanian operate under competitive conditions, there was also a recognition among them that it was important for the industry as a whole to maintain its *market share* and not to lose business to other producers or to similar products made from other tree species or materials (Amin, 1987; Holmes, 1987). The **National Bank of Tanzania's** interest in securing *foreign exchange* and *taxes* from the activities of this enterprise were met because the export market was the only market for this enterprise's products (Mongella, 1987). The **sales agent** of this enterprise was based in the United Kingdom and as a designated preferred sales representative for the sole owner, was ensured of the best supply of product from this enterprise (Amin, 1987).

First iteration of the IMA - Step Four, Case Study 3

The **first iteration** of the application of the IMA to this case study was marked by a comprehensive review of the Tanzanian mpingo sawmilling sector conducted under the auspices of the United Nations Environment Programme (UNEP). This intervention provided the foundation for subsequent iterations of the IMA. After this intervention, one stake changed to the positive as the Forest Department gained a greater confidence that the enterprise would make a positive contribution to forest-based economic development (Mbonde, 1987).

Second iteration of the IMA - Step Four, Case Study 3

The **second intervention** of the application of the IMA to this case study took place approximately one year after the initial intervention and was based on the recommendations that were made from the first intervention. There were two main areas of interest addressed in this intervention. One focus was aimed at more fully developing strategies to improve the management practices of the mpingo resource and the second was focused on the analysis of the processing and marketing activities of the mpingo. There were four stake ratings that were reported to have changed to the positive with this iteration of the IMA. The **local community** had been able to work with the enterprise and the Forest Department to make arrangements for the enterprise to pay some *revenues* for mpingo logs that were transported from the district (Miriki, 1988). The Forest Department was also successful in collecting *revenues from royalties* for the volume of logs delivered to the mill (Nyaki, 1988). This accomplishment of collecting royalties from mpingo wood deliveries improved the level of *job satisfaction* for the local **Forest Department** officials (Miriki, 1987). Through the process of

intervention in cooperation with the local government and industry representatives, the donor agency was able to *fulfill its mandate* (Zentilli, 1988).

Third iteration of the IMA - Step Four, Case Study 3

The **third intervention** of the application of the IMA to this case study (and final iteration for the study period) was defined by an ambitious agenda that was designed to encourage some of the major external stakeholders to support the process of developing a strategy for the sustainable development of the mpingo resource. This agenda, aimed at both Case Study 2 and Case Study 3 has been described in Section 6.2.4.

Two stake ratings were reported to have changed to the positive during this intervention period. The changes in stake effectiveness ratings were for the stake termed *sustainable development* held by both the **interventionist** and the **donor agency**. This rating change was made based on the increasingly positive attitude among most of the stakeholders towards supporting efforts to achieve sustainable development (Zentilli, 1990). The proposed program of technical projects to incorporate the concept of sustainable development into the management of the mpingo resource was receiving support and efforts to generate funds to initiate these projects, such as special musical concerts in Europe, were ongoing (Lamb, 1991).

6.3.5 Step Five - Convening the Roundtable

In Step Five of the IMA, the Roundtable is convened by the interventionist to establish stakeholder claims, to negotiate and reach agreement on a Mission Statement and to develop a Stakeholder Action Plan (SAP) for implementation. In this section, a summary of the Roundtable process, the Mission Statement and the SAP and its implementation for each of the iterations of the IMA to the African Blackwood Enterprises case study will be presented. In Table 6.13, the stakeholders for this case study are identified and for each iteration of the IMA shown on this table, a shaded area indicates that the corresponding stakeholder was a participant in the Roundtable.

Table 6.13: Participation of Stakeholders in Roundtable Sessions - Post-Intervention - African Blackwood Enterprises.

<u>Stakeholder</u>	<u>Stakeholders Participating at the First iteration of MA</u>	<u>Stakeholders Participating at the Second Iteration of IMA</u>	<u>Stakeholders Participating at the Third iteration of IMA</u>	<u>Stakeholder Identity: Benchmark Situation</u> Internal - I External - E Supportive - S Adversarial - A	<u>Stakeholder Identity: Post Intervention</u> Internal - I External - E Supportive - S Adversarial - A
Employees				I S	I S
Management				I S	I S
Sole Owner				E S	I S
Customers				E S	E S
Local Community				E S	E S
Forest Department				E A	E A
Interventionist				E S	E S
Donor Agency				E S	E S
Competitors				E A	E A
National Bank				E S	E S
Sales Agent				I S	I S
TOTAL 11	7 (64%)	10 (91%)	7 (64%)		

First iteration of the IMA - Step Five, Case Study 3

The Roundtable for the first iteration was defined by a comprehensive field review of the mpingo sector of August 1987 that was lead by Moore and Hall (1987). Of the eleven stakeholders identified for this case study, inputs from seven were included in the development of the SAP. The intervention process for this case study was undertaken in parallel with the intervention for Case Study 2 and the SAP that was produced is outlined in Section 6.2.5. At this stage a Mission Statement was developed that defined the objectives of this intervention, which were to describe the current state of the mpingo resource and its management and, with input from the stakeholders, to develop projects that would improve the management of the mpingo resource in the future (Moore and Hall, 1987).

The SAP for this iteration was reviewed and agreed to by the case study stakeholders. Part A of Level One of this SAP was the responsibility of the Tanzanian Forest Department to implement. Funding was secured by the lead donor agency for the development of the long-term activities (Table 6.9: Level One, Part B) and for the implementation of the short-term activities (Table 6.9: Level Two). The implementation of this SAP began less than one year after the first iteration was completed.

Second iteration of the IMA - Step Five, Case Study 3

The second intervention in this case study was focused on the funded portion of the SAP and began with the assignment of the interventionists. All stakeholders except the U.K. based sales agent were reported to have been involved in the development of an SAP for this iteration (see Table 6.13). The Mission Statement for this iteration recognized that there was a need for a SAP that included two approaches. For Level One, the mission was to develop detailed plans for the improved management of the mpingo forest resource over the long-term that could be funded by donor agencies. These plans were to include as much local input as possible (White, 1988). The forest management plans for the mpingo forest resource as described for Case Study 2 were to apply to this case study also. The mission for Level Two was to analyse the sawmilling practices of the case study sawmill and to survey potential export markets for mpingo by-products from current billet production for the benefit both of the case study enterprise and of the resource (Hall, 1988a,b). Additional technical information was required by the interventionists for both levels.

For Level One, the interventionist undertook a field assessment that incorporated on-site advice from stakeholders at the local and the national level. This information provided the foundation for the development of a comprehensive plan of forest management activities (see Appendix 6.2.4) that were developed specifically for implementation at the local level with the objective of minimum outside involvement. This approach was also aimed at providing a greater definition to mpingo needs in a national forest management strategy that appeared to be necessary due to the absence of forest reserves of mpingo habitat, the absence of harvesting standards and the absence of protection of mpingo habitat from fire (Moore and Hall, 1987). To guide in the development of the SAP, a number of principles were chosen: 1) to provide a comprehensive plan for the improved management of the mpingo resource, comprised of a suite of elements that could either stand alone or function in combination, 2) to involve the local administration, industries and labour force, 3) to emphasize self sufficiency of the enterprise by encouraging the use of local technology and equipment

in these projects, and 4) to link these activities with other forest management initiatives, where possible.

For Level Two the interventionist undertook two detailed surveys to obtain more specific information regarding a) the processing practices (Hall, 1988a) and b) the potential export markets for the by-products of mpingo billet production (Hall, 1988b). The results of the first survey indicated that the cost of inefficiencies in the harvesting, processing and marketing of mpingo were transferred to the forest resource. For example, the log supply for this case study was obtained by a logging crew that was supervised by the sawmill staff. Government harvesting standards or rules were not successfully imposed on this activity by the authorities and no royalties were paid to the government. Harvest rates were not reported by the enterprise to the government (Mariki, 1988). The log harvesting activities of this case study were not limited by the availability of log transport (as was the situation for Case Study 2). Log harvesting was undertaken in areas up to 150 kilometres from the sawmill and the location of harvesting sites changed frequently. The authorities were not informed as to where the harvest was located at any given time and, having no transport available, they were unable to monitor the harvest activities (Mariki, 1988).

Marketing practices at this enterprise were a combination of direct sales to the end-users and indirect sales through a U.K. based sales representative of the enterprise (Amin, 1988). The SAP developed during this intervention included the "one-time-only" projects (listed in Appendix 6.2.5) that could be funded by willing end-users of mpingo (for example, manufacturers, musicians and concert goers). These projects were aimed at both Case Study 2 and Case Study 3. The sole owner of the enterprise expressed a willingness to participate in the SAP on the condition that his authority over the enterprise and the confidentiality of the enterprise accounts would not be compromised by his participation (Amin, 1988).

The quantity and quality of the by-product material produced by this enterprise was assessed by the interventionist (Hall, 1988b). A summary of this information was used as a reference during the survey of potential export markets for mpingo by-products undertaken by the interventionist (Hall, 1988b). The completed market survey was made available to all stakeholders to serve as a catalyst for the improvement of the enterprise's marketing strategies, thereby improving the level of utilization of the logs processed. The sole owner of this enterprise reported that the results of the international survey were used to establish marketing links with buyers of mpingo billet by-product material (Amin, 1987).

Both Level One, Part B and Level Two of the SAP were approved by the stakeholders. Funding for Level One, Part B activities was identified, however the Tanzanian representatives indicated that it was their intention to integrate the mpingo forest management plans into the national forest management strategy being developed under the Tropical Forest Action Plan (TFAP) (Zentilli, 1989). Level Two projects were also accepted by the stakeholders and a strategy to incorporate the end-users was initiated by the lead donor agency (Lamb, 1989).

Third iteration of the IMA- Step Five, Case Study 3

The third intervention in this case study was a parallel process to the third intervention of Case Study 2 and is described in detail in Section 6.2.5. The Roundtable process included the seven stakeholders listed in Table 6.13.

6.3.6 Step Six - Internal Monitoring of the Progress of the SAP to Determine the Achievements of the IMA and /or the Need to Reapply the IMA

The IMA is an iterative process; therefore a post-application evaluation of the effects of its application to the case study is required after each iteration so that subsequent applications can be improved. In this step of the IMA, the changes to the criteria of the three spheres of the conceptual model of sustainable development are recorded for each iteration. Each criterion is also rated, as suggested in Section 2.7.4, to provide a preliminary indication of the level of impact each application of the IMA has on the case study. The results of the application of the IMA to the African Blackwood Enterprises case study and the post intervention rating for the criteria are recorded in fully referenced Appendices. The Biological sphere for this case study is treated in parallel to Case Study 2 and therefore the Appendix for the Biological sphere for this case study (6.2.1) is the Appendix for the Biological sphere of Case Study 2. The appendices for the Social and Economic spheres, which are unique for this case study, are found in Appendices 6.3.1 and 6.3.2.

The post intervention ratings for the criteria of each of the three spheres that describe the conceptual model of sustainable development are summarized in Table 6.14 and a graphic presentation of these values is shown in Figure 6.6. In this graph, the rating values are shown for the Benchmark Situation and for each iteration as the IMA is applied. The Benchmark Situation for each of the three spheres of this case study is presented in Appendix 1; Sections 1, 2 and 3. In the following section, changes to the

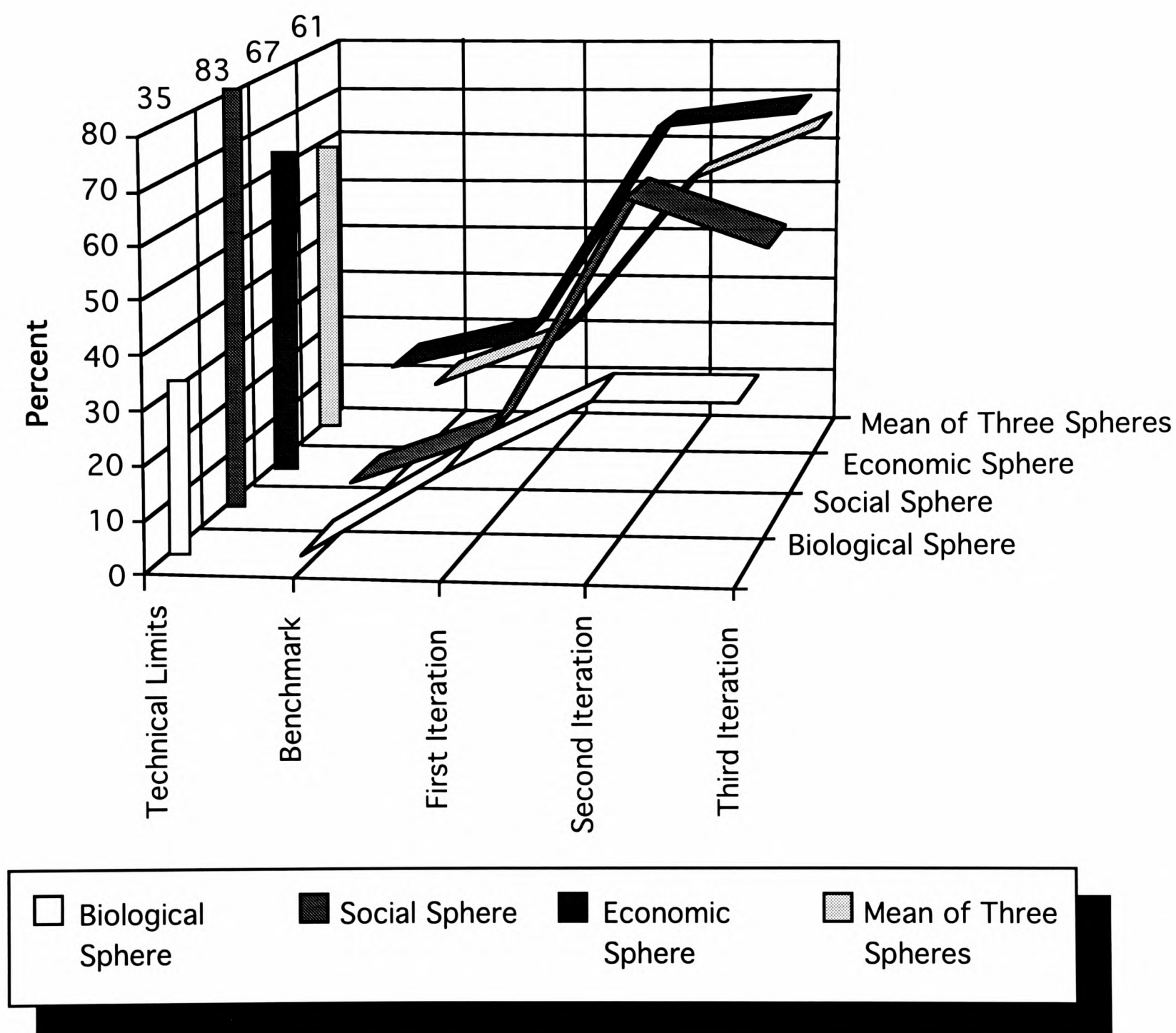
criteria of the African Blackwood Enterprises case study will be summarized from the information presented in Appendices 6.3.1 and 6.3.2.

Table 6.14: Summary of Criteria Ratings - African Blackwood Enterprises.

Phase of the IMA:	Technical Limit		Benchmark Situation		Intervention 1		Intervention 2		Intervention 3	
Spheres:	# of ratings +1	%	# of ratings +1	%	# of ratings +1	%	# of ratings +1	%	# of ratings +1	%
Biological (31 criteria)	11	35	1	3	6	19	10	32	10	32
Social (24 criteria)	20	83	2	8	4	17	15	63	13	54
Economic (35 criteria)	24	67	8	23	10	29	25	71	26	74
Total (90 criteria)	55	61	11	12	20	22	50	55	59	66

Note: the number of criteria having a positive one (+1) rating at each iteration for each sphere is expressed as a percentage of the total number of criteria that were assigned to each sphere (and the total of all three spheres for the case study)

Figure 6.6: Criteria Rating Summary - African Blackwood Enterprises.



First iteration of the IMA - Step Six, Case Study 3

The assessment that followed the **first iteration** of the IMA indicated that there were four changes to the positive in the social welfare criteria ratings (Appendix 6.3.1). Three criteria ratings of the Economic sphere changed to the positive (Appendix 6.3.2). Positive changes in the Social sphere resulted as government officials recognized the need to facilitate a rapid processing of supply contracts for enterprises that earn foreign exchange and government requirements were reported to have been changed for

processing import requests of enterprises (Amin, 1987). As a private entrepreneur, the owner of this mill considered himself to be more flexible than his counterparts in government managed enterprises and as such he was able to take advantage of changes in Tanzanian laws that gave exporters better access to the foreign exchange their exports earned, which in return could be used to purchase necessary supplies from foreign suppliers (Amin, 1987). The collection of baseline information on the mpingo sector to provide a foundation upon which to develop a national strategy for the mpingo-based sector of the economy was seen as an indirect cost that was necessary for the long-term sustained development of this sector in Tanzania (Moore and Hall, 1987).

Positive changes to the Economic sphere criteria were recorded for three criteria after the first iteration. A record-keeping system of logging costs was initiated by the owner that led to better estimates of log delivery costs (Amin, 1987). A survey was completed of the mpingo-based sector in Tanzania (initiated by UNEP in collaboration with the Government of Tanzania) to establish a comprehensive assessment of this sector including the identity of all mpingo processing enterprises and their ownership patterns (Moore and Hall, 1987). The sawyers responsible for billet production in the sawmill were also responsible for cross cutting mpingo logs before they were fed into the sawmill. These sawyers worked on a production bonus system and were motivated to develop experience in "reading" the logs to maximize the production opportunities of the "bell shaped" billet. Bell shaped billets were the limiting factor in the completion of billet sets. This system was put in place to maximize the billet set production from logs delivered (Amin, 1987).

Second iteration of the IMA - Step Six, Case Study 3

After the second iteration of the IMA to this case study, the ratings of fourteen criteria were reported to have changed to the positive for the Social sphere and sixteen changed to the positive for the Economic sphere (Appendices 6.3.1 and 6.3.2). For the Social sphere, representatives from the District Councils where log harvesting occurred began to conduct ongoing audits of billet production at this enterprise as a basis for tax assessment (Mariki, 1988). Information collected from private and parastatal mpingo processors provided baseline data for the assessment of the comparative advantages to Tanzanian society of the private and state run systems of mpingo production (Hall, 1988a). A report of a survey of potential international markets for mpingo billets and billet production by-products and for alternate sources of mpingo timber was undertaken to determine potential demand and possible opportunities for employment generation (Hall, 1988b). A survey of workers was undertaken and job satisfaction was found to be tempered by employees' concerns over the absence of safety measures in

the sawmill. A proposal for upgrading worker safety conditions through stakeholder support was prepared (Hall 1988a). The impact of exporting regulations and procedures on selling prices was assessed. Government officials indicated a willingness to change the process to facilitate direct buyers that wished to purchase only smaller volumes of less than one cubic metre per year (Mbonde, 1988). The existing mpingo export records were traced and evaluated against field records. This led to recognition of the need for central record-keeping of exports and production by the Forest Department (Saria, 1988).

Although the income for this enterprise was based on foreign currency, action was taken by this owner to improve the preventative maintenance program to reduce the negative effects of inflation and an unstable local currency (Amin, 1989). The District Council assigned officers to monitor harvesting and to collect royalty payments on logs delivered to the mill (Mariki, 1988). A mechanism was developed whereby the local community would receive a share of profits directly from mpingo exports within a proposed project entitled "Forest Reserve Boundary Demarcation and Firebreak Construction in South East Tanzania" (White, 1988). A sawmill analysis was conducted to determine the quality and the quantity of mpingo production of billets and by-product materials (Hall, 1988a).

A survey and report of end-users outlined opportunities for direct sales of billet and billet production by-product material³² (Hall, 1988b). Opportunities for the export sales of mpingo billet production by-products directly from the producers (rather than through agents or wholesalers) were identified (Hall, 1988b). The Mpingo Campaign was established (by UNEP through funding by FINNIDA) to support activities aimed at sustaining the mpingo resource and at promoting its wise use from the forest to the concert hall (Zentilli, 1988). A proposal entitled "Mpingo sawmill workers' safety upgrading" was a small grant proposal aimed at initiating a pilot programme to improve the safety of mill workers (Hall, 1988b). Sixteen projects were developed for the improvement of the management of the mpingo-based sector of Tanzania to reduce indirect costs at the national and international levels (Appendices 6.2.4 and 6.2.5; Hall, 1988a&b; White, 1988).

In the Economic sphere, conditions changed for sixteen criteria. To improve the level of control over access to the mpingo resource, project proposals were developed through a UNEP sponsored programme in collaboration with the government of Tanzania. These

³² Billet production by-product material is a term used to describe the solid sawn mpingo wood pieces that do not meet the criteria for musical instrument billets.

projects were for the establishment of a central selling facility for mpingo, for the establishment of mpingo forest reserves and for a forest inventory that included commercial aspects of the mpingo resource. Funding for these projects was secured from a donor agency (Zentilli, 1989). An estimate of the total available volume of mpingo was made through the amalgamation of the existing survey work on mpingo through a UNEP/FINNIDA sponsored project (Moore and Hall, 1987). Also, the projects "Inventory and Reserve Programme in South East Tanzania" and "Forest Reserve Boundary and Firebreak Construction in South East Tanzania" were studies developed to secure known resources of mpingo over time (White, 1988).

A technical study was undertaken of this mpingo-based industry to identify areas of potential improvement to the physical plant that resulted in a number of proposed project proposals focusing on improving employee safety and upgrading of sawmill equipment (Hall, 1988a). The study of this enterprise determined its log input capacity and its production capacity (Hall, 1988a). The Mpingo Campaign resulted in a number of proposals receiving approval for funding from the lead donor agency that were aimed at improving recovery rates of billets and reducing log harvest rates and included the "Mpingo By-Product Conversion Project", the "Small Log Recovery and Sawmill Equipment Upgrade Project" and the "Establishment of Mpingo Forest Reserves Project" (Hall, 1988a; White 1988). A technical study of this enterprise identified areas of potential improvement to increase timber recovery rates and in a number of project proposals being developed by stakeholders that focused on improving the mpingo sector in Tanzania (Hall, 1988a).

An analysis of the logging and sawmilling industry was conducted to determine the comparative standard of production for this enterprise and the quality and quantity of the log harvest and of the production of mpingo billets and by-product materials to determine the production efficiency of this enterprise (Hall, 1988a). The sole owner had initiated a system to identify production lots by date and improved shipping methods to reduce billet degrade during shipment (Amin, 1988). This method was to pack billets in 0.25 cubic metre wooden crates marked with production dates for use in storage at the mill and for shipment so that feedback on billet grade from the buyer to the producer would be possible (Amin, 1988). An analysis of the logging and sawmilling industry was conducted to determine the quality and quantity of by-product materials that could be resawn into marketable products (Hall, 1988a). End-users were surveyed and they unanimously rejected the processing of mpingo beyond the billet stage at Tanzanian sawmills (Hall, 1998b). A survey of end-users was completed that outlined

opportunities for the direct sales of billet and billet production by-product material. This survey was distributed to all mpingo producers (Hall, 1988b).

Third iteration of the IMA - Step Six, Case Study 3

The third iteration of the IMA to this case study focused on the end-users (customers) of the mpingo resource. For the Social sphere, there were no negative ratings that changed to the positive. Two ratings changed to the negative after the third application of the IMA to the African Blackwood Enterprises case study (Appendix 6.3.1). One rating was changed to the negative for the criterion of the community's share of profits. The mechanism that had been developed in the second iteration was found to have not been put into practice (Nyaki, 1990) because funds that had been allocated by the lead donor agency for project implementation were withdrawn (Zentilli, 1990). The rating for the criterion for the improvement of worker safety was also changed to the negative as staff changes at the main coordinating institution (UNEP) resulted in a delay in action. The proposed strategy was not implemented because funds that had been allocated were lost as the lead donor's period of fiscal commitment lapsed (Zentilli, 1989). The owner's efforts to improve worker safety were negligible after this iteration of the IMA (Nyaki, 1990).

The ratings for three criteria of the Economic sphere were reported to have changed to the positive after the third iteration of the IMA to this case study. After the existing export records were traced and evaluated against field records, the resulting assessment of these records led to the recognition within the Forest Department of the need for a central record-keeping system for exports and production of mpingo, which was subsequently implemented (Saria, 1988). The sole owner of this enterprise followed up on marketing leads provided through UNEP intervention to establish indirect export sales of billet production by-products (Amin, 1990). The end-users (musical instrument manufacturers and musicians) that were contacted were found to be supportive of proposed collaborative efforts to improve the harvesting and utilization of the mpingo resource (Lamb, 1989).

Two criteria ratings of the Economic sphere changed to the negative after the third iteration of the IMA. The projects that had been scheduled to improve the level of control over and to determine the volume of mpingo available in the forest were not undertaken because staff changes at the main coordinating institution (UNEP) resulted in delays in action being taken and in the implementation of the proposals. The funds that had been allocated were lost as the period of lead donor's fiscal commitment lapsed (Zentilli, 1989).

6.4 Review and Evaluation of the Application of the IMA

6.4.1 Methodology for Summarizing the IMA Outcomes

In this study, it is suggested that the IMA is a useful tool to guide the interventionist in the incorporation of the concept of Sustainable Development into an existing management system. The IMA was developed recognizing that economic activity often occurs under frontier conditions where the use of traditional management evaluation methods have proven ineffective.

In Sections 6.1 to 6.3, the results of the application of the IMA to three case studies were presented. Now a review and evaluation of the IMA will be presented separately for each case study. This will be followed by a general critique of the IMA based on the case study experiences. This critique will lead to an outline of suggestions for improvements to the IMA that could be tested in further applications of the IMA.

In evaluating the effectiveness of the IMA for the case studies, four measures were used to provide a means of comparing the impact of applying the IMA to each of the three case studies. The four measures for each sphere were derived from the tables that have been included in the text of the study. These four measures are:

- the criteria rating summary for each sphere,
- stakeholder participation,
- satisfaction of stakes, and
- the mean of the three spheres' criteria ratings.

It is important to note that the data presented in this section are not weighted³³. The results of the evaluation are summarized and presented in percentage form. Further, although every effort is made through the IMA to promote the development of the most comprehensive listings of criteria for the three spheres, not all elements that have affected or may potentially affect the case study are included. However, the method chosen to present the results provides a good indication of the gross impact of the IMA on the case study system. Through the progressive presentation of the results of the application of the IMA, each participant is given a means to observe trends in the change in ratings. Whether these changes are viewed as positive or negative, they

³³ The weighting of many criterion chosen for these case studies can be a function of the personality of the stakeholder representative. Weighting can therefore change over time as conditions change and as personalities change, however, weighting could also be a formal function of the Roundtable process.

provide a prompt to the participants to examine the data to determine the conditions that led to the change and through the iterative process, to continue to shape the outcomes of the case study activity.

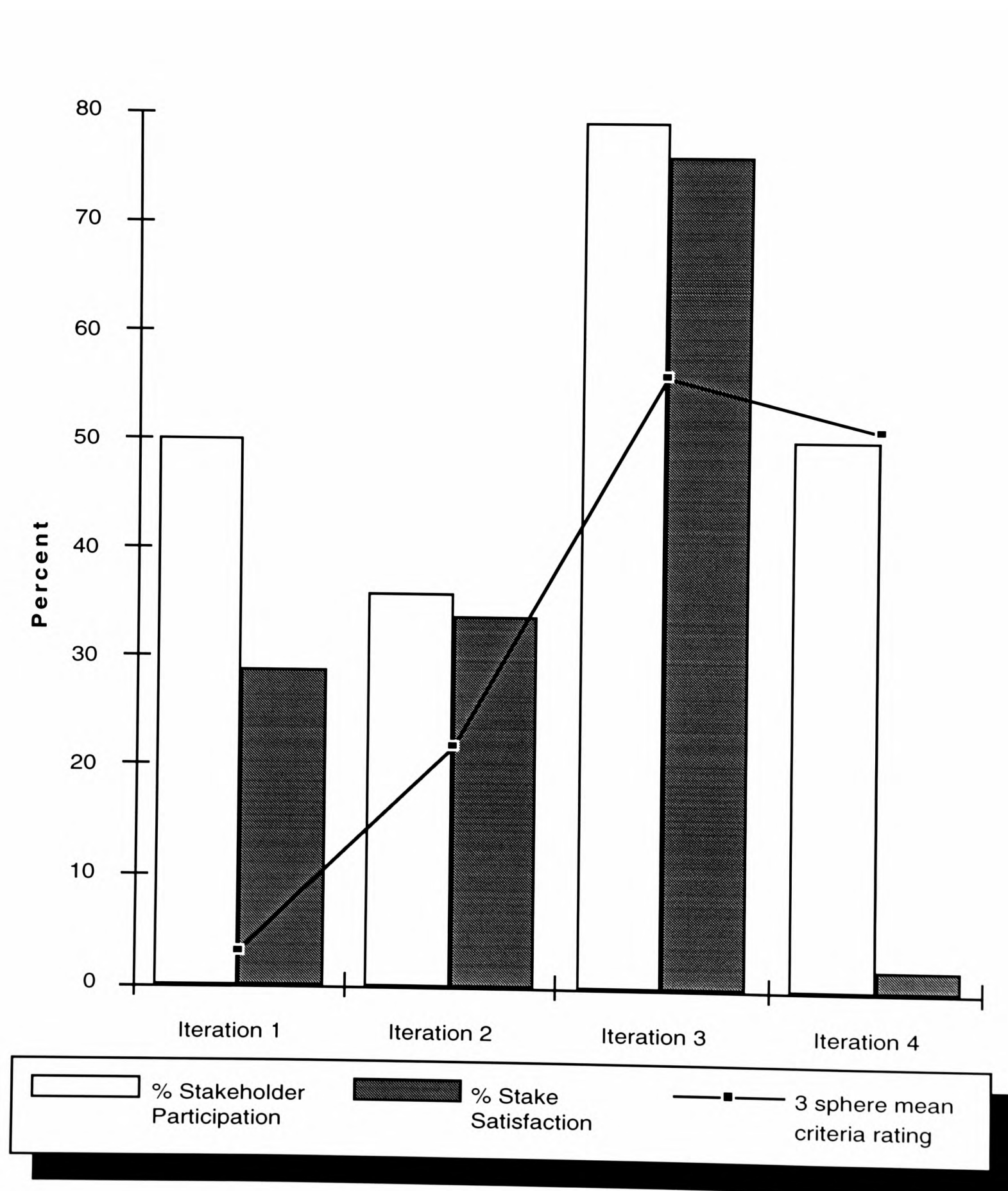
6.4.2 Review and Evaluation of the Application of the IMA to the Case Studies

i) Case Study 1: Nithi Timber Cooperative Society Limited

Figure 6.2 summarized the criteria ratings for the three spheres of the conceptual model of sustainable development for each iteration of the IMA during the study period for this enterprise. For each sphere the criteria ratings for the Benchmark Situation dropped significantly from the Technical Limit ratings, but subsequently increased through to the third iteration. The criteria ratings dropped again at the fourth iteration. At the end of the study period the ratings are reported at a higher level than that found at the Benchmark Situation; however, these criteria ratings still did not equal the criteria ratings level determined for the Technical Limit.

In Figure 6.7, a summary of stakeholder participation, satisfaction of stakes and the mean of the three spheres' criteria ratings is shown for the study period. The general trend that can be identified from the information presented in this graph is one of increasing stake satisfaction over the first three iterations, followed by a dramatic drop at the fourth iteration. Stakeholder participation and the criteria ratings follow a similar pattern; however, for these measures the drop in the last iteration is less puissant than for the stake satisfaction.

Figure 6.7: Stakeholder Participation, Stake Satisfaction and the Mean of the Three Spheres' Criteria Ratings - Case Study 1.

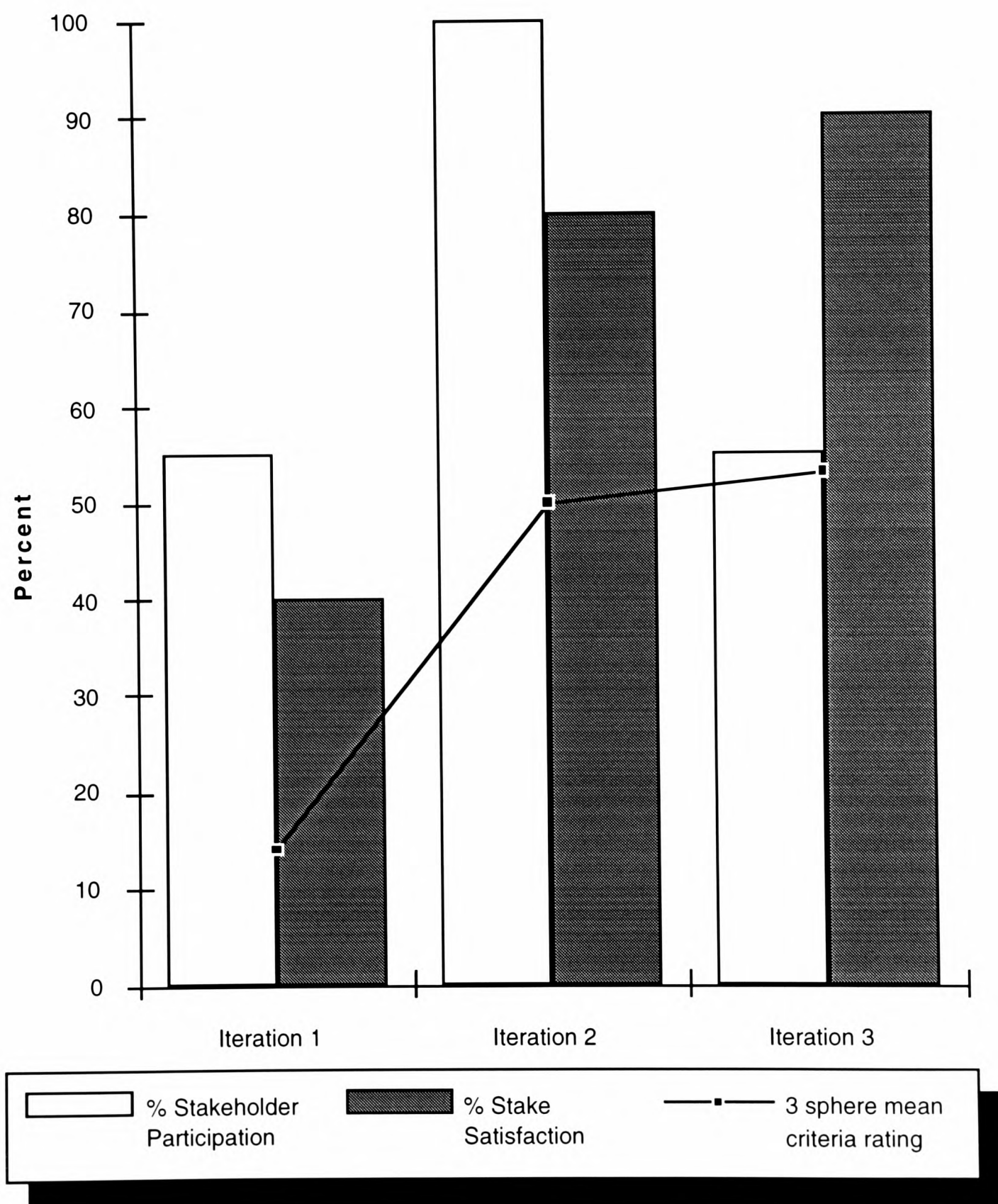


ii) Case Study 2: Mingoyo Cooperative Sawmill

Figure 6.4 summarized the criteria ratings for the three spheres of the conceptual model of sustainable development for each iteration of the IMA during the study period for this enterprise. For each sphere the criteria ratings for the Benchmark Situation dropped significantly from the Technical Limit ratings, but subsequently increased through to the third iteration. At the end of the study period the ratings are reported at a higher level than that found at the Benchmark Situation, however these criteria ratings still did not equal the criteria ratings levels established for the Technical Limit.

In Figure 6.8, a summary of stakeholder participation, satisfaction of stakes and the mean of the three spheres' criteria ratings is shown for the study period. The general trend that can be identified from the information presented in this graph is one of increasing stake satisfaction, stakeholder participation and criteria ratings over the three iterations.

Figure 6.8: Stakeholder Participation, Stake Satisfaction and the Mean of the Three Spheres' Criteria Ratings - Case Study 2.

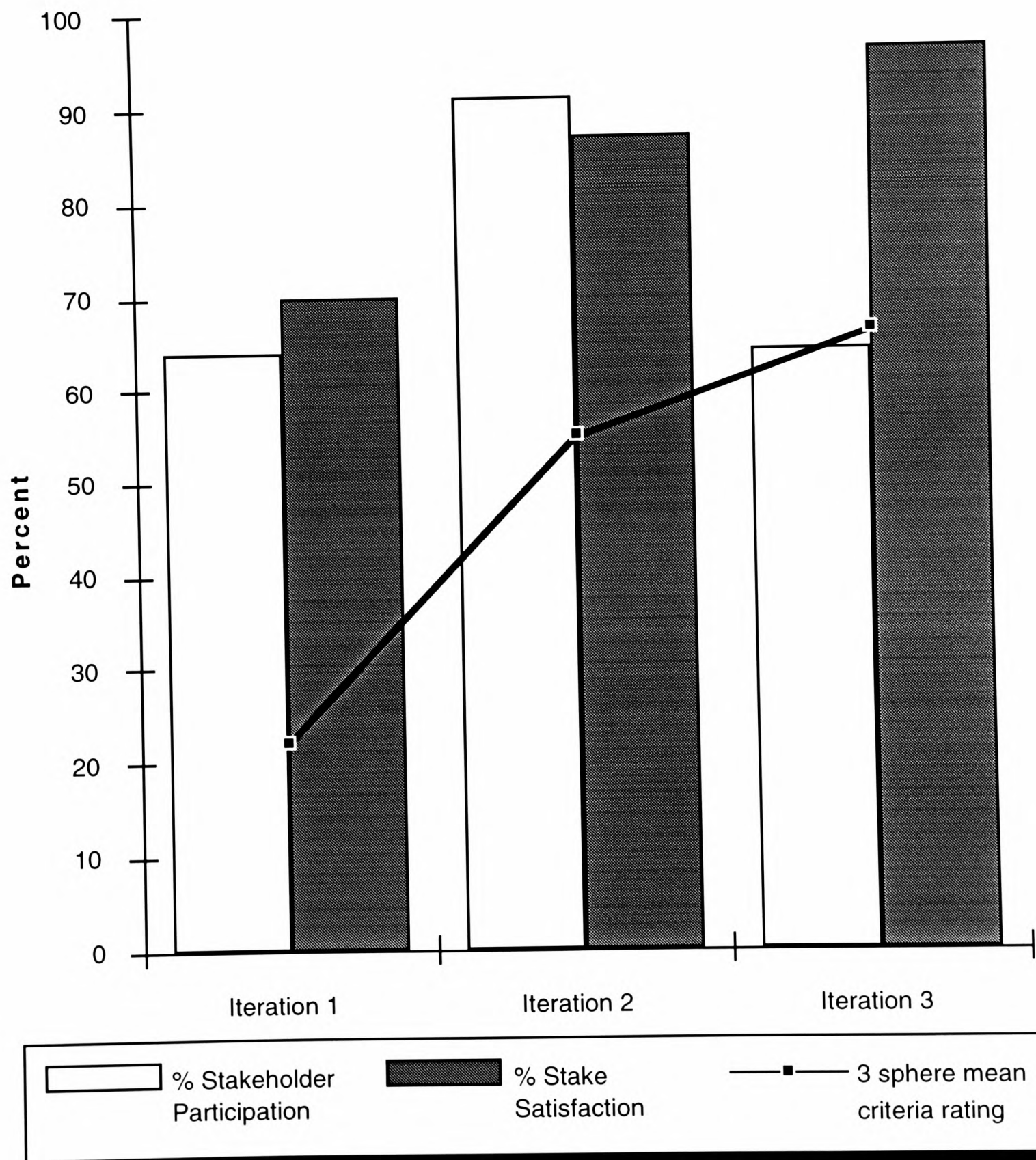


iii) Case Study 3: African Blackwood Enterprises

In Figure 6.6, a summary is presented of the criteria ratings for the three spheres of the conceptual model of sustainable development for each iteration of the IMA during the study period for this enterprise. For each sphere the criteria ratings for the Benchmark Situation dropped significantly from the Technical Limit ratings, but subsequently increased at each iteration. The exception was one decrease in the Social sphere at the third intervention. At the end of the study period, the ratings are reported at a higher level than that found at the Benchmark Situation, but they never equaled the criteria ratings level established for the Technical Limit.

In Figure 6.9, a summary of stakeholder participation, satisfaction of stakes and the mean of the three spheres' criteria ratings is shown for the study period. The general trend that can be identified from the information presented in this graph is one of increasing stake satisfaction, stakeholder participation and criteria ratings over the three iterations.

Figure 6.9: Stakeholder Participation, Stake Satisfaction and the Mean of the Three Spheres' Criteria Ratings - Case Study 3.



6.4.3 Summary of the Application of the IMA to the Case Studies

The results of the application of the IMA to the case studies show a general increase in all evaluative measures over the study period. In addition to these positive outcomes specific to each case study, there were some positive outcomes as a result of this study that are more general in character. First, it was possible to test the IMA under variable field conditions. Second, a framework for developing working definitions of sustainable development for each of the case studies was successfully incorporated into the management system of each case study. And third, the application of the IMA to the case study enterprises provided a systematic, transparent method to facilitate the identification of accomplishments and failures of the intervention process in the forest management and utilization systems, as represented by the case study characteristics. This provided each stakeholder with better knowledge of the suite of criteria that pertained to the three spheres defining the system, the consequences of management decisions for them, the total system and stakeholder participation.

Another positive outcome of this study was the opportunity to identify any shortcomings of this version of the IMA. For the purpose of this study, a number of suggestions are made for the improvement of the IMA for future applications. These shortcomings are listed in Section 7.5 of the following chapter along with suggestions for their improvement.

The IMA in itself is not a solution, rather it is a mechanism that can be used to guide the intervention process. As such, it may be subject to continuous refinement. The IMA is a flexible mechanism. It can facilitate the expression of local, national and international values within the context of the three spheres that define the concept of sustainable development. This in turn can help overcome the problem of defining development through the identification of conditions in the three spheres over time within a wider context. Also, the application of the IMA permits the outcomes of its application to be judged with a local, national and international perspective.

The specific objective of this study was to develop a management tool through which the concept of sustainable development could be incorporated into an economic system where existing societal controls were ineffective in guiding the behavior of individuals or enterprises (i.e., operating under frontier conditions as defined in Chapter 1 of this study). The three case studies to which the IMA was applied in this study were operating under frontier conditions.

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To incorporate the concept of sustainable development into an existing system and to change stakeholder behavior, the IMA requires the expression of stakeholders' values within an iterative mechanism. It takes an investment of time and money to identify stakeholders and to identify and incorporate the suite of each stakeholder's values into existing management structures. It requires an iterative approach whereby the mutual setting of goals and the monitoring of progress towards meeting those goals is apparent from the outset of the process.

By definition, sustainable development can only be achieved at the local level. The IMA is a tool, which, through the practical application of stakeholder theory, facilitates intervention in the three spheres that define sustainable development. The IMA's iterative Roundtable process defines and integrates the goal sets of each sphere to lead to sustainable development. In the following final chapter, the principles and outcomes of this study are summarized in terms of their application to other management situations. The hypotheses of this study are then evaluated finally.

Chapter 7

Achieving Sustainable Development Through the Application of the IMA

7.0 Background

In Chapter 1 of this study, the forest was recognized as a renewable resource that provides a vital foundation for the well-being of people. However, scenarios of successful management in the natural tropical forest are few and conventional solutions are found to be ineffective. Two main factors were described as contributing to this dilemma. The first factor was the recognition that most natural tropical forest situations were akin to frontier conditions. Frontier conditions exist where there is a lack of social control over activities that affect the resource base and where the implementation of political decisions is ineffective. Frontier conditions make conventional management strategies difficult to implement. The second factor lies in the application of the concept of sustainable development. Here, balanced trade-offs between the objectives of the Biological, Social and Economic spheres are required. Consequently, as the concept of sustainable development is applied to the management of the forest resource, the array of possible forest management objectives becomes much broader than those of traditional management approaches such as those aimed at the narrower concepts of sustained timber yield or ecosystem conservation.

Conventional forest management strategies have not demonstrated that the economic, social and biological aspects of the resource base can be equitably determined. A management tool was therefore needed to address these critical shortcomings in traditional management scenarios. That management tool would have to address two key concerns. First, it would have to involve and affect the behavior of specific agents of change (as described in Section 1.5). Second, it would have to demonstrate that due consideration was given concurrently to a variety of values and to express this in a multi-objective management strategy.

7.1 Features of the IMA

Based on these requirements, the Integrated Management Approach was developed (see Chapter 2), with two key features providing a means to address these two concerns.

The IMA was based on a practical application of *stakeholder theory* and on a process of structured negotiations (the Roundtable). The IMA, through the embodiment of stakeholder theory, provided opportunities for the expression of the interests from all three spheres. The negotiation phase initially provides the opportunity to describe the theoretical potential (the Technical Limit) of the case study. The actual state of affairs found at the time of initial intervention (the Benchmark Situation) is then assessed. Finally, the process involves determining the changes required (Negotiation Aims) so that the management would be in a position to shift towards an ideal as determined by the stakeholders.

A key feature of the IMA is its iterative nature. The IMA has thus been designed to be re-applied as required. This iterative approach is the most critical process of the IMA and the one which sets it apart from other analytical and management approaches. The application over time provides enhanced opportunities to gather more information, to continually assess objectives and to monitor the outcomes of various actions³⁴. There is also a shift towards a greater state of equity³⁵ among the decision-makers as more information is available.

7.2 Review of the Hypothesis

In Chapter 2, a hypothesis was suggested to be tested in this study. In this section the hypothesis will be restated and followed by a description of the outcome as a result of this study. The **specific aims** of this study were:

- to develop a management framework and tool (IMA) aimed at incorporating the concept of sustainable development into the management of the tropical forest,
- to apply the tool, under field conditions, to existing forest-based activities, and
- to observe the results and make recommendations for further improvements to the proposed methodology.

Through the development and application of a "management tool" (the IMA), these aims were set out as a means to test the hypothesis proposed in Section 2.2.

³⁴ This feature of the IMA of enhancing the information available contributes to the development of virtuous circles as described by Ascher and Healy (1991).

³⁵ The greater availability of information to the stakeholders and other interested parties provided through the application of the IMA tends to shift the system away from the "political system" and towards the "information system" as described by Gunn (1991).

Hypothesis

- A. Forest resource outputs can be maximized by focusing on the biological sphere: forest management.
- B. However the sustainable development of forest resources can only be achieved by recognizing the additional spheres that are concerned with the economic and social elements of the resource management system.
- C. One solution to achieving sustainable development for natural forests is through extending the stakeholder concept, as adapted from modern corporate management philosophies. By focusing on the indigenously developed sawmill, methods that can contribute to the sustainable development of the natural forest system can be determined so that:
 - i) solutions to tropical forest management can be found by integrating social, economic and biological factors,
 - ii) sawmilling technology and forest management techniques are relatively minor concerns in achieving sustainable development based on the exploitation of the natural forest for timber, however, they prove to be an acceptable target for intervention for sustainable development, and
 - iii) the major factor in precluding the achievement of any successful form of forest management is a political one.

The IMA was developed as a first step towards the incorporation of the concept of sustainable development into ongoing, forest-based enterprises where existing social controls were not effective in guiding the behavior of individuals or enterprises (i.e., those operating under frontier conditions). The IMA was applied to three case studies, each an indigenous sawmill enterprise. The case studies proved excellent targets for the investigation proposed in this study. The case studies were operating under frontier conditions and involved "agents of change", including the "interventionist". Among these agents of change some are likely to have a stake in the short and/or longer-term conditions of the forest upon which they depend. Also, the three elements fundamental to the concept of sustainable development (biological, economic and social) are all found to some degree within the system described by the activities of the local sawmill.

Was the hypothesis proved or disproved ?

Were solutions to tropical forest management problems found through the integration of biological, social and economic factors? In this study it was determined that much of the natural tropical forest is found under frontier conditions and that a management approach that considered the Biological, Social and Economic spheres during the intervention process was needed. This approach facilitated the input of values held by stakeholders resulting in an understanding of the broader array of social values held by stakeholders at both the local and international levels. The inclusion of this suite of social values into the decision-making process in itself is a first step towards the elimination of frontier conditions for a given forest-based system. The reduction in frontier conditions is a major step towards finding solutions to forest management problems.

Did the local sawmill enterprise prove to be an acceptable target?

The challenge facing forest managers is that of gaining adequate control over the human activities that shape the forest over time. The local sawmill, as represented by the case studies, proved to be an excellent target for intervention for sustainable development (of which part is the management of the forest) because the sawmill provides a tangible framework from which the stakeholders and their values can be determined. The sawmill is also a framework for locating and describing human activity in the forest over time. Changes to these activities in the forest can be initiated through the existing infrastructure of the local sawmill in particularly where broader political control is absent (i.e., frontier conditions).

Was the major factor precluding the achievement of any successful form of forest management a political one ?

This study did not prove this *per se*, however, the IMA as with any form of intervention must be sanctioned by the political leadership. For example, in Case Study 1 the intervention process went well until a significant political decision rendered the forest unavailable for the extraction of timber products. The experience with Case Study 2 and 3 indicated that the institutionalization of the intervention process is of fundamental importance to solving the problem of forest management and this decision is often political.

7.3 Summary of Study Outcomes

There are a number of achievements that can be listed as resulting from this study. The main achievements are as follows:

1. The concept of sustainable development was successfully introduced into the three case studies.
2. The scope of the management objects broadened in each case study to include considerations within all three spheres, after the application of the IMA.
3. The IMA provided a framework for the initial (and subsequent) identification of the stakeholders and their stakes and for the exchange of this information among the stakeholders.
4. Observations were made and recorded for each iteration during the study period.
5. Changes occurred in each of the case studies over time as a result of the IMA's iterative process.
6. Through the application of the IMA there was an increase in the number of individuals involved in the decision-making process.
7. There is a recognizable framework to accommodate those who wish to participate in the roundtable process over time.

It is also important to gain a perspective of the general situation of each of the case studies at the end of the study period. A review of stakeholder participation and the degree of change in the criteria ratings provides some indication of the overall situation for the study period. In Figure 7.1, stakeholder participation is presented for each case study over the respective study periods. As evidenced by Figure 7.1, stakeholder participation was variable over the application period, of the IMA. Stakeholder participation rose during the application period, but by the end of the study period it was at about the same level as it was during the initial iteration for each case study.

In Figure 7.2, the mean of the criteria ratings for all three spheres is presented for each case study. There is an overall increase in the number of positive criteria ratings as the number of iterations increased (with the exception of a slight decline at the fourth iteration in Case Study 1). Levels of stakeholder participation and the change in criteria ratings are important indicators for monitoring the application of the IMA.

The case study enterprises were in operation at the time of printing this study.

Figure 7.1: Stakeholder Participation by Iteration for All Case Studies.

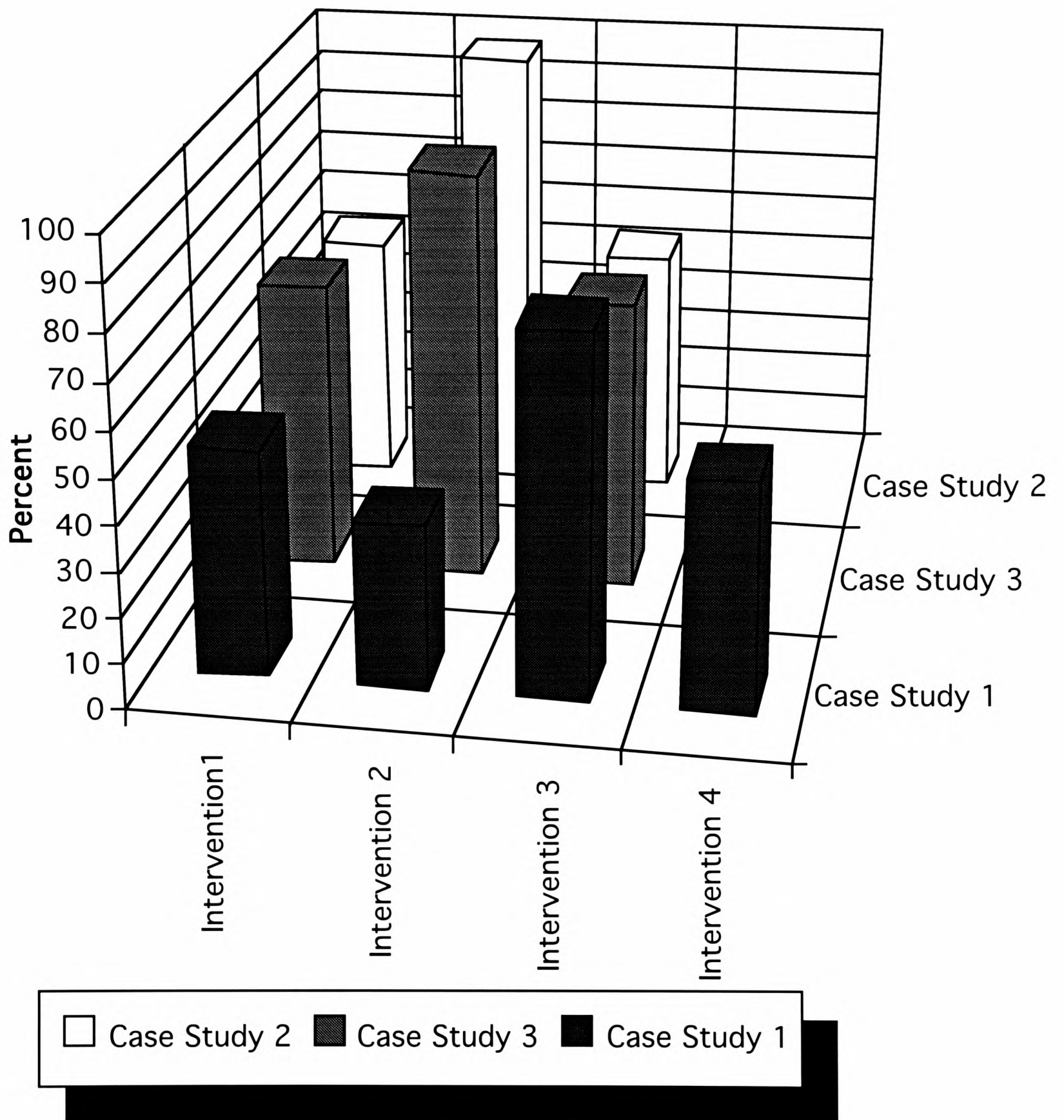
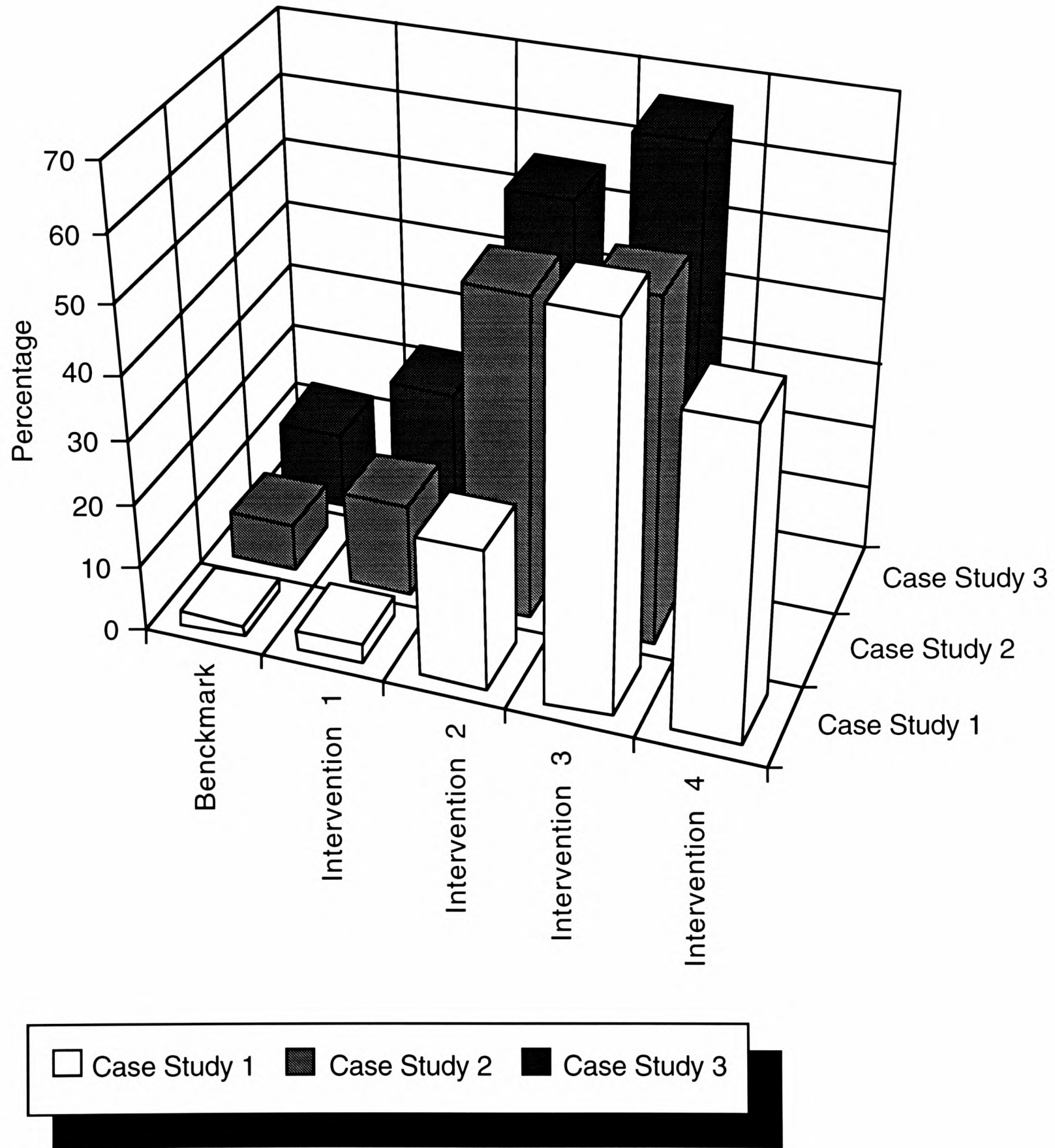


Figure 7.2: Mean Criteria Ratings for All Spheres at Each Intervention for All Case Studies.



The expressed intention of this study was not to undertake the determination of weights of criteria, stakes or stakeholders, although the methodology for weighting was provided in Chapter 2. It is interesting to note however that, over the application period of the IMA, some criteria, stakes and stakeholders emerged as apparently having more power than others. For example in Case Study 1, the key stakeholders at the time of initial intervention were the Management Commission, the Financier, the Sales

Agent, the Ministry of Cooperative Development (local office) and the Forest Department (local office). The key stakeholders (with their stakes) that emerged as most weighted at the end of the fourth iteration were the Forest Department (at the level of the Minister), the Ministry of Cooperative Development (at the level of the Minister) and the Financier and the interventionist.

As well as the emergence of apparent stakeholder weightings, a number of criteria were observed by the interventionist to emerge as being more critical than others. The key criteria for the Forest management sphere were Security of Tenure, Working Plans, and Limits to Regeneration. For the Social Sphere the key criteria were Government Officials, Accountability of Management and Documented Policy and Procedures. For the Economic Sphere the key criteria were the Degree of Access to the Resource, the Market Position and the Identification of Competitors these criteria correspond to the key stakeholders listed above.

Although the observation that at the end of the fourth iteration these key stakeholders and criteria warranted greater attention than others, it is important to note that conditions change over time and the parameters of weighing therefore can be expected to change. It is important therefore that in cases where weighting of the criteria and stakeholders and their stakes is undertaken that the outcome of the weighting exercise does not draw attention away from either the need to ensure that all stakeholders are included in the application of the IMA or the fact that less weighted stakeholders at any given time may become factors of greater weight in the future.

Given the pioneering nature of this study, effort was focused on the development and application of an appropriate IMA framework. Consequently, although a methodology for the more sophisticated process of weighting criteria, stakes and stakeholders was proposed in Chapter 2, this study did not attempt such weighting. However, with hindsight, it is interesting to note that, over the application period of the IMA, some criteria, stakes and stakeholders emerged as apparently more powerful than others. For example in Case Study 1, the key stakeholders at the time of initial intervention that emerged as most powerful by the fourth iteration were the Management Commission, the Financier, the Sales Agent, the Ministry of Cooperative Development (local office) and the Forest Department (local office). The key stakeholders (with their stakes) that emerged as most powerful by the fourth iteration were the Forest Department (at the level of the Minister), the Ministry of Cooperative Development (at the level of the Minister) and the Financier and the interventionist. Similarly, within the Forest Management Sphere, it became apparent that the key criteria were Security of Tenure,

Working Plans, and Limits to Regeneration; within the Social Sphere, key criteria appeared to be Government Officials, Accountability of Management and Documented Policy and Procedures; and within the Economic Sphere, the key criteria seemed to be the Degree of Access to the Resource, the Market Position and the Identification of Competitors these criteria correspond to the key stakeholders listed above. These key criteria correspond to the powers or level of responsibility of the powerful stakeholders identified above.

Although it was apparent by the end of the fourth iteration that these stakeholders and criteria were of particular importance, and therefore warranted greater attention than others, it should also be noted that the weighting accorded different stakeholders is likely to change over time. Where explicit weighting of criteria or stakeholders is conducted, it should be not result in exclusion of stakeholders from the IMA process, or in the neglect of particular criteria; either may become of greater importance subsequently.

7.4 Possible Further Applications

There are many organizations that are searching for management strategies that can successfully incorporate the concept of sustained development. These organizations are found operating at the local, national and international level in every corner of the globe and range in size from local NGOs or industries to global institutions and international corporations. From the results of this study the IMA was shown to be applicable specifically to forest resource management strategies. However, the application of the IMA to other resource management scenarios that are ongoing under frontier conditions is feasible though careful adaptation and application by the interventionist. Although the IMA would have to be adapted to fit their particular requirements, there are key features of the IMA that make it different from previous approaches. These key features include:

1. The employment of a "systems" approach rather than a "political" approach (Gunn, 1991).
2. The involvement of thorough stakeholder participation and recognition of internal and external stakeholders (including adversarial stakeholders).
3. The application of the IMA becoming a learning process over time. As it is applied, more information, reactions and needs/values become known to the participants, thus leading to more informed decisions.

As such the IMA could be adapted to suit intervention activity in many other fields. The IMA could be applied in examples of development such as the provision of highway infrastructure to developing countries using foreign aid, the construction of power generation plants (high technology vs. appropriate technology or thermal vs. nuclear vs. "alternate" energy sources), agricultural development projects, where a flow of rural produce away from the local stakeholders is expected, or the development of rural health care services in developing countries.

To incorporate the concept of sustainable development into ongoing behavior, the IMA allows for the expression of values of the stakeholders within an iterative mechanism. An important aspect of the concept of sustainable development is that it requires the achievement of objectives that are not readily valued using conventional measures such as price. There are few non-monetary values that enjoy universal definition beyond the local level and determining non-monetary values persist as a vexing problem beyond the confines of specific locales (Cuilla, 1989). The definition of sustainable development therefore can only be achieved at the local level. The IMA is a tool that, through the combined application of stakeholder theory and the negotiation process, facilitates the intervention process aimed at incorporating the concept of sustainable development into a management system. Its design gives the IMA the potential for a very wide scope of application in many other sectors by providing a mechanism that defines and integrates the goal sets determined for each of the three spheres of the given management system.

7.5 Further Refinements of the IMA

The application of the IMA leads to a more fully informed and thereby more balanced and equitable decision-making process. The experience gained through this study has led however, to the following suggestions for the improvement of the IMA and areas of possible further research, which are outlined in the following section.

1) *Ranking Negotiation Aims.* Including an exercise whereby the Negotiation Aims are ranked by the stakeholders may prove useful in the allocation of scarce resources and may also help to focus the efforts of the stakeholders to those areas that give a greater degree of benefit to the operation as a whole.

2) *The Weighting of the Stakes.* The IMA tested in this study provided no formal opportunity to weight the stakes. In the outline of stakeholder theory in Chapter 2, a

method to weight stakes was suggested. A process whereby the stakeholders are invited to assign a weighting would be a useful addition to this methodology. Stakeholders would then be more aware of the bearing each stake has on the operation and would thereby provide better informed stakeholder decision-making.

3) *The Weighting the Stakeholders*. Over the study period for all three case studies, it became apparent that stakeholders had varying degrees of impact on the outcome of the Roundtable process. A proactive approach in determining the impact of each stakeholder on the IMA through a process of weighting stakeholders would allow, where deemed necessary, an exercise in balancing the stakeholder weighting to the satisfaction of the full stakeholder group. This process could be iterative and built into the IMA.

4) *A Proactive Approach to External / Adversarial Stakeholders*. As stated in Chapter 2, the external/adversarial stakeholder presents a significant challenge to the interventionist and to the successful application of the IMA. The IMA, as presented in this study, could be improved through the incorporation of a formal proactive approach to manage the external/adversarial stakeholder(s). One approach to guide the interventionist and the stakeholder group in dealing with the external/adversarial stakeholder may be found in Axelrod's (1990) work on the *Prisoner's Dilemma* where a strategy for the resolution of conflict through cooperation or defection is made. Axelrod's argument centres on the observation that decision-makers stand to gain through defecting rather than cooperating in the short-term, but, for interactions between two bodies that are expected to recur, the greatest pay off for both parties is found in cooperation³⁶.

5) *Reassessment of Criteria and Stakeholder Representation Over Time*. Because conditions and circumstances change over time, a mechanism within the IMA that provides for a formal reassessment of criteria and stakeholder representation is necessary. Provision for the review at regular intervals of the appropriateness of current criteria and stakeholder representation would provide the stakeholders with an opportunity to determine appropriate arrangements for those criteria and stakeholder representatives that are not serving the purposes of the intervention process. Including a review process in the IMA would stimulate stakeholders to ensure that their participation was active and that only those criteria of interest to them were assessed.

³⁶ Further discussion of the application of the Prisoner's Dilemma model to the question of resolving forest resource management conflicts is found in Poynton and Hurditch (1993).

Also consideration could be given to the weighting of the criteria in future applications of the IMA.

6) *Development of a More Formal Feedback System for Stakeholder Inputs.*

Stakeholder feedback on issues such as ratings, rankings and Negotiation Aims is an important aspect of the IMA and requires the development of a more formal feedback system to facilitate this process. This process must be accountable to the stakeholders and the information must be readily available.

7) *Formalize the Incentive for Stakeholders to Participate in the IMA.* There is a need to investigate the means to ensure that stakeholders participate with genuine intent to find consensus. These could be developed to suit each situation and might include monetary incentives or the provision of a mutual adversary where individuals would stand to gain greater benefits by teaming up rather than standing alone or in smaller interest groups.

8) *Institutionalization of the Intervention Process.* To succeed as a guide to the intervention process, the IMA must be introduced and supported within an institutional framework. There are many international and regional organizations that would benefit from the adoption of the IMA in their intervention programs, including the FAO, ITTO, most government and non-government donor agencies and various international development banks.

7.6 Concluding Comments

The IMA was developed because there is a basic need for better management of the natural tropical forest. To achieve this, economic and social elements were incorporated into the Integrated Management Approach so that the necessary changes in the treatment of the forest could be realized over time. The demand for a management tool such as the IMA has been made by many authorities (Barbier, 1987; Westoby, 1987; Fearnside, 1989; Cocklin, 1990; and Gregerson, 1990). However, the essential elements of this demand have been most succinctly stated by D.M. Cleary (1992) in a paper presented to the Oxford Conference on Tropical Forests. He states that

" at the local level the most basic objective that needs to be built into project design is enhancing the diversity of local livelihood strategies...which depends on integrating the socio-economic knowledge...into all project stages. This means changes in the way many projects

have traditionally been planned and evaluated. The criteria used to monitor progress and evaluate success...need to be broadened to include qualitative, non-statistical factors...The alternative is the situation which exists at present in Amazonia, where the number of good projects with a forest management component can be counted on the fingers of one hand."

In this study, through the development of the Integrated Management Approach, an attempt has been made to satisfy the pressing need for a new paradigm that can successfully incorporate the principles of sustainable development into the management of the natural forest.

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Appendix 1

Data for Step One of the IMA for the Forest Management Sphere, the Social Sphere and the Economic Sphere of Case Study 2 and 3.

This Appendix presents the outcomes of analysis for the two Tanzanian sawmill enterprises, Case Studies 2 and 3. Results relevant to the Forest Management, Social and Economic Spheres are summarized in Section 1, 2 and 3, respectively.

Section 1, Forest Management Sphere - Case Study 2 and 3

Mpingo Forest - Mingoyo Cooperative Sawmill and African Blackwood Enterprises

- a) Technical Limit: There is no security of tenure for the forest resources where the mpingo is found because the national land tenure policy and common practice is for open access to public lands. There are no forest management objectives set for the stewardship of the mpingo species. The only formal regulation concerning the mpingo is the ban on the export of whole logs (Sargent and M'bwana, 1989). The information required to calculate an AAC is not available and no arbitrary yield control was set by the government. There is, however, some information available from a number of inventories that indicates the mpingo species is widely distributed, occurring as scattered individuals throughout much of Tanzania at elevations below 1,100 metres above sea level (masl).

No widespread inventory has been undertaken to collect data specific to mpingo. Some research has been undertaken and the intrinsic and extrinsic limits to the regeneration of the mpingo are known (Phillips, 1930b; Mugasha, 1983). Experiments have demonstrated that mpingo successfully regenerates from seeds, cuttings and root suckers. Also a few sample plots have been established where growth rates have been shown to vary with available moisture, the occurrence of fire and soil conditions, however the annual increment or growth rate has yet to be determined over the life span of the species.

Fire is a major factor in the mpingo ecosystem and fire is an annual occurrence over much of the area where mpingo is found. Fire is one factor that limits the successful regeneration of mpingo from seed, coppice sprouts and root suckers.

Phillips (1930) found that established mpingo can survive light grass fires, but regeneration cannot. Fire management measures have been developed that could be used to protect the mpingo resource from the limiting factors that fire presents. The practice involves deliberately burning the forest areas while the fine fuels are still comparatively moist. As a means of reducing the intensity of the fire and therefore reducing the negative impact on the mpingo, this technique has been proven effective (Phillips, 1930).

There are no working plans for the mpingo although some local districts may attempt to designate general areas for harvesting and state a maximum volume to be removed through a licencing procedure, but these arrangements are not common (Kewero, 1987). There is no planning for the location of concessions, roads, buildings, and boundaries within the forest (Moyo, 1987). Although the felling cycle has been estimated by Mugasha (1983) as being between 50 and 80 years, there are no formal restrictions on the practices of harvesting and extraction of mpingo. There are sufficient documented research results and field experience to permit the prediction of the outcome of a number of silvicultural techniques such as the promotion of root suckering by physically disturbing the surface roots of standing or newly felled trees. Also, the procedure for the successful propagation of mpingo in the nursery from seeds and cuttings from the root and stem are known (Mugasha, 1983). Mpingo regeneration is also known to be intolerant of shade and fire. No definitive procedure has yet been developed whereby these two factors can be managed to ensure that the mpingo ecosystem is maintained. For example, where the crown cover is sufficiently reduced to permit the regeneration of mpingo, grasses and other plants that provide fine fuels to fire also thrive and increase. With this increase in fine fuels, the intensity of fire increases resulting in a reduction in the success of mpingo regeneration. If, on the other hand, the crown is kept closed as a measure to reduce the amount of grasses, mpingo regeneration is also compromised because of the shade intolerance of the species. Until this dilemma is resolved, the choice of appropriate silvicultural techniques such as selection cutting or seed tree provision remains at the experimental level.

- b) Benchmark Situation: There is no official security of tenure on Public Lands in Tanzania. Therefore forest management activities that require long-term security of land tenure are not undertaken. All forest areas on public lands are under threat of conversion to alternative uses such as agriculture or settlement (Kewero, 1987). Although some local districts have stated an intention to use licencing procedures to manage the harvesting of mpingo, none have the means

of enforcement available (Moore and Hall, 1987). At the time of intervention there was insufficient information available upon which to determine appropriate yield control measures or to calculate an AAC. Forest inventory data available for mpingo indicated that the better quality, commercially acceptable mpingo trees were found in Southeast Tanzania where the species is found in some riverine areas in higher concentrations.

Some records are kept on the volumes harvested, processed and exported, but there are no formal arrangements for this practice and records are not kept on a consistent basis. The areas under harvest pressure, however, were not within the areas inventoried. Therefore, extensive information on the rate of growth, size, volume and quality distribution was not available. Extensive field observations and local reports did indicate that mpingo was poorly represented in the diameter classes less than 10 cm. To ensure the successful regeneration of mpingo, protection efforts would have to concentrate on the management of fire.

The wide distribution, low concentrations and undetermined successional dynamics of the mpingo preclude any rational approach to widespread, indiscriminant protection efforts, even if the necessary levels of funding were available. Harvesting and log transport practices were found to be carried out independently and as seen fit by the sawmill operators. Working plans, felling cycles, concession areas, road construction and maintenance, location of buildings, the establishment of boundaries and pre- and post-harvesting sample plots were not found to be factors of the management of the mpingo resource. Centralized records of harvest, production and export volumes were not kept, nor was any silviculture work attempted. Harvesting methods observed included the selection of trees based on a combination of factors. In areas near vehicular access, the widest range of diameter classes felled was found. As the distance from the vehicular access increased, larger diameter classes only were felled, then cross cut into 2 metre log lengths and only the highest quality logs were removed. As distance from the vehicular access increased still more, felling was restricted to the smaller diameter trees and only the highest quality butt logs were extracted. This practice favoured the removal of trees exhibiting the phenotypic characteristics that are of commercial use and will result, if continued, in a restriction of genetic information from trees exhibiting less commercially desirable characteristics.

Table 1: Mpingo Forest Management Criteria Ratings.

Frame		Criteria	Technical Limit	Benchmark Situation	Negotiation Aims
Tenure	1.	Security of tenure	-1	-1	*
	2.	Threats to tenure	-1	-1	*
Forest Management Activities	3.	Setting objectives	-1	-1	*
	4.	Yield control (AAC)	-1	-1	*
	5.	Area of forest	+1	-1	*
	6.	Species composition	+1	-1	*
	7.	Age/size and volume distribution	-1	-1	*
	8.	Growth rates	-1	-1	*
	9.	Quality distribution	-1	-1	*
	10.	Relative prices	-1	-1	*
	11.	Intrinsic limitations to regeneration	+1	-1	*
	12.	Extrinsic limitations to regeneration	+1	-1	*
	13.	Protection	-1	-1	*
	14.	Working plans	-1	-1	*
	15.	Felling cycles	+1	-1	*
	16.	Concessions	-1	-1	*
	17.	Roads	-1	-1	*
	18.	Buildings	+1	-1	*
	19.	Boundaries	-1	-1	*
	20.	Sample plots	+1	-1	*
	21.	Prediction	n/a	n/a	
	22.	Costings	-1	+1	*
Silviculture Techniques	23.	Annual records	-1	-1	*
	24.	Organisation of silvicultural work	+1	-1	*
	25.	Regulation of shade and canopy openings	-1	-1	*
	26.	Treatments to select species mix	-1	-1	*
	27.	Woody climber cutting	n/a		
	28.	Poisoning	n/a		
	29.	Enrichment planting	+1	-1	*
	30.	Selection cutting	+1	-1	*
	31.	Seed tree provision	+1	-1	*
		TABLE SUMMARY	11 / +1	1 / +1	
			17 / -1	27 / -1	
			3 n/a	3 n/a	

In summary, the ratings of the criteria for the Technical Limit of the mpingo forest, as depicted in Table 1, are eleven values of +1 and seventeen values of -1, indicating that there are basic needs which must be fulfilled before the system can be expected to meet the goals of the sphere. The summary of the ratings of the criteria for the Benchmark Situation of the mpingo forest are one value of +1 and twenty-seven criteria having the value of -1, indicating that the system is operating in a manner that is almost completely not meeting the goals of the sphere.

Table 2: Mpingo Forest Management Negotiation Aims.

<u>Frame</u>		<u>Criteria</u>	<u>Negotiation Aim</u>
Tenure	1.	Security of tenure	According to Kewero (1990), public lands are accessible to anyone. There is no policy to support control of access or exploitation of public lands for forest exploitation or other uses.
	2.	Threats to tenure	For conditions to be set for land clearance for agriculture whereby mpingo (and other species where deemed necessary) is restricted from felling.
Forest Management Activities	3.	Setting objectives	For setting of objectives of mpingo exploitation to at least retain ecological diversity and maximize future resource utilization options.
	4.	Yield control	For the development of information to enable better determination of annual cutting levels of the resource over time.
	5.	Area of forest	For establishment of reserves of public lands which at the minimum restricts the felling of mpingo.
	6.	Species composition	for more detailed inventory of the areas identified by the case study sawmills as the areas where they intend on harvesting in the next 5-10 years.
	7.	Age/size and volume distribution	For further investigation into the diameter distribution of mpingo including regeneration status, diameter including 0-5, 5-10 cm dbh, stem quality (operational).
	8.	Growth rates.	For follow up on existing growth and yield plots. For establishment and tending of growth plots in areas representative of the sites being harvested now and in foreseeable future.
	9.	Quality distribution	To include quality parameters in future inventory work. To undertake sample surveys for estimates on quality of mpingo resources inventoried to date.
	10.	Relative prices	For a system whereby royalty rates can be collected. Set royalty rate from trees felled not from volume delivered to the mill.
	11.	Intrinsic limitations to regeneration	For trials on vegetative reproduction of "plus trees" as a basis for developing plantation or enrichment planting stock techniques.
	12.	Extrinsic limitations to regeneration	For the exclusion of fire from certain areas to determine the successional outcome with respect to mpingo. To establish early burn trials to determine the effects of light intensity fire on regeneration and successional status over time for mpingo.
	13.	Protection	For a comprehensive approach to the needs for the protection of the species.
	14.	Working plans	For centralization of the issuing of licences. The licence must specify the location of the harvesting, the standards of utilization (stump height, minimum top diameter. etc), penalties for non-compliance.
	15.	Felling cycles	For the development of standard sustained yield management strategies where practical.
	16.	Concessions	For an organized harvest in prescribed areas to facilitate monitoring of the harvesting standards and follow up management activities.
	17.	Roads	For the establishment of organized exploitation where harvesting is balanced rather than the present situation of "least cost first cut" and "first come, first served".
	18.	Buildings	For an investigation of the feasibility of the location of mobile sawmills in the forest to semi-process logs with the intent of making greater use of all trees felled.

	19.	Boundaries	For the administration of the harvesting to be accountable to a more centralized authority.
	20.	Sample plots	For the establishment of sample plots and for their monitoring to provide information on post logging performance of the residual stand.
	21.	Prediction	n/a
	22.	Costings	For a greater proportion of the selling price to be allocated towards better harvesting and utilization standards.
	23.	Annual records	For a more accountable Forest Department record keeping system with centralized reporting.
	24.	Organisation of silviculture work	For the development of silvicultural treatments that could be integrated into the harvesting system with the aim of maximizing the potential of the regeneration of mpingo from coppice or root suckers until a more comprehensive strategy for silviculture systems is developed.
Silviculture Techniques	25.	Regulation of shade and canopy openings	For research to determine the successional status of the species and methods to ensure its continued regeneration.
	26.	Treatments to select species	Refer to the negotiation aim for Criteria 25.
	27.	Woody climber cutting	Not applicable as there are no woody climbers present.
	28.	Poisoning	n/a
	29.	Enrichment planting	For the manual disturbance of the roots of the mpingo trees both the felled and leave mpingo trees in harvest areas to stimulate suckers. Operational trials for early burning to help in future silvicultural prescriptions.
	30.	Selection cutting	For a restriction that any tree felled must be delivered to the mill.
	31.	Seed tree provision	For the selection and protection of some "plus trees" in all areas being harvested.

c) Mingoyo Cooperative Sawmill and African Blackwood Entreprises

The results of the assessment of the information collected for the Technical Limit and the Benchmark Situation for the mpingo Forest Management sphere revealed that there are fundamental problems within the existing forest management system that preclude the attainment of the goals of the Forest Management sphere. The overall circumstance of the mpingo forest area as described through the criteria is unlike that described for the camphor forest area. In the mpingo case study forest area, the Technical Limit for over half of the criteria have not yet been established. For example, the national policy on tenure over lands where the mpingo is found is that access is to be open. There are no tenure rights *per se* to form the foundation for the undertaking of classical forest management activities. This situation has negative repercussions on the implementation of activities under criterion such as setting objectives, yield control, inventory, working plans, costings and organizing silviculture work.

There is a need to identify the areas that are most likely to benefit from forest management activities and ensure that suitable tenure arrangements are in place to support the development of forest management strategies that will, at least, reduce the negative impact of harvesting on the character of the natural forest. There are two criteria under the Silviculture Techniques Frame, the regulation of shade and treatments to select species mix, that are critical to the determination of suitable silvicultural practices for the mpingo forest type and yet the technical conditions for both are unknown. Also, where information on the Technical Limit is unavailable, negotiation is required to facilitate the inclusion of that knowledge within the system. For example, the intrinsic and extrinsic limits to regeneration are known as well as felling cycles. Harvesting practices therefore, could be modified to include some practices that would predispose harvested areas to regenerate more profusely. Therefore the Negotiation Aims developed for the mpingo forest management (fully recorded in Appendix 3.3 and summarized in Table 2) are extensive and require attention to the development of knowledge of the Technical Limit as well as for the adjustment of ongoing activities to increase the potential of the system to contribute to sustainable development.

Appendix 1 Section 1, Social Sphere - Case Study 2 and 3

Mingoyo Cooperative Sawmill

a) Technical Limit

In reviewing the information listed under the Technical Limit category in Appendix 4.2 for each of the social welfare criteria for this enterprise, it is evident that many of those deemed necessary to meet the goals of the Social Welfare sphere have been considered. Some of the criteria developed for this sphere were, however, not addressed at the Technical Limit stage of this enterprise's development. For example, employer associations, trade unions and formal policies and procedures for the enterprise are three important social institutions that were reported as not being included in the planning phase of this enterprise. As a parastatal, the enterprise was, in theory, operating for the benefit of the nation as a whole by the federal government (Mongi, 1987). The enterprise was subject to audits from headquarters and, in essence, all managers could be construed as government officials (Kewero, 1991). In theory, this enterprise was to be operated by the people for the benefit of the people. The enterprise was planned to operate according to the

clear management goals and established lines of reporting (Mongi, 1987). The management was accountable to the government through the parastatal's headquarters staff and to the employees in accordance with the national labour laws (Holmes, 1987). Direct employment was generated at the mill and employment was created indirectly through local services for the mill, however, employee job satisfaction was an issue that was not recognized by this organization (Moyo, 1987).

The prices for the products of this enterprise were determined in a foreign, free market situation (Mbonde, 1987). There was a greater demand for the products of this enterprise than there was supply. Customers could either purchase goods from the headquarters officer or directly from the mill (Moyo, 1987). The enterprise was autonomous and could establish the necessary contracts or other arrangements necessary to secure supplies and services (Mongi, 1987).

The benefits from this government owned and operated enterprise were to be distributed for the benefit of the population through the government's overall activities. All citizens were considered shareholders in this cooperative as they were the recipients of implicit benefits from the enterprise activities such as a stronger economy and increased availability of foreign currency (Mbonde, 1987). The employees received some direct or explicit benefits, over and above their wages and housing allowances, however, these were flat rate benefits that were not indexed to productivity rates (Moyo, 1987).

Positive externalities from this enterprise were expected at the local level. The enterprise was to provide a focus for local service industries and to be a source of affordable wood fuel for the local community (Moyo, 1987). At the national level, the enterprise contributed to the ability of the nation to purchase goods for which hard currency was required (Mbonde, 1987). The enterprise supplied a significant percentage of the raw material required for the production of high quality woodwind instruments in foreign countries. Positive externalities at the international level include employment for highly skilled labour in the manufacturing of musical instruments from wood with the high quality sound characteristics prized by clarinet players and their audiences in Western cultures (Moore and Hall, 1987; Holland, 1987).

Some externalities have negative ramifications at the local, national and international levels. These negative externalities are implicit in the absence of controls over harvesting of the raw material (Moyo, 1987). The lack of management control over this resource does not provide for a stable industry over time nor does

it allow for the maximization of the social benefits derived from this enterprise (Holmes, 1987; Mbonde, 1987).

b) Benchmark Situation

A review of the information collected for the criteria listed under the Benchmark Situation indicates that, in practice, the enterprise was not matching the Technical Limit. For example, the government officials at headquarters did not allow the enterprise to operate at the level of autonomy that had been set out in recently changed government policy (Moyo, 1987). While public participation was expected only through democratic activities at the national level, the enterprise could not provide any demonstrable effects of this input to this enterprise (Moyo, 1987). There had been no formal review of the existing lines of reporting in the enterprise since the change in government policy that gave, in theory, the enterprise greater autonomy (Moyo, 1987). In practice, the pricing system required customers to pre-pay for orders and accept a standard delay in delivery of over three months (Moore and Hall, 1987). This restricted the number of buyers that were willing to deal directly with the enterprise thereby reducing the freedom of the market mechanism in the setting of prices.

The enterprise was to be autonomous in developing its sales contracts and in negotiating contracts for supplies, but the headquarters' organization remained in control of these aspects of the business (Moyo, 1987). There was no incentive scheme whereby the employees could expect a share of increased profits resulting from their increased productivity (Moore and Hall, 1987). The enterprise was unable to emulate the value-added activities that were dependent on highly skilled labour and presently undertaken in foreign countries (Nagel, 1987).

African Blackwood Enterprises

a) Technical Limit

A review of the information listed under the Technical Limit for the social welfare criteria indicates that this case study enterprise is, in theory, well suited to meet the goals of the Social Welfare sphere. The enterprise was legally established and various government officials were responsible for fulfilling certain functions related to this business such as expediting imports of supplies and exports of product (Holmes, 1987). As a private enterprise, the case study operations were subject to auditing by government taxation officers and to the rules and regulations deemed appropriate by the democratically elected government (Amin, 1987). The employer was not a member of any employer's or trade association and there was no trade union organized by the employees (Amin, 1987). The operations were subject to the national government's policy and regulations governing the logging and sawmilling industry (Mbonde, 1987).

The management goals for this enterprise were clear. The first goal was to keep the mill operating at full capacity and the second was to develop markets for by-products of the billet production process (Amin, 1987). The lines of reporting were well established by the owner. The owner was accountable to the government for taxes, customers for products and employees for reasonable working conditions (Mbonde, 1987).

Employment generation was planned as part of an expansion of the production capacity of billets (Amin, 1987). Job satisfaction for the employees was planned through the provision of the tools necessary to meet and exceed production goals (Amin, 1987). The pricing system was based on the free market system (Mbonde, 1987; Nagel, 1987). All customers were from foreign countries and dealt directly with the owner. Most of the supplies for the mill were available locally, however, for some items, such as saw blades, the entrepreneur was subject to government regulations for importing which could significantly affect the efficiency of supply (Mongi, 1987). The local currency value was set by the government (Mongi, 1987).

The enterprise was privately owned and had no shareholders (Amin, 1987). The financial benefits from the mill did accrue to the employees through a bonus payment system that was linked to productivity (Amin, 1987). The community benefited from the enterprise through the provision of services to the enterprise operations and to its employees. The local community also benefited from royalties

that were unilaterally calculated and collected by the local District Council for harvest rights in the local forest area (Mbonde, 1987). The enterprise also provided other local benefits such as full time employment for at least 20 people and a local source of low cost wood fuel.

At the national level the enterprise contributed a source of foreign exchange earnings and taxes, while at the international level the enterprise supplied the clarinet manufacturing industries, musicians and their audiences with a raw material that has no equal substitute (Mbonde, 1987; Nagel, 1987). There are no controls over the level of harvest of the resource and there are no plans, at present, to ensure that there will be a commercially viable supply of this species for use in the future (Holmes, 1987). The future supply of the resource is not being planned. There is no equal substitute for this timber, therefore, if there is no supply of this resource, then negative externalities will result at the local, national and international levels (Zentilli, 1987).

b) Benchmark Situation

A review of the information collected for the criteria listed under the Benchmark Situation indicates that the enterprise, at the time of intervention, was not achieving the goals of the Social Welfare sphere. There were shortfalls in the response of various government officials to the needs of the enterprise. For example, obtaining supplies from overseas required that the purchaser allow extensive lead times to accommodate the delay in processing the requests by local government officers (Amin, 1987). Audits had not been done by government officials and there was no direct public involvement in the activities of the enterprise, even those undertaken on publicly owned lands (Amin, 1987). The employees did not belong to a trade union, however, the enterprise was operating under the laws and regulations governing such businesses (Moore and Hall, 1987).

The overall management of the business was effective in achieving the clearly stated management goals (Amin, 1987). The lines of reporting were well known and the management was considered to be accountable in all aspects required by law (Moore and Hall, 1987). The entrepreneur had created 38 full-time jobs and expected to increase this number through his active search for more customers. The entrepreneur had attracted employees that were considered to be the most experienced and capable billet sawyers through bonus payments linked to production levels (Amin, 1987; Holmes, 1987; Moyo, 1987).

The market mechanisms were reported to work against the aims of enterprise (Mbonde, 1987; Nagle, 1987). The pricing system was to be based on a free market system, however, in practice, the cumbersome and lengthy process of payment demanded of customers by the government for orders reduced the competitiveness of the market (Moore and Hall, 1987). The exchange rate of the national currency was determined by the government and when inflation rates were high, the timing of the exchange rate determination was often to the disadvantage of the entrepreneur. The entrepreneur reported that, due to the recognized delays in obtaining necessary supplies from overseas, a series of supply contracts were being developed. The entrepreneur was reluctant to reveal much information regarding customers as this information was considered a private matter (Amin, 1987). The distribution of financial benefits from this enterprise extended from the sole owner to the employees through the production bonus payment system and to the community through the forest royalty payments imposed by the District Council (Moore and Hall, 1987).

There were a number of indirect benefits generated by this enterprise. At the local level, steady employment and a local supply of fuelwood were evident. At the national level, the enterprise generated a significant amount of foreign exchange for use by the government. At the international level, the enterprise provided the material for value-added activities such as the manufacturing of musical instruments and ultimately to cultural activities such as musical concerts (Zentilli, 1987).

There were also a number of negative externalities identified in association with this enterprise. Locally, the free harvest pattern was following a "least expensive first" strategy (an unsustainable management technique) as a result of the lack of social controls over this activity. At the national level there was an effort to adopt a strategy to maintain the market advantage over other potential producer countries such as Mozambique (Holmes, 1987). At the international level there were concerns that the resource upon which this sector relied would be depleted through mismanagement (Zentilli, 1987).

Table 3: Mingoyo Cooperative Sawmill Social Welfare Criteria Ratings.

<u>Aspect</u>		<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aims</u>
Institutions	1.	Government Officials	+1	-1	*
	2.	Independent auditing	+1	+1	
	3.	Public participation	+1	-1	*
	4.	Associations	-1	+1	*
	5.	Trade unions			*
	6.	Documented policies & procedures	-1	-1	*
Business Management	7.	Clear management goals	+1	+1	
	8.	Lines of reporting	+1	-1	*
	9.	Accountability of management	+1	+1	
	10.	Employment generation	+1	-1	*
	11.	Job satisfaction	-1	-1	*
Market Mechanisms	12.	Pricing system	+1	-1	*
	13.	Purchasing contracts	+1	-1	*
	14.	Supply contracts	+1	-1	*
	15.	Stability of currency	+1	-1	*
Benefit Distribution	16.	Shareholders' share of profits	-1	-1	*
	17.	Employees' share of profits	+1	-1	*
	18.	Community's share of profits	-1	-1	*
Indirect Benefits	19.	Local	+1	-1	*
	20.	National	+1		
	21.	International	+1	-1	*
Indirect Costs	22.	Local	-1	+1	*
	23.	National	-1	-1	*
	24.	International	-1	-1	*
		TABLE SUMMARY	16/+1	5/+1	
			8/-1	19/-1	

Table 4: African Blackwood Enterprises Social Welfare Criteria Ratings.

<u>Aspect</u>		<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aims</u>
Institutions	1.	Government officials	+1	-1	*
	2.	Independent auditing	+1	-1	*
	3.	Public participation	+1	-1	*
	4.	Associations	n/a	-1	*
	5.	Trade unions	n/a	+1	*
	6.	Documented policies & procedures	+1	-1	*
Business Management	7.	Clear management goals	+1	-1	*
	8.	Lines of reporting	+1	+1	
	9.	Accountability of management	+1	-1	*
	10.	Employment generation	+1	-1	*
	11.	Job satisfaction	+1	-1	*
Market Mechanisms	12.	Pricing system	+1	-1	*
	13.	Purchasing contracts	+1	-1	*
	14.	Supply contracts	+1	+1	*
	15.	Stability of currency	n/a	n/a	*
Benefit Distribution	16.	Shareholders' share of profits	n/a	n/a	*
	17.	Employees' share of profits	+1	-1	*
	18.	Community's share of profits	+1	-1	*
Indirect Benefits	19.	Local	+1	-1	*
	20.	National	+1	+1	
	21.	International	+1	-1	*
Indirect Costs	22.	Local	-1	-1	*
	23.	National	+1	-1	*
	24.	International	n/a	-1	*
TABLE SUMMARY			18/+1	4/+1	
			1/-1	18/-1	
			5 n/a	2 n/a	

For the Mingoyo Cooperative Sawmill (Table 3), the criteria ratings summary for the Technical Limit shows fifteen +1 values and nine -1 values, indicating that in the planning of the enterprise a majority of the criteria would contribute to the achievement of the Social Welfare sphere goals. A significant number of criteria were assessed as not contributing to the sphere goals at the planning stage. This is an indication that there may be fundamental shortcomings in the case study enterprise with respect to its ability to unilaterally meet the Social Welfare sphere goals. The ratings of the criteria for the Benchmark Situation resulted in seven +1 values and seventeen -1 values. The ratings outcome of this case study suggests that the

enterprise would not meet the goals of the Social Welfare sphere under benchmark conditions.

The criteria ratings for the Technical Limit for the third case study, the African Blackwood Enterprises (Table 4) resulted in a total of seventeen +1 values and five -1 values. One criterion was assessed as not applicable to this particular enterprise (denoted *n/a*). As in the previous case study, the ratings of the Technical Limit indicates that at the planning stage there were limits placed on the enterprise that would not permit it to meet the goals of the Social Welfare sphere. The summary of the criteria rating for the Benchmark Situation for the African Blackwood Enterprises were four +1 values and nineteen -1 values, suggesting that, under benchmark conditions, this enterprise was not operating in a manner that would meet the goals of the Social Welfare sphere.

Table 5: Mingoyo Cooperative Sawmill Social Welfare Negotiation Aims.

<u>Aspect</u>		<u>Criteria</u>	<u>Negotiation Aim</u>
Institutions	1.	Government officials	For the reduction in administration levels and for a more liberal access by mill management to the foreign exchange earnings to facilitate the purchase of supplies in a timely manner as determined by the management.
	2.	Independent auditing	n/a
	3.	Public participation	For the development of a mechanism whereby public input into the management of the enterprise could be facilitated.
	4.	Associations	For the development of a mechanism to provide a more formal association of employees and management to facilitate in-house communication between employees and the management and for communications within the industry and with consumers.
	5.	Trade unions	For the establishment of a formal association of the employees to facilitate the development of employee concerns and to communicate with the management. This association would not necessarily have to be a formal union organization.
	6.	Documented policies and procedures	For the development and documentation of policies and procedures specifically designed for the successful operation of the enterprise which incorporates mechanisms for employee and public inputs to the management.
Business Management	7.	Clear management goals	n/a
	8.	Lines of reporting	For the review of the interface between the headquarters and the local management to determine the specific role and responsibility centres for each employee.

	9.	Accountability of management	n/a
	10.	Employment generation	For the development of a strategy for the expansion of the operation whereby development assistance is linked to certain harvesting and processing standards.
	11.	Job satisfaction	For a survey of the employees to determine what conditions would provide them with a greater sense of job satisfaction.
Market Mechanisms	12.	Pricing system	For an assessment of the exporting procedures to determine whether or not an alternative system could be developed which would enable all purchasers of billets to deal directly with the producers in order to keep the market as unrestricted as possible.
	13.	Purchasing contracts	For the centralizing of export licencing and reporting in order to gain an accurate understanding of the trade in mpingo billets from Tanzania to permit the development of a more effective national strategy for the management and marketing of mpingo.
	14.	Supply contracts	For an assessment of the current procedures for obtaining supplies in order to determine a more efficient method which would better serve the efficiency of the enterprise.
	15.	Stability of currency	For direct access by the management to the foreign exchange which their operation earned to facilitate the timely purchasing of spares from overseas in order to reduce inefficiencies in their operations due to inoperable machines. For wages of employees to be linked to the exchange rate to protect the employees against the devaluation of the local currency.
Benefit Distribution	16.	Shareholders' share of profits	For some degree of more direct accountability to the general public for this operation in order to provide stimulus to the business needs of the enterprise.
	17.	Employees' share of profits	For the implementation of an incentive scheme.
	18.	Community's share of profits	For the development of a mechanism whereby the local community would receive a direct share of the profits from the enterprise. The share could be based on the enterprise meeting harvesting standards established to ensure a sustained supply of mpingo.
Indirect Benefits	19.	Local	For the assessment of the possibility of expansion of the operation to include processing of the waste material from the sawmill operation into export items.
	20.	National	n/a
	21.	International	For an investigation into mechanisms which would enable the return of a portion of the positive externalities enjoyed internationally as a result of the final product manufacture and use to be returned to the resource and producers.
Indirect Costs	22.	Local	For the improvement of worker health and safety conditions.
	23.	National	For a national strategy to ensure that the industries based on the mpingo resource operate in concert with the needs of the market and with respect to the long-term optimization of the benefits to the people of Tanzania obtained from mpingo.
	24.	International	For the development of a mechanism to facilitate the input of international community values into the development of interventions into this enterprise that would be compatible with sustaining the benefits derived from this enterprise both nationally and internationally.

Table 6: African Blackwood Enterprises Social Welfare Negotiation Aims.

<u>Aspect</u>		<u>Criteria</u>	<u>Negotiation Aim</u>
Institutions	1.	Government officials	For the more rapid processing of import orders for industrial spare parts and for the export of goods by the government agencies involved.
	2.	Independent auditing	For an audit of the enterprise and of the status of tax payments expected to be generated from the enterprise.
	3.	Public participation	For an assessment of the role of private enterprise in the mpingo processing industry and its contribution of benefits to society in order to establish a base line for possible changes in the policies and procedures of private enterprise in Tanzania.
	4.	Associations	For the formation of a mpingo billet exporters' association which could speak to the government as a united voice with regard to the common problems of exporting and importing, and the potential problem of competition from other countries.
	5.	Trade unions	For a more formal assessment of the terms and conditions, benefits and job security and provisions for health care that the employees have at the enterprise.
	6.	Documented policies and procedures	For the incorporation of harvesting standards having the objective of reducing the volume of mpingo left in the forest into a written corporate document which would become part of the in-house standards of the enterprise.
Business Management	7.	Clear management goals	For social and environmental concerns to be included with economic objectives in the management goals.
	8.	Lines of reporting	n/a
	9.	Accountability of management	For the review of the laws governing the exploitation of the forest resource on public lands with the purpose of determining a method of setting standards by which the management of the enterprise can be assessed for its accountability.
	10.	Employment generation	For an assessment of the international market for mpingo billets to determine the demand, alternative sources and expected capacity of the Tanzanian producers as a basis for advising the Tanzanian government on possible export quotas for each producer.
	11.	Job satisfaction	For a survey of the workers to determine what conditions would provide them with a greater sense of job satisfaction.
Market Mechanisms	12.	Pricing system	For an assessment of the exporting procedures to determine whether or not an alternative system could be developed whereby smaller volume purchasers could have more ready access to the suppliers in order to keep the market open and reduce the impact of agents operating as the middleman on the pricing system.
	13.	Purchasing contracts	For the centralizing of export licencing and reporting in order to gain an accurate understanding of the trade in mpingo billets from Tanzania to permit better planning.
	14.	Supply contracts	For the streamlining of government requirements for the importation of goods for production machinery.

	15.	Stability of currency	Determine preventative maintenance and supply needs and order in advance to minimize effect of inflation and maintain working efficiency.
Benefit Distribution	16.	Shareholders' share of profits	Encourage the selling of shares to the communities where the wood is harvested.
	17.	Employees' share of profits	For a greater proportion of the profits from the mpingo trade being allocated for the greater benefit of the people in the area where it is harvested and processed and to the management of the resource as a base for sustained development.
	18.	Community's share of profits	For the establishment of centralized licencing for harvesting which specifies the exact location of harvesting, the volume permitted for removal and other harvesting specifications and penalties for non-compliance and increased royalty rates chargeable on all felled trees in order to increase the local community's share of the profits generated by the enterprise.
Indirect Benefits	19.	Local	For an assessment of the possibility of expansion of the operation to include processing of the waste material from the sawmill operation into export items.
	20.	National	n/a
	21.	International	For an investigation into mechanisms which would enable some of the positive externalities enjoyed as a result of the final product manufacture and use to be returned to the resource and the producers.
Indirect Costs	22.	Local	For the improvement of worker health and safety conditions.
	23.	National	For a national strategy to ensure that the industries based on the mpingo resource operate in concert with respect to the international market place and with respect to the long-term optimization of the benefits to the people of Tanzania obtained from mpingo.
	24.	International	For the development of a mechanism which would facilitate the inputs of the international community into activities which would identify means by which the use of the mpingo resource could be compatible with sustained benefits to the producers.

c) Mingoyo Cooperative Sawmill

The information listed for the Technical limit for this case study indicates that there were criteria that did not contribute to the Social Welfare sphere goals at the planning stage. At the time of intervention a majority of the criteria were not contributing to the sphere goals. Based on these circumstances, it was necessary to develop Negotiation Aims for most of the social criteria listed for this case study. The elements of the Negotiation Aims for this case study are summarized in Table 5.

For the institutions aspect, negotiations were needed to reduce the number of levels of administration that the enterprise was burdened with and for more liberal access to the foreign exchange earnings by the operation's management. There was also a

need to negotiate for a mechanism whereby an increase in the level of public input to the enterprise operations could be facilitated. The relationship between the employees and the employer required the negotiation of a more formalized structure so that both parties could more effectively communicate for their mutual benefit.

The lines of reporting between headquarters and the enterprise also required restructuring through negotiation to determine the most effective role for each employee. There was an opportunity to negotiate an expansion of operations through external assistance and to increase employment opportunities through a development strategy linked to specified harvesting and processing standards. Employee job satisfaction was an unknown aspect to the management, suggesting that there was a need for an investigation to identify employee needs followed by negotiations with the management for their achievement.

The existing processes for finished goods and for importing supplies contributed to the inefficiency of the enterprise. Imports of supplies were delayed by the bureaucratic requirements, often resulting in a halt in production. The number of customers was restricted due to the complex and lengthy pre-payment arrangements with a third party (the Central Bank of Tanzania) and as a result, the operation was less competitive than it could be. Despite the apparent under-supply of billets in the market (Nagel, 1987), prices were not increasing, indicating that the customers controlled demand (and therefore prices) within this specialized sector. There was a need therefore to streamline existing import and export processes to open up access to markets for the products and to improve the access of the enterprise to supplies.

The value of the local currency these against foreign currencies was determined by the government. There was a need to set employee wages against the exchange rate value of the products to protect these against the regular devaluation of the local currency.

The distribution of benefits from this enterprise at the local level was restricted to employee salaries and benefits. The enterprise was a government owned business. The shareholders were, in theory, all citizens of Tanzania (Moyo, 1987). The distribution of benefits from the enterprise to the shareholders was indirect and insignificant at the level of the individual.

There was a need to increase the accountability of the enterprise to the public, perhaps through the issue of shares in the cooperative. The employees' share of the

profits was limited to their wage packages. A production bonus incentive scheme was needed to involve the employees in contributing to the efficiency of the enterprise. The community did not receive any direct benefits from the enterprise. There was a need to negotiate a mechanism whereby the local community could receive a share of the profits from the use of the local resources by the enterprise.

At the local level, there was a need to negotiate for an investigation into the possibility of increasing value-added activities based on the by-products of the current billet production process. At the national level, there was a need to negotiate for a resource use strategy that took into consideration market factors and had the objective of optimizing the long-term benefits to the people of Tanzania that were derived from the mpingo resource. At the international level, there was a need for the development of a mechanism that would facilitate the development of interventions into this sector to assist in the rational management of the resource and the processing enterprise for the sustained benefit of the people of Tanzania and for the international community that relies on goods produced from mpingo wood.

d) African Blackwood Enterprises

A review of the information gathered for the social criteria under the Technical Limit and the Benchmark Situation indicates that there is a need for change in most of the criteria in order for African Blackwood Enterprises to meet the goals of the Social Welfare sphere. The elements of the Negotiation Aims for this case study are summarized in Table 6.

Within the aspect of institutions, there were a number of changes necessary. The import and export process required a significant increase in efficiency, with less time spent on government bureaucratic requirements. The enterprise should have been subjected to an audit to determine the amount of tax revenue due the government. The role of private enterprise in this sector of Tanzanian resource processing in providing benefits to society should have been determined. There was also a need for the establishment of an association to represent the billet producers in dealings with the government on a sector basis. There were government requirements that restricted the general efficiency of the sector that should have been changed. The employees should have established more formal representation with the employer regarding working conditions and worker safety.

This enterprise was reported to be operating within the law, however there was a need to develop and document more specific procedures to improve the workers' welfare and to ensure that appropriate harvesting standards were in place to encourage a reduction in the volume of logs abandoned in the forest. The enterprise had clear management goals, however these were narrowly defined. There is a need to broaden the management goals from the current economic focus to goals that reflect social and environmental concerns.

There were no effective processes in place by which the management could be held accountable, indicating a need for the development and implementation of employee and environmental standards against which the management could be held accountable. This enterprise had the potential to increase production to a level that could over-supply the market. There was a need for an evaluation of the demand in the international market and of alternate sources for the mpingo timber. Such an evaluation would provide the basis for planning possible quotas for billet production for each producer. Employment generated through any possible expansion of production could be steady over the long-term.

The pricing system was, in theory, supposed to be based on free market conditions, however, the lengthy purchasing process required by the Tanzanian government reduced the number of willing customers. A review of the government imposed purchasing process was required to identify a means by which more end-users, rather than a few agents, could purchase the products.

The accuracy of the central records kept on the recent export volumes of billets could not be verified. There was a need to negotiate for a centralized record system to provide vital information for planners and policy makers. To be efficient, this enterprise required some goods that were available only through importation. The streamlining of government import procedures was required to reduce the down times experienced by this enterprise resulting from the slow supply of repairs and maintenance parts. The distribution of direct benefits from this privately owned enterprise was limited to the employees and, most significantly, the owner/manager of the enterprise. There was a need to negotiate for an increase in the employees' and the local community's share of the benefits generated by this enterprise.

There was a need to negotiate at the local, national and international levels for the development of a mechanism whereby a portion of the indirect benefits that were generated by this sector and enjoyed at the international level could be returned to the managers and the custodians of this resource and to the people involved in the processing of the resource.

Appendix 1 Section 3, Economic Sphere - Case Study 2 and 3

Mingoyo Cooperative Sawmill

a) Technical Limit

The degree of access to the forest resource was limited by the rules and regulations stipulated by the Republic of Tanzania Forestry Department (Kewero, 1991). The total available volume of suitable logs (i.e., target logs) for this enterprise had not been determined (Mongala, 1986). The harvesting and log transport equipment were sufficient to supply the volume of logs required by the sawmill under local conditions (Moyo, 1987). The average cost to deliver one cubic metre of logs was approximately 4% of the market value of the processed wood (Moyo, 1987). The sawmill was owned by a government parastatal organization (Tanzanian Wood Industries Corporation, T.W.I.C.O.) headquartered in Dar es Salaam (Mongi, 1987).

The physical plant consisted of four bench saws and one band saw. These machines were powered by electricity. The source of electrical power was either the on-site diesel generator or the national power grid (Moyo, 1987). The primary source of capital was, in practice, available only from the government through the parastatal organization, although private investment and joint ventures were officially encouraged by the Tanzanian authorities (Moore and Hall, 1987; Mongi, 1987).

The return on net assets was reported as favourable and production costs were approximately 11% of the selling price (Moyo, 1987). Planned mill log input was 500 cubic metres per year and the expected output per shift was .07 cubic metres of finished billets for a projected annual production of 35 cubic metres of finished billets (Moyo, 1987). The production methods focused on an objective to harvest, transport and mill the logs as quickly as possible and to seal each billet produced with hot wax and store under shade. These practices were employed to reduce defects in the finished product that are the result of uncontrolled drying conditions (Moore and Hall, 1987).

The demand in the export market was expected to exceed supply (Mongi, 1987). The timber recovery rate averaged 7% of log input to the mill (Moyo, 1987). Two shifts of eight hours each per day or 500 shifts per annum were planned as operating time available with expected production efficiency of 1.16 cubic metres per year per mill employee (Moyo, 1987). Value-added practices included grading, resawing, end

trimming, cutting to order, and sealing the billet ends with wax to control the rate of moisture loss from the wood (Moyo, 1987). There were no final products produced on-site and planing, molding and shaping were not applicable to this enterprise (Moore and Hall, 1987).

A market study had been undertaken. It concluded that there was a global demand of between two to three hundred cubic metres of billets per year (Mongi, 1987). There was no domestic demand for billet material (Moore and Hall, 1987). Further market studies were planned for other end-products that could potentially be produced from the wood left over from the billet production process. There were three other competing enterprises in Tanzania that produced billets (Mongi, 1987). These four Tanzanian sawmills were the only known source of mpingo billets in the world (Nagel, 1987). The national economic advantage of Tanzania was its relatively stable society compared to Mozambique, which is the only other source of commercial grade mpingo (Mongi, 1987). The Tanzanian government supported the concept of a domestic billet production industry through its restriction of the export of mpingo logs (Mongala, 1987). Built-in cost structures, such as the cost of affiliation with the government parastatal organization, did not limit the enterprise (Moyo, 1987). Direct marketing was the sales technique used by the enterprise (Moyo, 1987). The products and market of this enterprise are highly specialized and all customers are foreign-based. Supply contracts are negotiated individually with each customer. The buyers must make payment arrangements through the Central Bank of Tanzania (Mongi, 1987).

b) Benchmark Situation

Harvesting activities were undertaken on public lands and were not restricted or controlled by any government authorities (Moore and Hall, 1987; Kewero, 1990). The total volumes of commercially viable standing timbers was not known, however, projections based on existing forest inventory indicate that there were over two million cubic metres of trees of commercial dimensions (i.e., target logs) in the Lindi and Mtwara regions (Forindeco, 1987). This projection does not indicate the operational viability of this wood (i.e., whether the standing timber occurs in concentrations of trees that are accessible (Moore and Hall, 1987). Log harvesting was done on a speculation basis by local inhabitants. Local people felled trees and crosscut them into logs. The mill foreman would then purchase only the best logs from those that were prepared (Moyo, 1987). The result of this procedure was an unconsidered incentive for the tree fellers to cut as many trees as possible to maximize the potential volume of logs purchased from them by the mill (Moore

and Hall, 1987). Log transport equipment was limited to one seven-tonne lorry that was in poor repair and not reliable. Costs other than labour and vehicle operating costs were not factored into the log delivery costs (Moyo, 1987).

The sawmill was owned by a government-run parastatal, although it was managed locally as an individual enterprise that was under the general direction of the parastatal managers (Moore and Hall, 1987). The physical plant was operational, however, production efficiency was reduced because of the poor condition of the saw blades and by unpredictable interruptions in electrical power supply (Moyo, 1987). Capital for the purchase of minimum necessary supplies was not available from the central government, however a recent change in currency controls permitted an exporting enterprise to retain half of the foreign currency earned to be used for the purchase of those supplies requiring hard currency (Moore and Hall, 1987). This enterprise was earning a long-term rate of return significantly higher than its cost of capital (Moyo, 1987).

The actual average mill log input was found to be about half of that planned, although there were some shifts that did exceed the rated log input capacity (Moyo, 1987). Actual production rates were about 60% of projected rates and all prime grade billets produced were sold on the export market (Moore and Hall, 1987). Other grades and offcuts were converted to charcoal for local sale and consumption. Production costs per unit were higher than projected by about 40% and the timber recovery rates ranged from 2% to 9% and averaged 7% (Moore and Hall, 1987). In practice, the production methods were hindered by delays in log transport. When logs were left exposed to the sunlight or the dry air degrades such as severe shakes and log splitting occurred. The longer the time that the logs were left exposed to the elements, the greater the reduction in recovery rates from that log. The poor condition of the saw blades both reduced productivity and increased the number of rejected billets. The tolerance levels for any default in the final export product were extremely low (Nagel, 1987).

Diesel fuel and electric power from the national grid were not always available, therefore available operating time was reduced (Moyo, 1987). The production efficiency, measured as cubic metres per employee, was about thirty percent less than anticipated. The overhead and depreciation were estimated to be about two percent of gross sales value. A number of value-added techniques were practiced by this enterprise. The billets were cut to order, end trimmed, and graded. Seasoning of the newly produced billets was initiated promptly. Each end was sealed with molten wax and the billet was stored under shade until shipment (Moyo, 1987).

The final product of the enterprise was billet material for export. The billets were produced to industry wide specifications. About 10% of the billets that were exported did not meet musical instrument manufacturers specifications (Amin, 1987; Nagel, 1987). Market studies were undertaken that concluded there was a global demand for up to three hundred cubic metres per year, however export records indicated an average annual shipment of fifty cubic metres (Nyaki, 1987). No proactive market research was done by this enterprise. The competitors to the enterprise were well known. All Tanzanian billet producers sold all the billets they produced without delay. Market saturation would require an industry wide increase of between four and six times the current production levels (Mongi, 1987).

The exact limitations that the management of this enterprise were subjected to by the parastatal headquarters were not identified (Moore and Hall, 1987). The enterprise management expressed concerns that delays were caused by bureaucratic necessities that lowered the enterprise's competitive advantage and increased the built-in costs of the enterprise. Actual prices per cubic metre ranged from \$11,500 U.S. to \$13,500 U.S., however the reported number of billets per cubic metre also varied (Moore and Hall, 1987). The marketing strategy of this enterprise was a combination of direct and indirect sales (Moyo, 1987). Large scale end-users purchased directly from the enterprise whereas smaller scale end-users preferred to deal with distributors located in Europe. The possibility of an over supply of billets was present, if the forecast levels of production by the main producers materialized (Holmes, 1987).

African Blackwood Enterprises

a) Technical Limit

The degree of access to the resource was not limited by government authority. The lands where this enterprise was harvesting its raw materials was deemed public lands and was available for public use. The target log component of the total available volume was unknown, however, available inventory data indicated that suitable trees were widely scattered (Holmes, 1987). Logs were harvested using two man hand saws and loaded manually into the seven tonne flatbed lorry. The average round trip for log delivery was over 200 kilometers and averaged \$50 U.S. per round trip (Amin, 1987).

The enterprise was owned outright by a private entrepreneur who was on-site and managed the complete operation (Mbonde, 1987). Although private ownership of such enterprises was not permitted in Tanzania between 1966 and 1986, this enterprise was promptly established after the policy was changed in the latter part of 1986 (Mongi, 1987). The logs were crosscut at the mill manually into 0.5 metre lengths. These lengths were processed in the mill using one band saw and ten bench saws that were all powered by a single diesel engine and pulley-shaft system (Amin, 1987).

The entrepreneur was self financed and had access to foreign funds (Amin, 1987). Returns on net assets were favourable with costs per cubic metre estimated at 12% of the selling price. The mill log input capacity was rated at five cubic metres per shift. The recovery rate averaged 7% and production per shift averaged 0.35 cubic metres per shift. The production method focused on harvesting, transporting and processing logs as quickly as possible into finished billets that were to be immediately sealed in wax and stored under cover. The sawmill was in operation for one shift per day for five days a week during daylight hours only as there was no electric power for lighting beyond the 12 hours of daylight. The forecast production efficiency was 2.3 cubic metres per employee per year (Amin, 1987). A number of financial aspects of the enterprise, such as overhead and depreciation, were not disclosed by the private owner of the enterprise. Value-added activities such as seasoning, grading, end trimming, resawing and cutting to order were standard practice for this enterprise (Moore and Hall, 1987).

Planing, molding and treatment with preservatives were not undertaken. The final product of this operation was billets cut to customer designated dimensions for use in further manufacturing elsewhere. The results of the international market study undertaken by T.W.I.C.O. (Forindeco, 1987) were known by this entrepreneur. The entrepreneur planned to seek new products and markets for the materials left over from billet production (Amin, 1987). There were only four sawmills in the world producing billets and these were all located in Tanzania (Nagel, 1987). Some logs were reported to be exported from Mozambique; however, this trade was interrupted by the unsettled political situation there. The selling price of prepared billets was \$13,500 per cubic metre (Mongi, 1987). The enterprise made direct sales from the mill and through its wholly owned distribution agency in England. Prices were set by negotiation with each customer under free market conditions (Amin, 1987).

b) Benchmark Situation

The responsibility for the degree of access to the public lands where harvesting took place was assumed by the local District Council. The District Council's representative forest officer was responsible for assigning general areas for harvesting and for collecting a royalty for log volume received at the mill site (Moore and Hall, 1987). The total volumes of target logs was not known, although inventory data indicated that there were in excess of 2 million cubic metres in an area up to 150 kilometers from the mill. Accessible stands of commercial concentrations were in short supply due to past harvesting practices (Forindeco, 1987). Harvesting and loading of logs was done manually and two seven tonne lorries transported the logs to the mill. Log transport costs accounted for an average of 12% of the selling price, but the cost of log transport was expected to increase as accessibility became more difficult (Amin, 1987).

The enterprise was owned and operated by an entrepreneur with no previous experience in sawmilling (Amin, 1987). All employees were operating on a bonus system based on final output from the mill. The employees were free to organize themselves as they saw fit to exceed the minimum production figures. Although the entrepreneur had capital readily available, there were often long delays in obtaining parts or supplies through regular customs channels (Amin, 1987; Holmes, 1987). The production cost figures were estimated by the owner/manager to be similar to Mingoyo Cooperative Sawmill, about 12% of the selling price. On a per shift basis, the actual log input volume averaged 4.6 cubic metres and production averaged 0.2 cubic metres of billets, an average recovery rate of 7% (Amin, 1987).

All prime grade billets produced were sold and exported. Other grades that were not sold were sorted and stored for possible reprocessing once a market was identified. Lowest grades of billets were periodically made into charcoal for sale in the local market. Production methods were similar to those of Mingoyo Cooperative Sawmill. The employee's production objective was to process logs as quickly as possible to reduce the potential defect from rapid drying and to maximize the production bonus payments (Amin, 1987).

The mill could only operate during daylight hours (about 12 hours maximum per day) (Moore and Hall, 1987). The employees were flexible in their working hours and adjusted to the log deliveries to ensure maximum production. The production efficiency as measured by volume of billets produced per employee per annum was 0.32 cubic metres. The overhead and depreciation of the enterprise was a small

proportion of the income generated. All equipment, except the diesel motor vehicles and saw blades, were refabricated from locally obtained materials. The sawmill was located within an abandoned sisal mill.

Value-added processes such as grading, cutting to order, seasoning, end trimming and resawing were standard practice for the production of billets. There was no treatment with preservatives nor any planing, molding, or shaping undertaken. The final products of this enterprise were billets sawn to industry wide specifications (Amin, 1987).

Market studies were not undertaken by the entrepreneur, however, the production plans were geared to meeting a growing proportion of the world demand estimated by the T.W.I.C.O. sponsored market study. The entrepreneur was well aware of the activities and production levels of the other three mills producing billets. The sales prices for the billets averaged \$12,500 U.S. per cubic metre (Amin, 1987). The entrepreneur sold directly to end-users and also supplied a wholly owned agency in the United Kingdom. Through this agency in the United Kingdom, the entrepreneur was able to reduce the risk and cost to buyers of purchasing directly from the sawmill in Tanzania. The market was known to be limited and the entrepreneur was making every effort to establish a good market position by offering reliable service to customers (Amin, 1987).

Table 7: Mingoyo Cooperative Sawmill Sawmilling Management Criteria Ratings.

<u>Process level</u>		<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>
Control of Access	1.	Degree of Access to Resource	-1	-1	*
Harvest and Transport	2.	Total available volume (i.e., Target Log component)	-1	-1	*
	3.	Logging Equipment	+1	-1	*
	4.	Cost of logs delivered to the sawmill per m ³	+1	-1	*
The Sawmill	5.	Ownership of the enterprise	+1	-1	*
	6.	Physical Plant	+1	-1	*
	7.	Availability of capital	+1	-1	*
	8.	Return on net assets/Price-earnings ratio	-1	-1	*
	9.	Mill log input capacity (e.g. m ³ /shift or m ³ /year).	+1	-1	*
	10.	Sawnwood production m ³ /shift, by species	+1	-1	*
	11.	Sales m ³ /year by species sawnwood, shorts	+1	-1	*
	12.	Production cost: currency units/m ³	+1	-1	*
	13.	Timber recovery rate: log input/sawnwood output	+1	-1	*
	14.	Production methods: quality control, handling	+1	-1	*
	15.	Operating time available	+1	-1	*
	16.	Production Efficiency: (m ³ /employee/year)	+1	-1	*
	17.	Overhead, Depreciation/m ³	-1	+1	*
Value-Added	18.	Seasoning (drying)	+1	-1	*
	19.	Grading	+1	-1	*
	20.	End trimming	+1	+1	
	21.	Cutting to order	+1	-1	*
	22.	Resawing/Edger	-1	-1	*
	23.	Planing, shaping, molding	n/a	n/a	
	24.	Treatment with preservatives	n/a	n/a	
	25.	Final product production	+1	-1	*
Market Studies	26.	Extent of market survey: national/international	+1	-1	*
	27.	Description of end-products to be researched	+1	-1	*
	28.	Identification of competitors: existing and potential	+1	-1	*
	29.	National economic advantage over competitors	+1	-1	
	30.	Built-in costs structure as a limiting factor	-1	-1	*
	31.	Prices	+1	-1	*
Marketing	32.	Direct sales and shipment: specialization	+1	-1	*
	33.	Indirect sales and shipments: diversification	-1	-1	*
	34.	Customer relations practices and pricing practices	-1	-1	*
	35.	Market position, degree of customer loyalty/time	+1	-1	*
		TABLE SUMMARY	25/+1	2/+1	
			8/-1	31/-1	
			2 n/a	2 n/a	

Table 8: African Blackwood Enterprises Sawmilling Management Criteria Ratings.

Process level		Criteria	Technical Limit	Benchmark Situation	Negotiation Aim
Control of access	1.	Degree of Access to Resource	+1	-1	*
Harvest and Transport	2.	Total available volume (i.e., Target Log component)	-1	-1	*
	3.	Logging Equipment	+1	-1	*
	4.	Cost of logs delivered to the sawmill per m ³	+1	-1	*
The Sawmill	5.	Ownership of the enterprise	+1	-1	*
	6.	Physical Plant	+1	-1	*
	7.	Availability of capital	+1	-1	*
	8.	Return on net assets/Price-earnings ratio	+1	+1	*
	9.	Mill log input capacity (e.g. m ³ /shift m ³ /year)	+1	-1	*
	10.	Sawnwood production m ³ /shift, by species	+1	-1	*
	11.	Sales m ³ /year by species sawnwood, shorts	+1	-1	*
	12.	Production cost: currency units/m ³	-1	-1	*
	13.	Timber recovery rate: log input/sawnwood output	-1	-1	*
	14.	Production methods: quality control, handling	+1	-1	*
	15.	Operating times available	+1	+1	*
	16.	Production Efficiency: e.g. m ³ /employee/year.	+1	-1	*
	17.	Overhead, Depreciation/m ³	n/a	n/a	
Value-Added	18.	Seasoning (drying)	+1	-1	*
	19.	Grading	+1	-1	*
	20.	End trimming	+1	+1	
	21.	Cutting to order	+1	-1	*
	22.	Resawing/Edger	-1	-1	*
	23.	Planing, shaping, molding	na	na	
	24.	Treatment with preservatives	na	na	
	25.	Final product production	+1	-1	*
Market Studies	26.	Extent of market survey: national and international	+1	-1	*
	27.	Description of end-products to be researched	+1	-1	*
	28.	Identification of competitors: existing potential	+1	-1	*
	29.	National economic advantage over competitors	+1	-1	*
	30.	Built-in costs structure as a limiting factor	+1	+1	
	31.	Prices	+1	+1	*
Marketing	32.	Direct sales and shipment: specialization	+1	+1	
	33.	Indirect sales and shipments: diversification	+1	+1	*
	34.	Customer relations practices and pricing practices	-1	+1	
	35.	Market position, degree of customer loyalty/time	-1	+1	
TABLE SUMMARY			26/+1	7/+1	
			6/-1	25/-1	
			3 n/a	2 n/a	

The ratings of the Mingoyo Cooperative Sawmill (Table 7) show that of the thirty-five criteria described for the Technical Limit of the Economic sphere there are twenty-five values of +1, eight of -1, and two that are not applicable. This rating

indicates that the planning of the enterprise left some gaps that must be filled before the system can be expected to meet the goals of the sphere efficiently. The summary of the Benchmark Situation criteria for this case study are two values of +1, thirty-one values of -1 and two criteria that are not rated. The Benchmark Situation rating indicates that the system is operating in a manner that is not efficiently meeting the goals of the sphere.

The ratings of the criteria for the Technical Limit of the Economic sphere of the African Blackwood Enterprises case study (Table 8) are twenty-seven values of +1, six values of -1, and two criteria that are not applicable. This rating indicates that there are a number of criteria that are not contributing to the efficiency of the enterprise. The summary of the Benchmark Situation criteria for this case study are nine values of +1, twenty-four values of -1 and two criteria not rated as they are not applicable to this enterprise. This rating of the Benchmark Situation criteria again indicates that although performing better than the Nithi Timber Cooperative and Mingoyo Cooperative enterprises, the system is not operating in a manner that is efficiently meeting the goals of the sphere.

Table 9: Mingoyo Cooperative Sawmill Summary of the Sawmilling Management Negotiation Aims.

<u>Process level</u>		<u>Criteria</u>	<u>Negotiation Aim</u>
Control of access	1.	Degree of Access to Resource	For the centralization of the issuance of licences to cut and remove forest products from public lands. Include specifications of the exact location of harvests, the volumes to be removed, the time limit of activity and penalties for under-utilization.
Harvest and Transport	2.	Total available volume (i.e., Target Log component)	For the survey and mapping of the general distribution of mpingo in Tanzania and for the identification of concentrations which are economically accessible. Have these areas gazetted as Forest Reserves to facilitate management control and conduct operational inventories within these new Forest Reserves to assist in guiding the determination of Annual Allowable Harvest Rates (Moore and Hall, 1987).
	3.	Logging Equipment	For the repair of log transport vehicles and the establishment of a maintenance programme for the transport lorries. Log transport is the limiting factor to this operation at present.
	4.	Cost of logs delivered to the sawmill per m ³	For the establishment of record-keeping of the logging section to determine actual costs of log delivery.
The Sawmill	5.	Ownership of the enterprise	For a greater degree of autonomy in the management of the day-to-day activities of the enterprise and for a greater degree of accountability of the TWICO organization in meeting its mandate through the forest-based industries.
	6.	Physical Plant	For blade supply and blade sharpening, maintenance equipment and supplies within a saw machine upgrading and maintenance program.

	7.	Availability of capital	For a one-time injection of capital (either grant or loan) to fund repairs so that the sawmill can operate with economic efficiency. Increased production and export earnings would provide sufficient operating capital for repayments and maintenance.
	8.	Return on net assets/ Price-earnings ratio	For an accounting and record-keeping system on production costs associated with the costs of mpingo production exclusively.
	9.	Mill log input capacity (e.g. m ³ /shift m ³ /year)	For the upgrading and maintenance of the sawmill equipment.
	10.	Sawnwood production m ³ /shift, by species	For the upgrading and maintenance of the sawmilling equipment and for the analysis and quantification of the mpingo produced but not exported.
	11.	Sales m ³ /year by species sawnwood, shorts	For the upgrading and maintenance of the sawmilling equipment to increase recovery rates of prime grade billets.
	12.	Production cost: currency units/m ³	For more comprehensive record-keeping to accurately determine the breakdown of production costs.
	13.	Timber recovery rate: log input/ sawnwood output	For a technical review of the sawmilling process upon which to base an advisory program for the upgrading of processing techniques, the selection and use of equipment and for saw maintenance to increase in recovery rates.
	14.	Production methods: quality control, handling	For a technical review of the sawmilling process as stated in criterion 13.
	15.	Operating time available	For the improvement of the logging sector and log transporting equipment.
	16.	Production Efficiency: e.g. m ³ /employee/ year	
	17.	Overhead and Depreciation /m ³	For a specific accounting and record-keeping system for the mpingo operation.
Value-Added	18.	Seasoning (drying)	For a system whereby the identification of the date of manufacture can be traced for each billet or lot of billets and for special express shipment of billets in crates to avoid incorrect storage while on route to the purchasers to reduce rejections.
	19.	Grading	For a system to identify the process steps as indicated in criterion 18.
	20.	End trimming	None required at this time.
	21.	Cutting to order	For better log selection and more efficient log hunting. Bell billet production was greatly dependent on the quality and size of the logs. Large diameter logs with few defects were required to obtain a greater proportion of bells per log.
	22.	Resawing/ Edger	For a survey and analysis of the material which is currently considered to be waste or by-product to establish its quantity and its qualities. There may be material which could be marketed if the by-product materials were resawn.
	23.	Planing, shaping, molding	

	24.	Treatment with preservatives	
	25.	Final product production	For the investigation of further local processing of the billet material for the end-users.
Market Studies	26.	Extent of market survey: national and international	For a survey of end-users for the purpose of establishing direct sales.
	27.	Description of end-products to be researched	For a survey of the export markets to identify potential uses for mpingo wood which could be produced within the enterprise organization (Moore and Hall, 1987).
	28.	Identification of competitors: (existing and potential)	For the establishment of harvesting and utilization standards which lead to better mpingo forest management. Assign export quotas to those producers who best meet the standards or exceed them with novel ideas and techniques to maximize sustainable development based on the mpingo resource. For a survey to determine other sources of mpingo such as northern Mozambique that may also supply mpingo logs to billet makers in Europe and Japan. For a survey of all sawmill capacity: actual, potential and planned.
	29.	National economic advantage over competitors	For the establishment and monitoring of harvesting and utilization techniques which lead to sustained yield of the mpingo resource within Tanzania. The market for mpingo billets is exclusively in the developed world where this style of resource management would be favoured.
	30.	Built-in costs structure as a limiting factor	For greater autonomy for the local management in the day-to-day running of the mill and greater access to capital for spare parts purchasing. For a refinement of the exporting methods which include full prepayment to the Central Bank by the buyer.
	31.	Prices	For the assessment of the export record-keeping procedure with the aim of improving the information available and ensuring consistency in the number of billets per m ³ .
Marketing	32.	Direct sales and shipment: specialization	For an investigation into the role of the stockists in the market in order to determine if there is an advantage to producers to develop methods of making direct sales of the billets to the instrument manufacturers exclusively.
	33.	Indirect sales and shipments: diversification	For a survey of end-users to determine their needs. For an assessment, based on the information gathered from the end-users' survey, to determine the best course of action for Mingoyo Cooperative regarding the marketing method to be employed.
	34.	Customer relations and pricing practices	For an assessment of the marketing mechanisms for mpingo billets and for the development of a system of sales which is convenient for the customer and for the producer and the Tanzanian Government.
	35.	Market position, degree of customer loyalty/time	For the development of good customer relations as soon as possible in order to establish a record of good service and develop customer loyalty before the market becomes a buyers' market rather than the sellers' market as it is at present.

Table 10: African Blackwood Enterprises Summary of the Sawmilling Management Negotiation Aims.

<u>Process level</u>		<u>Criteria</u>	<u>Negotiation Aim</u>
Control of access	1.	Degree of access to Resource	For the centralization of the issuance of licences to harvest and remove forest products from public land, including specification of the exact location, volumes to be felled, time limits and penalties for poor utilization. Balance low vs. high cost log source areas over time.
Harvest and Transport	2.	Total available volume (i.e., Target Log component)	For the survey and mapping of the general distribution of mpingo in Tanzania and for the identification of concentrations which are economically accessible. For the gazetting of these areas as Forest Reserves to facilitate Forest Department control and for operational inventories within these new Forest Reserves to assist in the determination of annual allowable cuts (Moore and Hall, 1987).
	3.	Logging Equipment	For the upgrading of the log transportation. Currently log transport is the limiting factor to sawmill production. More trees are felled than are transported. Only the highest grade of logs are transported.
	4.	Cost of logs delivered to the sawmill per m ³	For the establishment of record-keeping of the logging section to determine actual costs of log delivery.
The Sawmill	5.	Ownership of the enterprise	For a comprehensive review of the ownership of the enterprise.
	6.	Physical Plant	For a technical assessment of the operation in order to determine possible improvements in the processing system. For example, the hand feeding of irregular logs into the circular bench saw puts the maximization of the recovery rate and the workers at risk.
	7.	Availability of capital	For a review of the importation rules for industrial spares to identify options for streamlining these government controls.
	8.	Return on net assets/ Price-earnings ratio	For a review of the costs of production in conjunction with a technical review aimed at assisting the owner to reduce costs and increase efficiency.
	9.	Mill log input capacity (e.g. m ³ /shift m ³ /year)	For a comprehensive study of log input capacity aimed at establishing the causes for limits to input.
	10.	Sawnwood production m ³ /shift, by species	For a survey to determine the factors which restrict the level of production of billets.
	11.	Sales m ³ /year by species sawnwood, shorts	For the assessment of the system of harvesting and processing mpingo in order to determine possible means of increasing the production of billets while reducing the volume of trees felled to obtain logs.
	12.	Production cost: currency units/m ³	For the establishment of a record-keeping system for production costs to enable the management to monitor more accurately the level of efficiency.
	13.	Timber recovery rate: log input/ sawnwood output	For a technical review of the logging and sawmilling process upon which to base an advisory program for the upgrading of processing techniques, for the selection of standing trees for felling and use, and for maintenance of equipment for the increase of the recovery rate of the sawmill.
	14.	Production methods: quality control, handling	For a technical review of the logging and sawmilling process upon which to base an advisory program for the upgrading of processing techniques and the selection of standing trees for felling.

	15.	Operating times available	For the improvement of the logging sector and log transport equipment to ensure constant supply of logs of the highest grade.
	16.	Production Efficiency: e.g. m ³ /employee/year.	For a technical review of the sawmilling process upon which to base an advisory program for the upgrading of processing techniques.
	17.	Overhead, Depreciation/m ³	n/a
Value-Added	18.	Seasoning (drying)	For a system whereby the identification of the date of manufacture can be traced for each billet or lot of billets and for special express shipment of billets in crates to avoid incorrect storage while on route to the purchasers to reduce rejections.
	19.	Grading	For a system to identify process steps as indicated in previous criterion.
	20.	End trimming	None required at this time.
	21.	Cutting to order	For better log selection and more efficient log hunting. Bell billet production was greatly dependent on the quality and size of the logs. Large diameter logs with few defects were required to obtain a greater proportion of bells per log.
	22.	Resawing/ Edger	For the survey and analysis of the material which is currently considered to be waste or by-product to establish its quantity and qualities. There may be material which could be marketed if the by-product materials were resawn.
	23.	Planing, shaping, molding	n/a
	24.	Treatment with preservatives	n/a
	25.	Final product production	For the investigation of further local processing of the billet material for the end-users.
Market Studies	26.	Extent of market survey: national and international	For a survey of end-users for the purpose of establishing direct sales.
	27.	Description of end-products to be researched	For a survey of the export markets to identify potential uses for mpingo wood which could be produced within the enterprise (Moore and Hall, 1987).
	28.	Identification of competitors: (existing and potential)	For the establishment of harvesting and utilization standards which lead to better mpingo forest management. Assign export quotas to those producers who best meet the standards or exceed them with novel ideas and techniques to maximize sustainable development based on the mpingo resource. For a survey to determine any other sources of mpingo such as northern Mozambique that may also supply mpingo logs to billet makers in Europe and Japan. For a survey of all sawmill capacity: actual, potential and planned.
	29.	National economic advantages over competitors	For the establishment and monitoring of harvesting and utilization techniques which lead to sustained yield of the mpingo resource within Tanzania. The market for mpingo billets is exclusively in the developed world where this style of resource management would be favoured.
	30.	Built-in cost structures as a limiting factor	n/a
	31.	Prices	For the assessment of exporting procedures and the documentation of exports with the aim of establishing an accurate record-keeping system for exports and a consistent number of billets per m ³ .
Marketing	32.	Direct sales and shipment: specialization	No negotiation aims required at this time.

	33.	Indirect sales and shipment: diversification	To establish a marketing connection to the USA and Japan.
	34.	Customer relations and pricing practices	None required at this time.
	35.	Market position, degree of customer loyalty/time	None required at this time.

c) Mingoyo Cooperative Sawmill

The review of the results of the assessment of the Technical Limit and the Benchmark Situation for the Mingoyo Cooperative Sawmill case study indicates that there are problems within the existing enterprise system that hamper the achievement of the goals of the Economic sphere. From the information listed in Table 9, the elements of the negotiation strategy for the economic aspects of this case study enterprise can be summarized under the process level headings. There is no control over the exploitation of the forest resources that are utilized by this enterprise. There is a need to formalize the forest resource tenure arrangements and for the identification of the quantity, quality and locale of this forest resource.

These efforts are necessary to provide some security to the enterprise so that further investment in the enterprise, necessary for it to attain the goals of the Economic sphere can be justified. There is also a need for a greater managerial autonomy at the enterprise that will allow for the more efficient allocation of resources. There is concurrent need for better record-keeping to improve costing and to improve the accountability of the production unit and the level of customer service.

There is a need for a clear analysis of production by-products to provide the information upon which to base broader market studies. To determine the best marketing methods and to improve customer service, a survey of current and potential end-users of the timber species processed by this enterprise is required.

d) African Blackwood Enterprises

From the review of the criteria ratings of the Technical Limit and the Benchmark Situation, the activities of this enterprise do meet the goals of the Economic sphere to some extent. There are some aspects of this enterprise that could be changed to better meet the sphere goals (see Table 10). The basic requirements for planning could be improved upon. For example, the forest tenure arrangements could be

formalized and a licensing arrangement implemented to stabilize the flow of resources from the forest. An effective licensing of users would permit more effective planning and investment by the entrepreneur. A forest resource inventory is required that identifies the location, quality and quantity of the species required by this operation.

The log transport system also requires upgrading so that a reliable log supply can be predicted which in turn will enable the entrepreneur to plan with more confidence. Within the sawmill itself there is a need to undertake a comprehensive review of the operations to determine possible improvements that would increase the level of efficiency. There is also a need to develop a more accountable record system that would permit positive action to be taken on any feedback received from the customers. Billets require some identification so that the reports on their grade and post-shipping condition can be traced to the appropriate stage in the production process and corrective action can be taken. In other words, a basic quality assurance system needs to be implemented.

The harvesting methods also require technical review and assessment. A more efficient tree selection system is required that is linked to the requirements of the market. For example, large diameter trees are required for the production of the bell shaped billets and these trees are at a premium. There is at present no coordination between the marketing department, the production department and the harvesting crews to specify the quantity of the larger diameter trees that are actually required by the mill to meet the orders.

An investigation into alternate uses and markets for the sawmill by-products and low grade logs is required for this enterprise. Negotiations are also necessary to establish harvesting and log utilization standards that will lead to better resource management. A basic export volume quota could be assigned to each billet-producing enterprise. For those producers that demonstrate innovation and improve the utilization level of the timber, an increase in the basic export quota could be given. In the forest, there is a need for the establishment of a monitoring system that can determine if an enterprise is practicing harvesting techniques that are patterned to lead to sustained yield of the species within the local region of the enterprise.

Appendix 2

Case Study Background Information

Addition detail to the biological, social and economic aspects of the cases studies is provided in this appendix.

Physical Description of the Case Study Sites

Kenya and Tanzania are neighbouring countries in the central east coastal area of Africa (Appendix 2, Plate 1), with similar general physical features. From a low coastal zone, there is an arid to semi-arid plain, punctuated by scattered hills, gently rising to a highland plateau system (2,400 - 3,000 metres above sea level - *masl*). The plateau is interrupted by the Rift Valley which runs north-south through Kenya and into Tanzania. The Rift Valley is bordered by mountains and extinct volcanos. The land descends westward to Lake Victoria and in Tanzania the plateau is broken by a range of low hills bordering Lake Tanganyika. There is an east-west belt of mountains running parallel to the Kenya border from the rift Valley to the Coast.

The average annual temperature is 26° C at sea level with a reduction of 1.7°C for every 300 m increase in altitude. There can be two rainy seasons, but for most of Tanzania and the northern plains of Kenya there is only one. The higher elevations and the coastal areas receive the greatest amounts of rain while the extensive plains below 1200 metres are semi-arid to arid (Moreau, 1933). The physical features of Kenya and Tanzania relating to this study are listed in Appendix 2, Table 1. The data in Appendix 2, Table 1 show Kenya and Tanzania to be typical of many of the countries, both in Africa and elsewhere, where natural tropical forest is exploited. There is a rapidly increasing population, limited forest resource, and a weak forest management program.

Appendix 2, Table 1: Physical Features of the Case Study Countries.

	Kenya	Tanzania
Map Reference	4 N - 4 S 34 E - 42 E	1 S - 12 S
Total Areaⁱ	58 million ha	94 million ha
Forested Area (million ha)ⁱⁱ		
Total:	1.9 million ha (3.2% of total land area)	44 million ha (46.8% of total land area)
Reserves:	1.67million ha (2.8% of total land area)	0.98 million ha - closed forest (0.01% of total land area) 11.4 million ha - open woodland (12.1% of total land area)
Population (1986)ⁱ	21 million	22.5 million
Annual Population Increase - %ⁱ	4.12	3.52
Type of Government^{iv}	One Party Democracy	One Party Socialist Democracy
Rates of Deforestation Closed Forest 1980-1985ⁱⁱ	19,000 ha/yr	10,000 ha/yr
Annual Decrease in Forest Landsⁱⁱ	0.7%	0.4%
Annual Reforestationⁱⁱⁱ	7,000 ha/yr	7,000 ha/yr

Data Sources:

- i) WRI, 1986.
- ii) Lanly, 1983.
- iii) CFR, 1986.
- iv) Hallsworth, 1982

The Case Studies in Historical Perspective

The historical development of both Kenya and Tanzania can be divided into three periods, the Pre-Colonial, the Colonial and the Post Colonial. These periods provide a useful framework in which the elements of the forest conversion process, forest management, economic analysis and decision makers can be examined with respect to the specific forest area which is the present day source of logs for the case study sawmills.

A brief analysis of the developments in forest use and administration will help to place the socio-economic assessments made for each case study in this investigation in historical perspective.

Case Study I. Nithi Timber Cooperative Society Limited, Mount Kenya.

Pre-colonial Period (before 1885)

The Mount Kenya forest is thought to have originated from the remnants of a forest that once covered most of East Africa during the Miocene Period, when the climate was cooler and wetter. At some time the climate became warmer and drier, and the forest receded to the Congo Basin and up the slopes of the mountains of East Africa where the temperatures and rainfall permit their growth. The mountains of East Africa appear as "islands" of a similar forest type although they can be separated by hundreds of kilometres of a "sea" of drier woodlands at lower elevations (Moreau, 1933).

The first sighting of Mount Kenya by a European is attributed to a Dr. Krapf in 1849. To reach Mount Kenya, the early explorers had to traverse the 400 kilometres of scrubland between the mountain and the coast which was "infested with lions and with disease" (Krapf, 1880). This zone between the coast and the mountain was the traditional territory of the Akamaba people and their control of that land as part of the ivory trade is said to have kept the Mount Kenya area from much influence from the coast. Early explorers reported that the Mount Kenya Forest was used to a limited extent by various people for collecting bamboo and timber poles, honey and trapping. Leakey (1977) reports that the hollow trees were used for beehive making and that wide boards were sometimes split from the large diameter trees for use in hut construction.

The local tribes held Mount Kenya sacred as the origin of man and home of the gods, but on a more practical basis the mountain forests were considered to be a hostile wilderness inhabited by wild animals and the odd unsavoury character (Leakey, 1977). Extensive tracts of the moist montane forest were unclaimed by any descent group or individual however, the boundary between agricultural land use and the natural forest was progressing into the forest as more forest land was used for agriculture (Hutchins, 1907). The cooler temperatures at the higher altitudes caused reduced vigour in some crops and meant only one crop per year could be produced, compared with two crops at lower elevations. At the onset of the colonial occupation of Kenya, local elders reported that the Mount Kenya forest had extended to a much lower elevation than that found by the first colonialists (Abraham, 1958).

The Colonial Period 1885-1963

The British Crown declared a protectorate over Kenya in 1885 and by 1897 the first forest policy was enacted. The Ukamba Woods and Forest Regulations reserved the trees near Nairobi and within two miles of the railway line from Mombasa to Lake Victoria (Colony and Protectorate of Kenya, 1962). In 1900 the first government station was established on the south western slopes of Mount Kenya. In the year 1902 another station was established on the western slopes of Mount Kenya and the Kenya Forest Department began operating.

In 1905 the colonial government received an application for two large timber tracts on Mount Kenya. The government's response was to send the forester Sir David Hutchins to evaluate the forest area (Hutchins, 1907, 1909). He noted that the forest area was made up essentially of two forest types. On the eastern and southern slopes the wetter forest was characterized by abundant East African camphor (Ocotea usambarensis Engl.), a valuable hardwood, and podo (Podocarpus gracilior Pilger), an indigenous softwood, with commercial value. On the drier western slopes the forest was characterized by the East African pencil cedar (Juniperus procera Endl.). Hutchins (1907) reported that the forest had high timber values as well as significant watershed protection values and should be left under government control. This recommendation was accepted, to the dismay of a number of prospective loggers.

The people of the southern and eastern slopes of Mount Kenya resisted colonial control until 1908. This delay in colonial control over the south eastern and eastern slopes meant however, that the area was considered closed by the colonial administration, and therefore, excluded therefore from the initial wave of colonization and speculation. By 1908 the colonial administration considered itself to be in control of the Mount Kenya Forest and began to make decisions about the forest resource.

The forest was demarcated and by 1912 a boundary line had been cleared around the forest. Some local people were turned out of this designated forest and forbidden to return. The demarcation process was not well received by the local people who complained that the forest had been theirs before the colonials arrived. No effort was made by the colonial administration to relocate or compensate those people who were evicted. The same year also saw the completion of the Meru-Embu Road, which was constructed under the colonial administration by local people using simple digging sticks. The road was constructed along the 1,500 metre contour of the deeply incised eastern slope. The surface of the track was red clay soil which, when wet, made passage by vehicle impossible. This excluded all but the most determined drivers from using the road except during the two dry seasons. The towns along the route were often without road transport to the north and south for days during the rainy season.

By 1916 control of the forest by the Forest Department was considered to be in hand and a licensing system for extracting produce was in place. The Forest Department issued forest harvesting licences for the exploitation of the forest resources; sawmilling and pit sawing carried on through the local economy, which did not absorb as much sawn wood as had been expected by the sawmillers. The economic depression of the 1930s led to reduced activities in the forest because of poor markets. The two World Wars led to a reduced number of personnel available for the administrative duties in the forest. Access to the forest was therefore curtailed. Logging operations concentrated on the south and western slopes of the mountain and on the north east slopes near Meru town where operations were established near transport facilities.

The State of Emergency in Kenya was declared on October 20, 1952. This was due to the Mau Mau uprising which began in early 1950s. There was increasing

dissatisfaction amongst the local population with the colonial system of administration which was considered to be unfair. The forest was a refuge for those people active with the Mau Mau organization. Pitsawers and their employees were linked to the organization, and their experience in the forest was considered to be a considerable strategic advantage. The Mount Kenya Forest was closed to normal forest activities in 1953. It was not opened again until 1956 when the threat of the Mau Mau had been sufficiently dispelled. The forest on the eastern slopes was closed again in 1959 for about three months because of pockets of active resistance. Aerial bombing of suspected strongholds in the forest had been authorized by the government officials during that period and there were bitter struggles on the ground between the colonials and the Mau Mau (Ofkansky, 1984).

The Forest Department encouraged the resumption of pitsawing and other forest activities after 1953, but resumption of activities to their previous levels was slow. Forest Department activities such as seed collection and the establishment of plantations - primarily of exotic softwoods, but including some indigenous species, were interrupted occasionally by outbursts of "forest fighter" attacks. By 1961, with the end of the colonial era nigh, the forest became the focus of wildlife poaching, for trophies which drew attention to the colonial administration's waning control over the forest (Castro, 1988a,b).

Kenya became an independent nation on December 12, 1963. The new administration adopted many of the institutions established by the former colonial administration. The Forest Department was one such institution to make the transition to independence keeping the original mandate of maintaining the reserves for environmental protection and allowing licensed exploitation on a nominally sustained basis (Leakey, 1977).

Post Colonial Period (from 1963)

The forest reserve boundary on the eastern slopes has not changed since it was originally set by the Colonial Forest Department (Appendix 2, Plate 2), following the existing boundary. For example, there is an area of the forest on the eastern slopes that extends a further 300 metres down in elevation than the forest edge to the north and south. This forest area is known as the Chuka Bulge as it is located above Chuka Town and is reported to have been under less pressure from permanent agriculture activity in the pre-colonial period because it formed a no-man's land between unfriendly tribal groups (White, 1950). The original forest which had extended at one time to a much lower elevation was replaced through agricultural activity in the areas to the north and south of the Chuka Bulge.

The government of the newly formed Republic of Kenya was offered technical assistance from abroad. One project was a forest inventory of the eastern forest slopes conducted in 1965. This was the first comprehensive technical forest timber inventory done on the slopes of the mountain (Oy, 1975).

The establishment of the Nithi Timber Cooperative Society

Local interest was growing regarding the potential of exploiting the timber resource in the forest area of the Chuka Bulge. It was with that goal in mind that the Nithi Timber Cooperative Society Limited was established in 1965 at Chuka. The intention of its proponents was to build a sawmill where local pitsawyers could saw the squared beams which they were producing by pitsawing logs in the forest into planks. Shortly after, the volume of hardwood imports from neighbouring Uganda (immersed in civil war) and Tanzania (having a restricted timber export policy) fell substantially, and in the 1970s demand increased in both the local, rapidly expanding Kenyan market, and in the export market for indigenous hardwoods and spurred the activities of the pitsawyers in the forests of Kenya (Keen, I., Personal communication, 1986).

In 1975, the Nithi Society hired a consulting firm to undertake a feasibility study for the establishment of a wood industry in East Mount Kenya. The total area of approximately 17,900 ha was bounded by the Ruguti River and the South Mara River, by the forest boundaries at the lower elevation and by the Mount Kenya National Park at the higher elevation (Appendix 2, Plate 3). The feasibility study included a suggestion for a plywood and sawmill complex with an annual output of 9,000 m³ of plywood and 6,300 m³ of sawn timber. The forest resource would supply the complex for 40 years at a rate of 160 m³ daily. A plantation program of 300 ha per year was suggested to replace the harvested forest (Oy, 1975).

Following the feasibility study a local membership drive for the Society attracted a few local investors. This response was augmented through the decision of five local coffee co-operatives to invest into the scheme on behalf of their members. Subsequently, over 16,000 individuals became shareholders in the drive for funds.

Enough money was raised in this manner to secure the required additional funds through loans from the Co-operative Bank of Kenya Limited to build a sawmill rated at 25m³ of log input per shift (Appendix 2, Plate 4). The plywood mill was not built. By 1981 the sawmill was completed and 80 employees were brought to the mill by members of the management Committee and trained by the representative of the sawmill equipment makers. The original idea of local pitsawyers benefitting directly by using the processing facilities was lost before the sawmill became operational, and logging equipment was therefore purchased by the Society.

The sawmill began production in late 1981. It was not until December 2, 1982, that the Nithi Timber Co-operative Society Limited received a formal 10 year Licence to extract and mill timber from the Forest Department of the Ministry of Natural Resources. The Licence stipulated a minimum annual removal of 5,000 m³ to a maximum of 10,000 m³ of designated commercial species. There were eleven species designated as commercial in the Licence; however, East African Camphor (Appendix 2, Plate 5) has been the main species utilized to date. The local forest officer was to decide on each tree to be cut and by following a selection system¹

¹ In the selection system adopted for the Nithi Licence, each tree to be felled was selected and marked by the local forest officer in such a manner of distribution that no openings would be formed in the forest

ensure that there were no openings in the canopy which could be construed as "clear cutting" (Republic of Kenya Ministry of Natural Resources, Forest Department, 1982). A furniture plant and a forest nursery were added to the operation in 1985.

The administration of Nithi Timber Cooperative Society Limited was to follow the guidelines as developed by the Ministry of Co-operative Development. The day to day operations were the responsibility of the Project Manager who reported to the Management Committee. The Committee comprised five of the society's members who were elected by the membership. The committee has management authority over the enterprise and signing authority over the Society's funds. The operations were overseen by the local representative of the Ministry of Cooperative Development. Chronic management problems led to the Ministry of Cooperative Development intervening on behalf of the society's membership, and in January 1984 the Management Committee was disbanded and the Project Manager left. A Commission, made up of local civil servants who were appointed by the Ministry of Cooperative Development, was given charge of the Society to replace the elected Committee. The position of Project Manager was assumed by a representative from the Cooperative Bank of Kenya Limited, the principle financier of the Society. An expatriate sawmilling and logging expert was seconded in an advisory capacity to the Society for a six month period. The expert had no decision making power.

Few of the advisor's recommendations were implemented over the six month period. Neither had management improved. The advisor's report stated that there was no doubt of the profit-making capacity of the operation if two conditions were met: 1) the Project Manager be given the authority and power to make management decisions, and 2) the Forest Department meet its commitments to select trees as stipulated in the 10 Year Licence to Extract Timber which it had been reluctant to do during the advisor's time on site (Hemmingson, 1984).

Despite these changes in management personnel, by early 1985 the management difficulties of the enterprise had not improved. Production had never been above the planned minimum and the debt load had increased to approximately 50% above the original loan amount. The recommendations of the sawmilling advisor were taken into account by the financier, and the Cooperative Bank of Kenya arranged for a forestry expert to become the Project Manager for the Society. The Project Manager's mandate was to assume overall responsibility for all phases of work connected with the society's operations including marketing, production, logging and logging road maintenance, and the operation of the sawmill, furniture plant and the forest nursery. As an employee of the Society, the Project Manager was accountable to the Management Commission. For the two year period from June 1985 to June 1987, the Project Manager undertook to manage the enterprise on behalf of the Society. Using the five steps described in Section 2.5.3 of this study, the Project Manager assumed the role of the "interventionist".

canopy that would be larger than that formed by the felling of one tree. The forester was to select only decadent and over mature stems. (See Chapter 4: The Biological Factor: forest management, for a more detailed account of silvicultural systems used).

Case Studies II and III:

Mingoyo Sawmill Limited and African Blackwood Enterprises

Both enterprises in Case Study II and III will be described together since they share a number of similar characteristics. The sawmills are located in the United Republic of Tanzania, located within two kilometres of each other approximately 40 km west of the southern coastal town of Lindi, near the village of Mingoyo (Appendix 2, Plate 6). Access to the port of Mtwara is by all weather road and is about 80 km south.

Both Case Study sawmills utilize the same species of tree to produce the same type of product destined for a specific world market. The tree species used is Dalbergia melanoxylon Guill. & Perr. (Appendix 2, Plate 7) known as East African blackwood in the timber trade and as mpingo in the local Swahili language. The latter will be used here for brevity. There is no formal licence arrangement with the Forest Department for log supply for either of the sawmills (Kewero, 1990, Moore and Hall, 1987). Mpingo trees are not harvested from forest reserve areas which are the legal responsibility of the Forest Department, but from lands which are known as Public Lands. Public Lands are, by Tanzanian Law, available to be used freely by Tanzanian nationals. Kewero (1990) reports that Tanzanian officials drafted a new land use policy in 1986 that was to encourage an increase in the level of forest management on these lands; however, the legislation to formalize this policy has not yet been enacted.

To introduce Case Study II and III, the historic background which is common to both case study sawmills and the pre-requisites sustained yield forest management of the mpingo resource which is used by both sawmills is presented in the following sections. The historical development particular to each case study sawmill as well as other information related to each particular enterprise is noted in the respective Case Study descriptions.

Historical Background

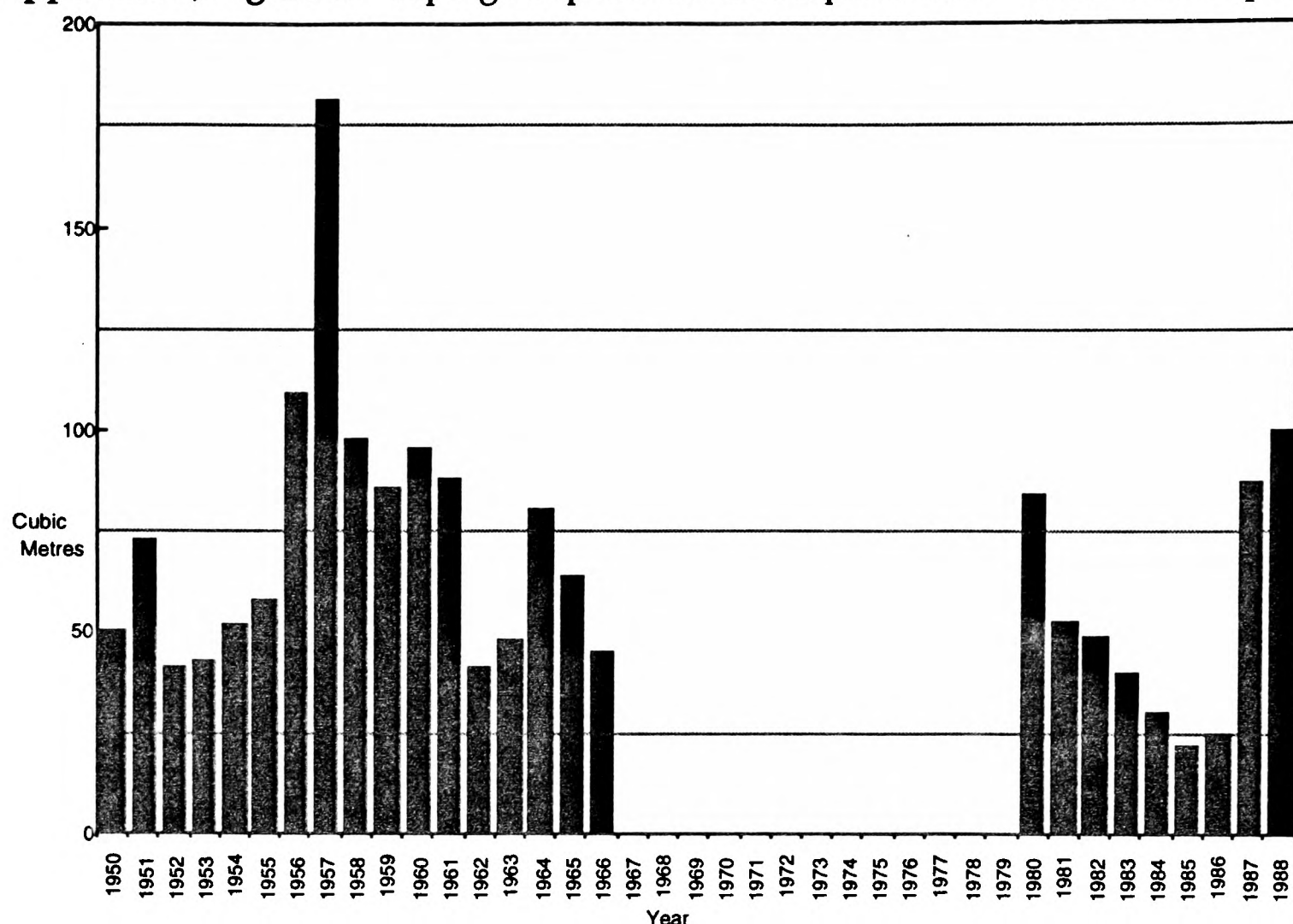
The Pre-Colonial Period (before 1885)

Mpingo was a valued trade item in ancient Egyptian times. In the tomb of Tutankhamun, for example, objects made from mpingo include a bed, a chair, and a stool. Other uses for the wood included chests, coffins, a harp, shrines, statues and staves. The wood had considerable value as early as the 5th Century B.C., and was included as tributes from one king to another in both finished products and in the form of logs (Thirgood, 1981). The wood was also used as an inlay and a veneer, generally in association with ivory for ornamentation on furniture and boxes (Lucas A. and Harris, J.R., 1952). The use of short logs as trade items was noted near Khartoum in the early part of the last century (Lucas A. and Harris, J.R., 1952). The source of the mpingo was from the lands south of Egypt, the area now known as Sudan and Ethiopia (Meiggs, 1982).

The Colonial Period 1885-1969

Germany assumed control of the area which is now known as Tanzania in 1891. After the First World War the area came under British rule (1920) until the country's independence in 1961. Mpingo in the form of logs has been exported to Europe and North America from Tanzania soon after the colonial period began, coinciding with exploration of the natural resources of the country. Forest Reserves were identified and demarcated beginning from 1904, primarily on grounds of environmental protection rather than for fiscal reasons (Schabel, 1990). More reserves were added during the British Colonial Rule and at no time was mpingo a target species for inclusion into the reserve system. Since Independence the Reserve Area has remained unaltered (Kewero, 1990).

An instrument manufacturer in Germany began using the mpingo wood for woodwind manufacture in the early part of this century, and mpingo logs from Tanzania have supplied this industry based in Europe, the United States and Japan. The wood is ideally suited for use in woodwind instruments. It is resistant to moisture, polishes well and can withstand extremes in temperature change. The wood is very hard and dense and turns well. It stands up well to thread tapping and combines well with metal workings of the woodwind instruments (Bryce, 1967). The wood is said to impart a particular resonance to the instrument, which is valued by musicians (Holland, 1989). Appendix 2, Table 1 shows the export volumes for the period 1950 to 1966. There was a steady rate of export for this period, averaging 1052 m³ of logs annually (see Appendix 2, Figure 1). The destination of the logs was France, United Kingdom, Germany, Japan, the United States and Italy. The exploitation of mpingo was entirely through private enterprises. (Mongi, 1987).

Appendix 2, Figure 1: Mpingo exports in billet equivalents - Cubic metres per year.

During this period a program of setting aside forest reserves was undertaken. The criteria set for the establishment of the Forest Reserves did not include parameters expressly to include mpingo; therefore, some areas with good concentrations of mpingo suitable for the billet trade are not within reserves (Moore and Hall, 1987).

The Post Colonial Period: 1969 to 1989

In 1969 the Tanganyika and Zanzibar combined and the United Republic of Tanzania was formed. With Independence, a new national strategy was undertaken. The changes that were initiated included a prohibition on the export of logs.

Mpingo wood is very dense and durable and it can be polished to a dark brown to black lustrous finish. It is used by the local people in Tanzania for hoes, pestles, mallets, cups, walking sticks and combs. The wood is also valued by some local blacksmiths because it burns at a much higher temperature than other woods, and was noted to be the preferred fuel of a few individuals along the coast south of the Rufigi River for the evaporation of sea water for salt making (Author's observation, August, 1987). However, near Handeni, local villagers avoided the species for firewood because of its relative hardness and therefore left it standing (Author's observation, August, 1987).

In the post colonial era, timber production in Tanzania was undertaken by a nationalized timber industry. In 1974 Tanzania took steps to increase the value-added to their timber production. A program to produce billets of mpingo (Appendix 2, Plate 8) in Tanzania and supply foreign manufactures of musical

instuments did not match previous export levels. Importers used their stockpiles and turned to other countries for log supplies, (such as Mozambique). Exports of mpingo billets dropped by over 50% between 1980 to 1984 (Minister of Lands, Natural Resources and Tourism, Personal Communication, August 3, 1987).

The potential for foreign currency earnings from mpingo billet export to the woodwind manufacturing industry was an important economic prospect for the Tanzanian Government. In 1985, the market value of one cubic metre of mpingo billets was between U.S.\$12,000 and \$15,000. The average annual demand for export billets was estimated to be 80 m³. However these potential earnings of about one million U.S. dollars could only be realized if the quality and quantity of the exported billets could reliably meet the exacting standards of the woodwind manufacturers. There was a lack of the necessary information regarding the mpingo resource and the industry exploiting it. Therefore, planning for the management of the resource for sustained yield in order to support the export billet industry was not possible. Mpingo was also under harvesting pressure for use by the handicraft and carving industry which produces tourist souvenir articles (Appendix 2, Plate 9).

In 1986, the United Nations Environment Programme (UNEP), Environmental Management Section, was approached by the Tanzanian Government to assist in the assessment of the possible options for mpingo management for sustained yield. In 1987, the Tanzanian Ministry of Lands, Natural Resources and Tourism and the United Nations Environment Programme, Environmental Management Section sent an interventionist to review the mpingo billet production sector², the respective sources of the mpingo for each enterprise, and the state of the overall mpingo resource in Tanzania (Moore and Hall, 1987).

Establishment of Mingoyo Sawmill and African Blackwood Enterprise

Demand for mpingo billets for musical instrument manufacturing has not fluctuated greatly over the last century (Nagle, 1988). When mpingo log exports were banned from Tanzania, the clarinet manufacturers (located in France, Germany, Japan, and the United States) relied on existing stockpiles in Europe as well as some erratic supplements of mpingo log exports from war-torn Mozambique. In 1984, a clarinet manufacturer based in France went to Tanzania and provided technical assistance to a sawmill located in Dar es Salaam to help develop the necessary local expertise and equipment to manufacture the mpingo billets to the required standard (Minister of Lands, Natural Resources and Tourism, Personal Communication, August 3, 1987). A national policy change in 1985 had a noticeable effect on mpingo export potential. The change was that private companies could export sawn timber. Most importantly, any producer who earned foreign revenue from export received half the value of the sale in local currency and half was available to the producer as foreign currency. This gave any exporter the power to import independently goods for which hard currency was required.

² In August 1987 there were five enterprises which were using the mpingo resource to produce musical instrument billets.

The existing sawmill in Dar es Salaam was unable to supply the required volumes of billets. The access to foreign currency was a powerful motivation and local interest in the production and export of mpingo began to increase. In response to the unfilled demand, and in the context of modifications to national policy for exporting of goods from Tanzania, three new mpingo processing sawmills were initiated in 1985. The Tanzanian Wood Industry Corporation (TWICO), a parastatal forest-based industry, initiated joint ventures at two of its existing sawmills³ to produce mpingo billets, and a private entrepreneur converted an abandoned sisal mill into a sawmill for the exclusive production of mpingo billets. For the purposes of this study, the TWICO affiliate and the privately owned sawmill, located in close proximity and sharing similar opportunities for forest exploitation, were selected as case studies.

With the increase in exports, the clarinet manufacturer, who had been assisting the Tanzanian producers, noted a drop in the wood quality of the exported billets. This meant that the billets could not be used in the manufacturing of woodwind instruments (Moore and Hall, 1987). The clarinet manufacturer was interested to ascertain whether or not the supply of quality logs was at an end, or if the sawmills were not able to procure the necessary logs and produce billets of the necessary grade. This concern was expressed to the Tanzanian Forestry officials, and led eventually to the request for the sector review conducted by the interventionist.

Management; structures and challenges

Mingoyo Sawmill is a parastatal organization affiliated with TWICO, but it is independently managed. The operation encompasses a general hardwood sawmilling operation for local and export markets, furniture making, charcoal making from offcuts, and mpingo billet production (for export). Of a total employee roster of 80, there are about 20 workers employed on two shifts for mpingo sawing (Appendix 2, Plate 10).

All the management staff are trained and experienced; they and administration staff were transferred to Mingoyo from the TWICO Headquarters in Dar es Salaam, while the workers are all hired locally. With the exception of two experienced sawyers, the mpingo sawyers are considered inexperienced. Most of them had not worked in a sawmill previously and received their training on the job.

The earnings from the mpingo production far exceed the earnings from the enterprise's other operations. Each step in the conversion process - the logging, crosscutting the logs before they are milled into billets, and grading of the finished product are undertaken by designated employees.

At the time of the study the joint venture with FINNIDA had not come to fruition and the mpingo operations were being undertaken independently by the local management. As a result, some of the expected capital investment and, more

³ The joint ventures were with the Finnish and Chinese overseas development agencies. They were established at Mingoyo and Kilwa Masoka respectively (Moore and Hall, 1987).

importantly, the timely importation of saw blades and other equipment had been foregone by the sawmill. The state of the equipment was very poor, but production was still possible at a reduced rate. The sawmill is powered by diesel generators; it is connected to the regional power grid, and although this source of electric power is considered more unreliable than the supply of diesel fuel, an uninterrupted power supply cannot be guaranteed.

The African Blackwood Enterprises sawmill is privately owned and managed by the entrepreneur for the exclusive production of mpingo billets. The sawmill was built by adapting the physical plant of an abandoned sisal mill. The 12 bench saws and 1 bandsaw are driven from a central pulley shaft which is powered by a single cylinder diesel engine. Of the 38 employees 18 are sawyers. Unlike Mingoyo, these individuals cross cut the delivered logs into shorter lengths themselves (Appendix 2, Plate 11) before processing the short logs in the sawmill (Appendix 2, Plate 12). The employees and the owner considered this to be a contributing factor to the recovery rate at this mill.

A Technical Description of the Case Study Operations

Nithi Timber Cooperative Society is one of the 105 long term sawmills in Kenya. In 1987, the Society's 10 Year Timber License amounted to 10% of the total annual licensed indigenous sawlog volume⁴. The production of the two Tanzanian case study sawmills represented 86% of the total national production at the time of the field work (Moore and Hall, 1987). As such, the case studies served as a significant sample of the existing industry in each country. The basic technical characteristics of each enterprise are presented in Appendix 2, Table 2.

⁴ the estimated annual volume of indigenous sawlogs was 100,000 m³ (World Bank Kenya Forestry Subsector Review, 1987).

Appendix 2, Table 2: Summary of Technical Characteristics of the Case Studies

Name	Nithi Timber	Mingoyo Blackwood	African Blackwood
Location	E. Mt Kenya	S.E. Tanzania	S.E. Tanzania
Type	Band Saw ⁱ	Circular Saw ⁱⁱ	Circular Saw ⁱⁱ
Product	Sawnwood/Furniture ⁱ	Musical Instrument Billets/Sawnwood ⁱⁱ	Musical Instrument Billets ⁱⁱ
Log Input per year	5,000 to 10,000 m ³ ^{iv}	350 to 400 m ³ ⁱⁱ	550 to 600 m ³ ⁱⁱⁱ
Recovery Rate ⁵ from Delivered Logs	35% ^{iv}	4-7% ⁱⁱ	7%-10 ⁱⁱ
Recovery Rate from Harvested Logs ^o	30% ⁱ	1% ^v	1% ^v
Production Capacity (sawnwood)	25 m ³ /shift ⁱ	0.45 m ³ /shift ⁱⁱ	5.5 m ³ /shift ⁱⁱ
Number of Employees	100 ^{iv}	20 (2 shifts/day) ⁱⁱⁱ	38 ⁱⁱⁱ
Forest Type ^{vi}	Montane Wet	Open woodlands Dry	Open woodlands Dry
Primary Species	<u>Ocotea usambarensis</u> ⁱ East African Camphor	<u>Dalbergia melanoxylon</u> ⁱⁱⁱ East African Blackwood	<u>Dalbergia melanoxylon</u> ⁱⁱⁱ East African Blackwood
Licence Area	17,900 ha ⁱ	unlimited access ⁱⁱ	unlimited access ⁱⁱ
Date of Start up	1981 ⁱ	1985 ⁱⁱ	1985 ⁱⁱ
Type of Ownership	Co-operative ⁱ	Parastatal ⁱⁱ	Private ⁱⁱ
Market	Domestic ⁱ	Foreign ⁱⁱ	Foreign ⁱⁱ
Secondary Processing	furniture/pre-fab housing ⁱ	charcoal ⁱⁱⁱ	charcoal ⁱⁱⁱ
Average Log Dimensions	1.0 m diameter 2.5 m length ^{iv} **	0.3 m diameter 3.0 m length ⁱⁱⁱ ***	0.4 m diameter 3.0 m length ⁱⁱⁱ ***
Average Log Volume (m ³)	2 ^{iv}	0.21 ⁱⁱⁱ	0.37 ⁱⁱⁱ
Selling Price/m ³ Sawnwood - \$US (1986)	\$370 ^{iv}	\$13500 ⁱⁱ	\$13500 ⁱⁱ

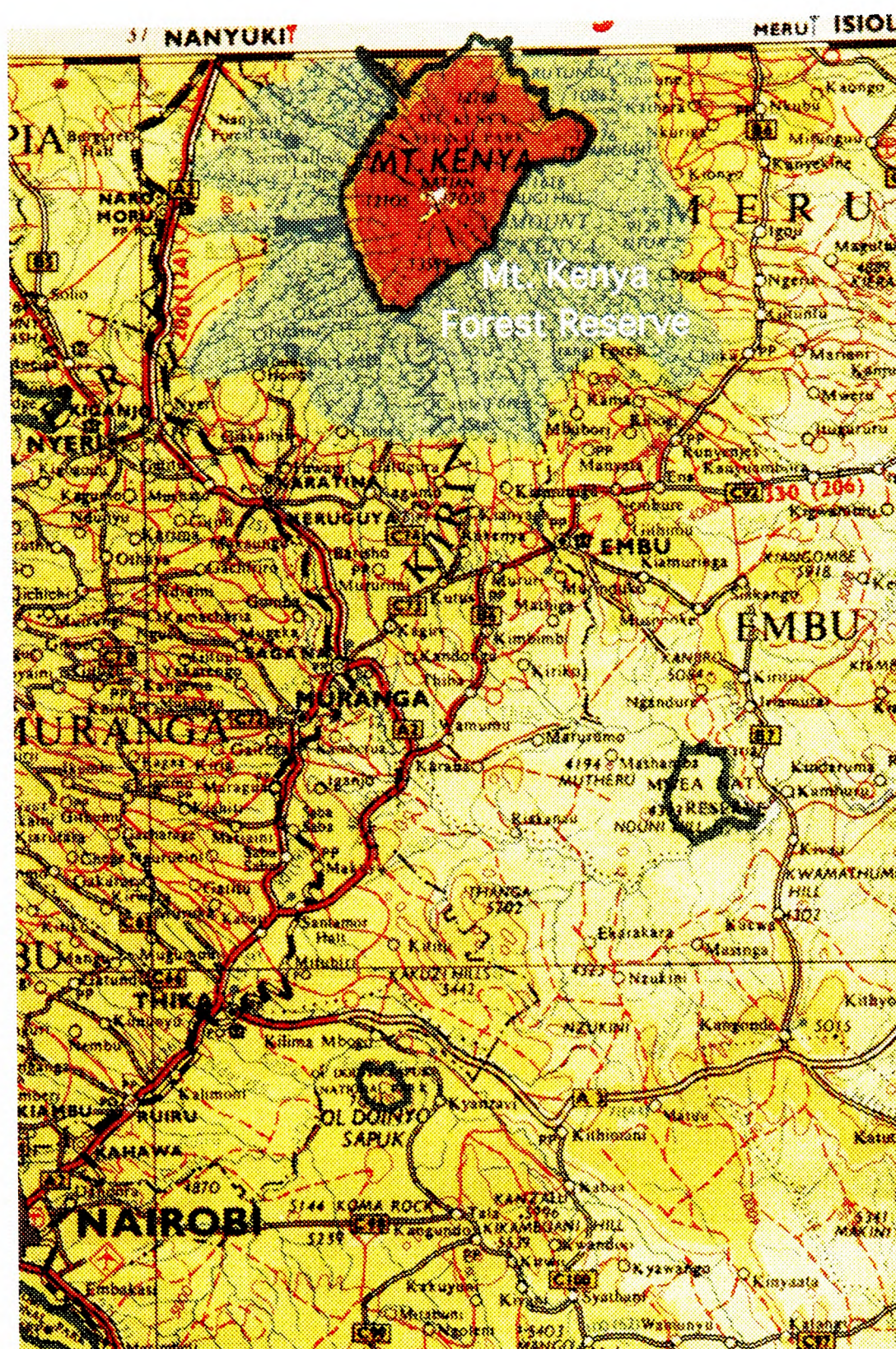
Sources:

i) Hemmingson, 1984. ii) Moore and Hall, 1987. iii) Hall, 1988a. iv) Hall, 1985. v) Hall, 1987-8; Estimates from personal field observations. This figure refers to the volume of export grade billets recovered from estimated volume of logs harvested.	vi) Wormald, 1984. vii) Greenway, 1973 ** Appendix 2, Plate 13 *** Appendix 2, Plate 14
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⁵ Recovery Rate is defined as the percent of the timber produced from a given volume of logs (Williston, 1982).



Appendix 2 Plate 1: Map of Africa showing location of Kenya and Tanzania on the continent of Africa.



Appendix 2 Plate 2: Mt. Kenya Forest Reserve Boundary -
Republic of Kenya.



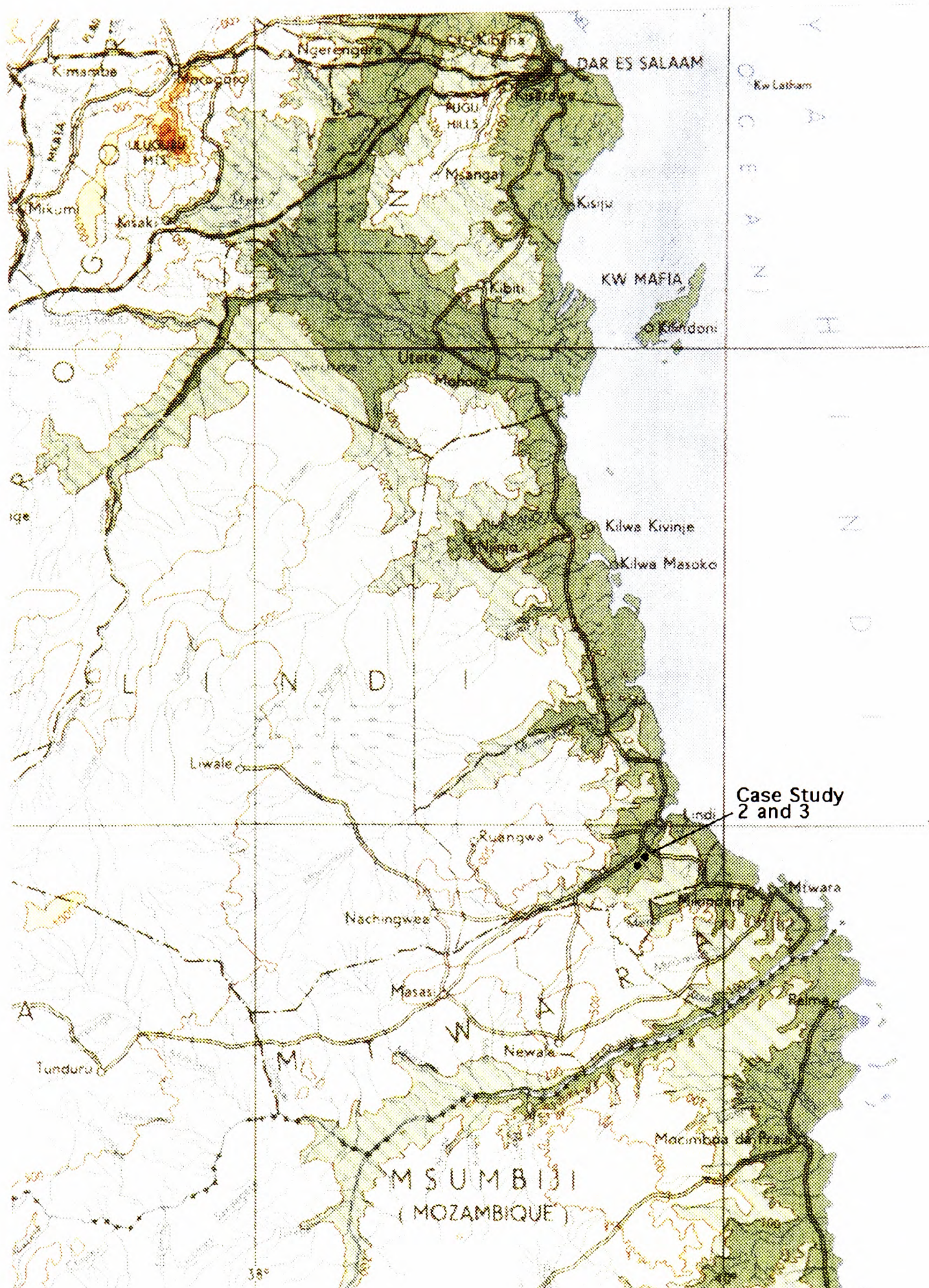
Appendix 2 Plate 4a: Nithi Timber Cooperative Society Sawmill Physical Plant and Log Storage.



Appendix 2 Plate 4b: Nithi Timber Cooperative Society Sawmill Interior View.



Appendix 2 Plate 5: East African Camphor Tree Felled on E. Mt. Kenya.



Appendix 2 Plate 6: Map of South-East Tanzania with the location of Tanzanian case study sawmills indicated.



Appendix 2 Plate 7: An Mpingo tree (*Dalbergia melanoxylan*) - S.E. Tanzania.



Appendix 2 Plate 8: Mpingo Billets of various dimensions - Mingoyo Sawmill, S.E. Tanzania.



Appendix 2 Plate 9: Use of Mpingo for carving industry - Tanzania.



Appendix 2 Plate 10: Initial breakdown saw at Mingoyo Sawmill - S.E. Tanzania.



Appendix 2 Plate 11: Sawyer cross cutting Mpingo logs at E.A. Blackwood Enterprises - S.E. Tanzania.



Appendix 2 Plate 12: Initial Breakdown saw at E.A. Blackwood Enterprise - S.E. Tanzania.



Appendix 2 Plate 13: Examples of the average size of Camphor logs. Nithi Licence Area - E. Mt. Kenya.



Appendix 2 Plate 14: An example of an average size Mpingo log - S.E. Tanzania.

Appendix 3.1 Forest Management Systems for Natural Tropical Forests

<u>Name of System</u>	<u>Date First Applied</u>	<u>Period of Application</u>	<u>Main Species or Forest Type</u>	<u>Management Objective</u>	<u>Silvicultural Prescription</u>	<u>Regeneration Method</u>	<u>Assessment of Status</u>	<u>Future Prospects</u>	<u>Notes</u>
Malayan Uniform System (MUS) -Malaysia (lowland)	1948	1948-1989	Dipterocarp spp.	Timber - conversion of virgin, complex tropical lowland forest to an even-aged forest of predominately commercial species.	Monocyclic. Poisoning of uneconomic species immediately after harvest to a minimum DBH of 5-15 cm. Clearfelling release of selected regeneration (Cousens, 1965) of Shorea species and mechanical extraction and immediate poisoning of uneconomic species and subsequent tending, thinning & climber cutting where necessary.	Based on selected natural regeneration existing at time of felling, determined by pre-harvest regeneration surveys.	Successful	Good, where forest still exist.	Sudden canopy opening, favouring Shorea sp. (Lee, 1982a).
"Gutta Percha" - Peninsular Malaysia	1900	1900 - 1910	Palaequium gutta, Balanocarpus heimi (changa)	Latex and hardwood timber.	Fell P. gutta for latex, selective fell B. heimi for timber.	Plantations of P. gutta and Para rubber (Hevea brasiliensis) and enrichment planting of B. heimi (Barnard, 1954).	Failed due to lack of subsequent tending.	n/a	
Departmental Improvement Fellings (DIF) - Peninsular Malaysia	1910	1910 - 1922	Forest areas exploited P. gutta and B. heimi.	Improvement fellings to favour pole size P. gutta and the more valuable timber species.	Increase the crop for future exploitation as much as possible in one operation if possible (Baur, 1968).	n/a (this is an improvement operation).	Successful, but limited period of application achieved an evenly distributed crop of seedlings, saplings and poles.	n/a	The area was opened in 1922 to logging for fuel wood and mine poles and mine timber reduced demand for timber reduced the validity of girdling potential crop trees (pole/fuel).
Commercial Regeneration Fellings - Peninsular Malaysia	1927	1927 - 1947	Equatorial rainforest	Removal of inferior species in several stages to promote growth of potential timber species. Thinnings are undertaken by commercial operators for poles and fuelwood.	Multiple pre-harvest thinnings, followed by felling of commercial species, clearing after felling if necessary (Baur, 1964).	Natural	n/a	n/a	
Regeneration Improvement Felling (RIF) - Peninsular Malaysia	1927	1927 - 1941	Lowland equatorial rainforest near major population	Similar to CRF but the girdling of stems to waste rather than commercial extraction for poles or fuel in areas lacking markets for these products (Baur, 1968).	Multiple entry pre-harvest girdling Natural to improve crop trees followed by felling of marked commercial species and clearing after harvest, if necessary, by poisoning relics.	Much of the area treated was converted to agricultural lands during the occupation of World War II. About 17,000 acres were not cleared and were found to support an average of at least 30 dominant well spaced crop trees per acre however no treatments post WW II (Cousens, 1957).	The treated stands that survived the occupation are some of the finest stands from natural regeneration (Baur, 1968).		
Modified Malaysia Uniform System - Peninsular Malaysia	1960	1960 - 1988	Hill Dipterocarp, steep lowlands and upper slopes.	Timber production	Similar to MUS but with enrichment planting where natural regeneration is inadequate (Burgess, 1970).	Natural regeneration with enrichment planting. Tending of crop trees as indicated by n+1, n+2 and n+5 surveys (FAO, 1989b).	Forest area under constant pressure for alternate uses as more fertile lands are consolidated.		

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Selective Management System (SMS) - Peninsular Malaysia	1970	1970 - 1988	Dipterocarp	Timber, to overcome timber shortage of primary sawlogs for established domestic sawmill industry (Wyatt-Smith, 1987). Harvesting planned for every 25-30 years, designed to be a flexible to suit highly variable forest and social-economic conditions (FAO, 1989b).	Management regime is based on preharvest assessment of timber stocks and regeneration rather than an arbitrary prescription. n-1 climber cutting and marking of leave trees. n directional felling and post harvest assessment to determine silvicultural treatments.	Minimum residual stocking of 32 stems per hectare, with 50 cm minimum DBH for dipterocarps and 30-40 cm DBH for other commercial species (Thang, 1987). Ongoing, % damage to 60 cm DBH residuals - 20% for 15-30 cm DBH - 50% - system could be successful if damage to residuals over 30 cm could be kept less than 30% (FAO, 1989b).	Little knowledge of likely future crops from areas treated with this system. System is designed to allow for optimization of forest management goals: 1. an economic cut, 2. sustainability of the forest, 3. minimum cost for forest development.		
Modified Malaysian Uniform System - Sabah	1955	1955 - 1983	Dipterocarp	Timber. To obtain an even aged dipterocarp forest with an increase in both quality and volume from original stand with in a specified period of time - usually between 80-100 yrs. (Chai, 1981).	n-2 to n-1 allocation of coupe/climber cutting. n felling operation of commercial species. n+3-n+5 survey and climber cutting/enrichment planting when necessary. n+10-15 survey and climber cutting.	Natural or enrichment where necessary.	On-going, but not keeping pace with logging. Only 1/3 of logged area between 1971 and 1983 was treated. No increase in rate of application expected.	No increase in the rate of application expected (FAO, 1989b).	Early applications included a poisoning of all residuals which resulted in the release of regen. that favoured less valuable pioneer species. Also the cleared-to-waste residuals increased in value to the point where it was inappropriate to destroy them.
Overstory	1974	1974 - 1980	Mixed Dipterocarp	Timber production	Removal of large crowns of residual non commercial species from the upper canopy to release desired therefore the second formal permanent demonstration plots established).	Natural			Did not selectively Not considered a removal - release regeneration practical system Sarawak Forest (MDF) of desired species. (FAO, 1989b) regeneration post logging (project stand less valuable than the first.
Sarawak Modified Malayan Uniform System - Sarawak	1974	1974 - 1980	Mixed Dipterocarp Forest (MDF)	Timber production	Post logging removal of large crowned noncommercial species and the retention of the best stems of desirable species that may be harvested before the released regeneration resulting in a polycyclic regime.	Natural regeneration and selected advanced regeneration.	Routine treatment, ongoing (FAO, 1989b)	Continued application expected.	

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Liberation Thinning - Sarawak	1974	1974 - 1988	Mixed Dipterocarp Forest (MDF)	Timber production	Based on the identification of as many desirable species as possible and the selection and liberation of direct competition of the best of them and the removal of overstorey trees permitting the maximum growth of the desired species and the shortest rotation.	Natural advanced regeneration for MDF, however	A routine procedure (Silva, 1989).	Results look more promising than Overstorey Removal and Mod. MUS. (FAO, 1989b) it is too early to appraise the method in all aspects.	
Indonesian Selective System - Indonesia	1970	1970 - 1984	Natural forest	Timber production	Harvest commercial trees greater than 50 cm DBH. Leave 25 stems per hectare having DBH greater than 35 cm. Harvest again in 30 years.	Natural	No effective control over implementation (Johnson and Dykstra, 1978). Useful only where forest is rich in desirable species and felling is carefully controlled (Whitmore, 1984).	Not considered a successful system because residuals are not left after felling (Johnson and Dykstra, 1978)	
Selective Logging Management System - Philippines	1954, 1974	1954 - 1989	Dipterocarp	Timber production, maintenance of adequate growing stock to provide protection of soil and water.	Removal of mature, overmature and defective trees while protecting maximum regen of potential commercial species and to improve residual growing stock through silvicultural treatments. Cutting at predetermined periods, leaving adequate stocking in different diameter classes resulting in periodic harvests of volumes approximately equal in volume of that of the periodic increment (FAO, 1989b). Further economic cutting at 30-40 years depending on growth characteristics.	Natural	n-1 tree marking. n tree felling up to 25% 60 cm DBH, 55% of 70 cm and 100% of 80cm+. n+1 post harvest assessment to determine future potential stand type and treatments to accelerate growth of desirable spp. n+2+ improvements e.g. climber cutting/girdling.	Future uncertain due to problems such as illegal cutting in second stage, non-implementation of the prescription, pulpwood requirements overtake timber requirements resulting in early felling at 20 years.	
Selection System or Selection and Improvement - India	pre 1900	1900 - 1989	Evergreen and semi-evergreen moist + dry deciduous.	Maintenance of forest cover to provide adequate protection of soil and water catchments, increasing the supply of wood	Polycyclic, variable harvest prescription based on forest conditions post harvest prescription included: removal of all broken and damaged residues, and maximizing the revenue to government	Natural and enrichment	Ongoing	Applied where possible however non timber pressures on forest growing	regen assessment, enrichment (FAO, 1989b). planting, tending and thinning for pole removal where necessary.
Philippine-German Timber Stand Improvement - Philippines	1975	1975 - 1981	Dipterocarp	Timber production	Selection of best potential crop trees for tending after selective harvest of commercial species.	Natural	Suspended	The political situation in the country has left the future of this system in question.	

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Tropical Shelterwood System (TSS) - Nigeria (and Ghana)	1924-1944	1944 - 1966	Natural forest (Khaya, Guajala, Chlorophora (Baur, 1964).	To enhance the natural regen. of valuable spp. before harvesting stage through the gradual opening of the canopy.	n-5 progressive poisoning and climber cutting to obtain at least 100 1m+ desirable seedlings per ha. over 5 years. n harvest. n+1-15 clearing and thinning. conversion to a uniform forest (Taylor, 1962).	Natural regeneration under a shelterwood.	No longer applied	Rate of harvest has been and continues to be so high that all valuable timber will have been harvested by 2000 (FAO, 1989b) restoration of stands exploited without preharvest treatment is difficult.	Problems with profuse climber regeneration. failure of desired spp. to grow adequately. Trees were poisoned which became valuable soon after e.g. <i>Pyramanthus andersonii</i> (Schmidt, 1991).
Amélioration des Peuplements Naturels (APN) - Côte d'Ivoire	1960	1960 - 1980	Logged over forests - <i>Tiarrellia uluila</i>	To enhance the growth of advanced regeneration of medium sized valuable stems in logged over areas (Baur, 1964).	Initial inventory to assess logged over stand for potential value. Climber cutting and weed tree poisoning to release the valuable medium sized residuals every three years and to increase the regeneration of natural seedlings by opening the canopy.	Natural	After 10 year period the system was abandoned because of poor results (Schmidt, 1991). Climbers rapidly regenerated	In 1976 trials thinning non commercial species has shown positive results on increasing the growth of valued medium sized stems better than the outcome of only harvesting which does not specifically --	* well stocked with advanced regen of valuable species (Schmidt, 1991). -- favour the valued stems. An area exceeding 10,000 ha of evergreen rainforest in Côte d'Ivoire has been established as an operational pilot programme (Maitre, 1987).
Selection System - Ghana	1980	1980 - 1991	Semi-humid tropical forest	To assure the regeneration of forests well stocked with valuable species.	Cyclical fellings every 25 years prior to 1971 and every 15 years after 1971 based on Forest Dept. pre harvest marking of well distributed seed-trees (Schmidt, 1991).	Considerable felling Ongoing damage to residual stand because of short cycles. Regeneration of less valuable shade tolerant species increased because of small canopy openings (Schmidt, 1991).	Criticisms that the prescribed removals at 15 yr exceeds the increment and cannot be sustained may lead to a felling cycle of 40 yrs after logging all commercial species as recommended by Azabere (1987).		
Uniformisation par la Haut (Normalization) - Zaïre (Belgian Congo)	1960	1960 - 1980	Tropical moist forest	To convert the mixed all aged stands into more uniform stands.	Removal of useless overstorey and vines and reducing the diameter distribution by poisoning smaller stems (Baur, 1964). Described as a grand weeding operation by Dawkins (1955a).	Treatment made no effort to encourage regeneration where it was not naturally occurring.	Abandoned in 1960 at independence of country.		

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Uniform System - Uganda	1963	1963 - 1970	Rainforest	To ensure post harvest forest regeneration is firmly established prior to the harvesting of commercially valuable trees and to maintain diversity of species (Baur, 1964).	Before logging the stand assessed for its regen potential and a refining operation is under taken prior to logging because it was found that the regen was better able to respond. Areas with abundant desirable regen are thinned to minimum dbh, areas with some regeneration in areas that were cleared of vines and interfering stems and area with little regeneration are not treated (Dawkins, 1955b).	Natural	Ongoing. Schmidt, (1991) political changes have lead to discontinued forest management although some results of past silvicultural efforts may offer some new opportunities for sustained yield management.	Continued application following the original general principles depending on the re-establishment of stability in the country (FAO, 1988a).	
Arena Shelterwood System (Arena Forest Reserve) - Trinidad	1927, 1957	1927 - 1987	Disturbed regenerated seasonal evergreen forest	To encourage natural regeneration charcoal, poles and timber production (Palmer, 1987a).	Standardized in 1952. Climber cutting, thinning and tending as required on an annual basis for 9 yrs. to induce and assist natural regeneration of desired species. Followed by treatments every 4-5 yrs. (Palmer, 1987a).	Natural, although various plantings of indigenous and exotic species was undertaken over the period of application (Palmer, 1987a).	Ongoing	The potential of this system is not being met (Palmer, 1987a).	
Queensland Treatment Rules 1946 - Australia	1946	1946 - 1954	Rainforest	Sustained yield of timber and retention of natural forest character.	Marking and selective harvest of desired species to min. girth limits. residual stand improvement treatments to obtain well spaced regeneration of desired species all useless residuals girdled or poisoned. Seed trees of desired species left (poor form stems if necessary).	Natural residuals and from residual seed trees.	New system adopted in 1954 having more detailed prescriptions based on research results of forest dynamics and harvesting.	10800 sq. km. original forest. 6000 km2 to settlement. 780 km2 to perm forestry. 3650 km2 to temp. forestry use. 1560 km2 to unclassified Crown land. Of total forest area, half is considered suitable for sust. yield forestry (Baur, 1984).	
Queensland Treatment Rules (1954) - Australia	1954	1954 - 1987	Rainforest	To manage areas available to logging under multiple use principles with logging to be set by conservative selection system with natural regeneration for minimal environmental impact (Poore, 1989).	Preharvest crop tree selection, climber cutting and poisoning of certain unwanted species.	Natural residual, seed tree source, some enrichment planting <i>Elndersia brayana</i> (5,000 ha), (Poore, 1989).	All factors were in place for this approach to provide a leading example of sustained forest management, however strong expression against commercial activity with the forest by society ended forest harvesting for timber and associated management activities (Crome, 1991).	Possible that society may change collective mind and logging may resume in future.	

Appendix 3.2 Camphor Forest Management Criteria

	<u>Criterion</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
Tenure	1. Security of tenure	Tenure to forest land secure. NTCS holds 10 year Timber Licence and Licence (Republic of Kenya, Licence to Extract and Mill Timber 1982-1991). The Licence is within a Gazetted Forest (Castro, 1988).	Tenure to forest land insecure. Access to the forest as per the Timber Licence restricted by District Forester (NTCS min 18/8; min 57/86). Limited access granted (NTCS min 15/86). Forest closed by Chief Conservator May 19/86 (NTCS min 86/76).	For adherence to the Terms and Conditions of the Licence. All changes to be done in consultation with the Licencee and with respect to the existing tenure arrangements.	
	2. Threats to tenure	Lower elevations of Mount Kenya on either side of the forest licence were agricultural land. Some local political pressure to remove the lower elevations from the gazetted forest to provide new agricultural lands for the local tribe (Mugambi, 1985).	Strong commitment from the President to retain the current forest boundaries, although 100m encroachment sanctioned on forest boundary for the establishment of the "Tea Belt" (World Bank, 1987a,b).	Not an issue which affects this enterprise at this time.	"not much hope for any forest area that is capable of supporting agriculture" based on Kenya 8.7% of land area can support agriculture: 3.3% of that is forested. Population growth rate is so high; food may become a higher priority than forestry (Halsworth, 1982).
Forest Management Activities	3. Setting objectives	There are two basic objectives the F.D. have for its gazetted forests protection for environmental and economic reasons and limited exploitation under the principle of sustained yield (Clawson & Sedjo, 1984). The Licence Area Inventory, (Republic of Kenya, 1984) production as goals (Mwangi, 1985).	There was no evidence that the single tree selection logging method allowed by F.D. in the even canopy, shade intolerant, homogenous camphor stands was undertaken for stated objectives of sustained yield or for protection. No regeneration evident (PM's Report July, 1985).	Larger openings of perhaps 5 to 6 trees to allow light to penetrate canopy and to reduce crown closure, combined with some stand tending or enrichment planting (Parry, 1957; Willan, 1961; Halsworth 1982) preserve inherent bioeconomic productivity.	The ridge tops were designated for production through selection felling and the steep valley slopes and valley bottoms were reserved as protection areas (Republic of Kenya, 1984, Min. of N.R. NTCS Forest Licence area had both protection and utilization zones specified.
	4. Yield control (AAC)	The Licence allowed for the annual removal of between 5,000 to 10,000 m3 of logs over a period of 10 years. The Licence area carried over 1,309,693 m3 of camphor and podo in age class mature and overmature of a total volume of 3,085,908 m3 of all species (Appendix 3.2.1).	The Forest Department did not arrange for the marking of minimum volume. Royalty records for the NTCS show that the annual log intake never exceeded the minimum of 5,000 m3 per year. Intake ranged from 1,128 m3 in 1981/82 to 4,240 m3 in 1984/85 (Appendix 3.2.2).	Negotiate for compliance with existing Licence.	
	5. Area of forest	The area of forest covered by the 10 year Licence is 12,127 ha. Total area of the Camphor zone on Mt. Kenya is approximately 100,000 ha. (Mwangi, 1985).	12,127 ha.	Retain licence area.	
	6. Species composition	53 species were recorded in the inventory survey for the Licence area (Appendix 3.2.3).	23 species listed as "merchantable" in the inventory. 11 species were permitted to be felled as per the Third Schedule of the Timber Licence. (Appendix 3.2.4).	For compliance with the Licence.	
	7. Age/size and volume distribution	Age of all species unknown. Volume estimates available for stems over 33 cm DBH (Appendix 3.2.3). Distribution of main commercial species located on Inventory Map by species composition and "age class" (estimated by vigour of dominants) e.g., decandent, over mature, mature.	No noticeable change in the forest composition as a result of logging activity.	To balance selection process with selection from the mature age class as well as the over mature and decandent age classes.	Mugasha (1978) estimated stocking to be from 25 -50 mature dominant camphor trees per ha. occupying about 50% of canopy in Tanzania.

Appendix 3.2 Camphor Forest Management Criteria

<u>Criterion</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
8. Growth rates	Growth rate information limited to known age stands on Mt. Kilimanjaro (Appendix 3.2.6) where sample plots were established in late 1950s. Estimates between 60 and 80 years to attain DBH of 60 cm.	Knowledge of growth rate of camphor based on speculation. Information from literature or from local experience of known age trees was absent, e.g.. Age of mature trees estimated by local forester to be over 600 years.	For the establishment of Growth and Yield plots and for the updating and remeasurement of the permanent sample plots on Mt. Kilimanjaro.	
9. Quality distribution	Over 42% of the total volume of all species on the licence are is camphor and podo (Appendix 3.2.1).	Only over mature and decadent trees were allowed to be felled or dead and down logs removed from the licence area(NTCS min. 24/85; 7/86).	Negotiate for a more balanced distribution between volumes of low quality and better quality logs based on recovery rates and production costs at the sawmill and actual market prices.	
10. Relative prices	Market prices in 1985 at time of intervention were Ksh.5.5 to 6.5/= for Camphor in Nairobi and Ksh.4.0 to 4.50/= for Podo per board foot measure. NTCS Camphor selling price Ksh. 7/= and Podo 4.5/=, Transport costs to Nairobi additional Ksh.1/=bf (NTCS Sales Records 1982-1982).	Average NTCS Production costs for timber for period 1981-1986 Ksh. 9.2/=, Average NTCS selling price for same period Ksh.5.5/= (Appendix 3.2.5).	Selling price must reflect costs plus profit. For better control of access to the gazetted forests to reduce the competition in the market place from illegally produced timber.	The market was flooded with Camphor timber and also with species that had been restricted from felling e.g.. <i>Vitex keniensis</i> (meru oak). (Office of the Vice President and Ministry of Home Affairs, Prisons HQ Tender No.2/85-86/17 Aug/85.)
11. Intrinsic limitations to regeneration	Camphor is dominant tree occupying up to 100% of canopy on the upper ridge (Abraham, 1958). Growth rates estimated up to 1.2 m per year in first 5 years (Willan, 1961)(Appendix 3.2.6).	Single tree openings. Evidence of recurring emergence of root suckers under closed canopy from root nodes near earth surface reaching 1m before dying. No seedlings or seeds found over the two yrs. Locally seedlings and seed prod. rare (Mwangi, 1985).	larger openings and with tending and protection and enrichment where required to ensure regeneration of Camphor and successful replacement of camphor into the canopy	Conditions found in Camphor forests do not appear suitable for initial germination or for the successful growth of root suckers (Abraham, 1958). Flowers from Dec.- March. Seeds in May-June (Brenan, 1949).No references available for genetic variability/autotoxicity.
12. Extrinsic limitations to regeneration	Visible light intensity under camphor canopy 0.1% of full sunlight. Temperature under canopy: minima same for under canopy and in open, but maxima 30° C lower inside than outside all year (Moreau, 1935). (Appendix 3.2.7).	Small gap size from single tree felling, browsing of root suckers, occasional debarking of mature trees by elephants	Creation of larger gaps, tending of regeneration and enrichment planting where necessary.	Possible electric fence as deterrent to manipulate the habits of browsers.
13. Protection	Poisoning of residuals, brambles and climbers, Appendix 3.2.8. Animal damage may be controlled through judicious felling to create tangles of crown materials.	No protection activities undertaken.	n/a	
14. Working plans	The Forest Department had divided the licence area up into about 20 coupes. NTCS was to operate in one or two coupe areas at a time until selected trees were removed (Rep. of Kenya, 1982, NTCS min 5/87).	There were no working plans(NTCS min7/86;15/86;18/85).	For compliance with the terms and conditions of the 10 Year Licence.	

Appendix 3.2 Camphor Forest Management Criteria

<u>Criterion</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
15. Felling cycles	Suggested rotation age of between 60 and 80 years to achieve a 60 cm DBH camphor trees from experiments intended second growth stands on Mt. Kilimanjaro. (Willan, 1961; Wood, 1963; Mugasha, 1980). Appendix 3.2.8.	Single entry felling with no attempt to encourage regeneration in harvested areas (NTCS PM Report, July 1985).	For larger gaps to encourage the regeneration of camphor.	
16. Concessions	NTCS licenced to fell and extract largest amount from the Mt Kenya forest 100,000 - 50,000 m3 over ten years. Other licensees and legal pitsawyers in the area harvested an annual average of 30.5 m3 and 550 m3 respectively (Republic of Kenya, Ministry of Cooperative Development, 1986).	Uncontrolled harvesting of camphor and other good quality timbers was creating a glut of timber in the market. The advantage of the concession was lost due to this (NTCS PM Report; June 11, 1986).	For compliance with forest department regulations on forest use in all areas to reduce uncontrolled harvest.	
17. Roads	Extraction by ground skidding is limited to 400 m and subject to avoidance of erosion and damage to standing trees. Extraction beyond this distance will be by wheeled arch or wheeled transport. Transport to mill will be by wheeled transport only (Rep. of Kenya, 1982).	NTCS did not receive any shared costs for maintenance. Roads were used in rainy season by other users causing severe damage to drainage and delays inefficient use of roads early in the dry season.	For strict road closure during rains, compensation for maintenance costs as per licence and early notification of approval of road location to permit road construction in dry periods one rainy season before logging to allow for hardening of the road surface.	Road location must be approved by F.D., road construction and maintenance Licencee responsibility except where shared use then F.D. adjudicates shared maintenance costs.
18. Buildings	Part 26 of the Licence permits the installation of a sawmill, storage facilities, housing for employees and administration buildings as per the approval of the Chief Conservator.	No storage facilities for sawn timber. No on-site housing for employees.	For employee accommodation facilities and for timber storage sheds.	Single room work rows to allow the employees flexibility during the week to stay on site..
19. Boundaries	The First Schedule of the Licence lists the boundary limits using geographic features and map coordinates.	There were no official changes to the boundaries, however there was some question as to the enforcement of the boundaries with respect to encroachment by private individuals involved in timber removal.	For the terms and conditions of the Licence to be enforced	
20. Sample plots	There are no official sample plots for the Camphor Forest with in the Licence area or within the E. Mt. Kenya camphor forest. Sample plots and arboretum trials do exist in Tanzania at Lushoto, Mt. Kilimanjaro (Willan, 1961; Wood, 1963; Mugasha, 1980).	Forest Inventory for the Licence area has been undertaken on two occasions in the past. In 1965, CIDA conducted a forest inventory for the E. Mt. Kenya Forest. In 1983 the Kenya F.D. Inventory Section conducted an inventory of the Licence area only.	For the establishment of permanent sample plots to monitor regeneration, crown response to openings and growth rates.	

Appendix 3.2 Camphor Forest Management Criteria

<u>Criterion</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
21. Prediction	Regeneration from of the original forest cover from single tree openings is unlikely (MacDonald, 1956; Abraham, 1958). Predictions in the literature are based on tended stands originating from clear cut, sucker regenerated on Mt. Kilimanjaro and a very small plot in Kenya (Kigomo, 1989).	Single tree selective felling will reduce negative impact of harvesting with respect to the future forest.	For adherence to the terms and conditions of the Licence and for larger openings and monitoring for potential enrichment planting/tending to ensure the redevelopment of the forest overtime.	
22. Costings	No forest management activities other than selection felling trees has been undertaken. Forest management costings are not available.		To determine costs for various forest management options.	
23. Annual records	Volume of logs removed annually from the Licence area (Appendix 3.2.9) .	Royalty billing lagged behind log removal (NTSC min 11/86). No method for cross checking log billing from forest department with logs received at mill(NTCS Auditor's Report 1985-86).	To have records for felling, log production, log marking (for royalty billing) log transport, log delivery to mill, log input into mill, daily production, daily sales.	
24. Organization of silvicultural work	NTCS is required by Licence to comply with the instructions of the F.D. regarding felling practices and log removal. For management prescription see Appendix 3.2.8 Schedule of Silvicultural treatments for regeneration of camphor Willan, (1961).	NTCS employees followed instructions of F.D., there was opportunity for personal gain not to do so.	For compliance with the Licence by the which would encourage the natural regeneration of the forest	
25. Regulation of shade and canopy openings	Regeneration has been successful from complete canopy openings (Willan, 1961)and from openings created by abandoned agriculture plots (Abraham, 1958). Camphor does not appear to establish itself under closed canopy, suckers appear but die (MacDonald, 1956).	Single tree selection was the only format of shade or canopy regulation undertaken.	For logging and transport activities to facilitate any silvicultural work planned by the F.D..	Mugasha, (1978) implication of gap size gap size: small gap results in regeneration occurring but is suppressed by closing of existing crowns. Medium gap: creepers etc. are less vigorous, camphor can become established and grow. Large gap: competition is very vigorous and camphor regeneration is choked.
26. Treatments to select species mix	Enrichment planting, tending of second growth to remove unwanted trees by felling or pre or post harvest poisoning(Kimanyo, 1972; Mugasha, 1978).	No treatments to modify species selection. Default outcome of single tree selection is fewer camphor trees and little or no regeneration.	For group selection felling combined with monitoring of opening and subsequent tending.	
27. Woody climber cutting	Climbers not a problem in most of the licence area (Mwangi, 1985).	Climber cutting pre harvest where necessary, however climber not present in most areas.	n/a	
28. Poisoning	Species which compete with camphor in openings and mature/overmature trees are susceptible to herbicide treatments(245-T and 24-D) either as over barkspray in diesel line base or in frill for woody material or broadcast spray for brambles (Tanz. F.D. Annual Report 1955).	No poisoning undertaken or planned	n/a	

Appendix 3.2 Camphor Forest Management Criteria

<u>Criterion</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
29. Enrichment planting	Sources of seedlings available from seed and root suckers reported in Kenya (Abraham, 1958). Seedlings and root cuttings removed from the forest, planted under some shading in nursery and successfully out planted in forest openings.	Camphor regen from seeds was not evident in the Licence area. Successful transplanting of Camphor root suckers to nursery had limited success and was restricted to stems over 1.5 m and required .3 m3 containers for roots (Mwangi, S. 1985).	For preharvest assessment of root sucker numbers and vigor to determine if selection felling choices could be modified to favour areas with greater potential for regeneration.	
30. Selection cutting	Single tree selection felling does not lead to regeneration of the forest. Group selection could provide the necessary light conditions to encourage natural regeneration (Willan, 1961).	Single tree selection only, no group cutting permitted.	For group selection felling with directional felling to create natural barriers from tops to dissuade elephant traffic	
31. Seed tree provision	Reports of seed production: Tanz. F.D. (1955) freshly collected seed germinated well. Kimario, (1972) sporadic seed production, germination under natural conditions uncertain, litter layer may present a barrier to rooting of small seed. Seeds are scarce (Mugasha, 1978).	No seed tree provision. No seed collection undertaken.(Mware, 1985).	For investigations into local seed production and conditions which could enhance natural regeneration from seedlings.	

Appendix 3.2.1

EAST MOUNT KENYA SAMPLING UNIT

South Block (Between Nithi and Ruguti Rivers)
Gross of Merchantable Volumes Available
source: Kenya Forest Dept. Forest Inventory, 1967

Common Name	Scientific Name	Total or Gross Volume available DBH 33 cm. & over in cubic metres
Camphor	<i>Ocotea usambarensis</i>	507324
Muna	<i>Aningeria adolfi-friederici</i>	18365
Muganga	<i>Fagara macrophylla</i>	9997
Muhuru	<i>Vitex keniensis</i>	8779
Mukeo	<i>Dombeya goetzenii</i>	56
Munderendu	<i>Teclea nobilis</i>	28
Mununga	<i>Ekebergia ruepeliana</i>	2322
Muirungi	<i>Casearia battiecombei</i>	37240
Musharagi	<i>Olea hochstetteri</i>	18379
Mueri	<i>Prunus africanum</i>	48823
Podo m.	<i>Podocarpus milanjanus</i>	186260
Macaranga	<i>Macaranga</i> spp.	142761
Mutondo	<i>Funtima latifolia</i>	7731
Mukurue	<i>Albizia gummiifera</i>	106341
Mukinduru	<i>Croton megalocarpus</i>	12290
Musaiai	<i>Cassipourea malosana</i>	48738
Mutundu	<i>Croton macrostachyus</i>	25516
Mutuntuki	<i>Neoboutonia macrocalyx</i>	18719
Mukongoro	<i>Lovoa swinnertonii</i>	6400
SUB-TOTAL	PRESENT COMMERCIAL SPECIES	1 198 086
Muchari	<i>Allophylus abyssinicus</i>	4021
Murendetie	<i>Xymalos monospora</i>	95438
Mutingombe	<i>Brucea antidysenterica</i>	934
Mungarima	<i>Ochna</i> spp.	16000
Muganyone, Muchai	<i>Apodytes dimidiata</i>	96401
Mukoi	<i>Syzygium guineense</i>	9005
Mwarangu	<i>Strombosia scheffleri</i>	81674
Mwerere	<i>Conopharyngia holstii</i>	39959
Muirosi	<i>Diospyros abyssinica</i>	703
Musumura	<i>Ilex mitis</i>	4616
Mutunguru	<i>Anthocleista sambesiaca</i>	2633
Mutuya	<i>Myrianthus holstii</i>	5012
Murumandu	<i>Bersama abyssinica</i>	1019
Mugumo	<i>Ficus</i> spp.	311
Mesenia	<i>Chrysophyllum gorungosanum</i>	8127
Mukuyu	<i>Ficus malletocarpa</i>	12092
Mwanda	<i>Nuxia congesta</i>	36759
Mwenyere	<i>Cussonia spicata</i>	21806
Mwangu	<i>Bauhinia</i> spp.	5295
Murango	<i>Faurea saligna</i>	1444
Rieme	<i>Suregada procera</i>	36447
SUB-TOTAL	PRESENT NON-COMMERCIAL SPP	609 814
GRAND TOTAL		1 807 900

Block area: 9,166 ha

Appendix 3.2.1 (continued)

EAST MOUNT KENYA SAMPLING UNIT

North Block (Between Nithi and Maara Rivers)

Gross of Merchantable Volumes Available

source: Kenya Forest Dept. Forest Inventory, 1967

Common Name	Scientific Name	Total or Gross Volume available DBH 33 cm. & over in cubic metres
Cedar	<i>Juniperus procera</i>	5125
Camphor	<i>Ocotea usambarensis</i>	55909
Munondo	<i>Hagenia abyssinica</i>	4701
Muna	<i>Aningeria adolfi-friederici</i>	24610
Muchichio	<i>Premna maxima</i>	934
Muganga	<i>Fagara mocrrophylla</i>	453
Muhuru	<i>Vitex keniensis</i>	4644
Mukeo	<i>Dombeya goetzenli</i>	4191
Munderendu	<i>Teclea nobilis</i>	679
Mununga	<i>Ekebergia rueppeliana</i>	2463
Murundu	<i>Celtis africana</i>	1699
Muirungi	<i>Casearia battiecombei</i>	396
Musharagi	<i>Olea hochstetteri</i>	6343
Mueri	<i>Prunus africanum</i>	21183
Podo m.	<i>Podocarpus milanjianus</i>	164680
Macaranga	<i>Macaranga</i> spp.	36221
Mukorombosi	<i>Afrocrania volkensii</i>	4021
Musaiai	<i>Cassipourea malosana</i>	7731
Muthuri	<i>Euphorbia candelabrum</i>	396
Mutundu	<i>Croton macrostachyus</i>	633
Mutuntuki	<i>Meoboutonia macrocalyx</i>	17728
SUB-TOTAL	PRESENT COMMERCIAL SPECIES	869 933
Murendetie	<i>Xymalos monospora</i>	20333
Mugumshaine	Not identified	11444
Mugaita	<i>Rapanea rhododendroides</i>	2860
Mutingombe	<i>Brucea antidysenterica</i>	10931
Mungarima	<i>Ochna</i> spp.	1246
Muganyone. Muchai	<i>Apodytes dimidiata</i>	7442
Muthithioi	<i>Maytenus undatus</i>	821
Mukoi	<i>Syzygium guineense</i>	9005
Mukarakati	<i>Fagaropsis angolensis</i>	566
Mukomakoma	<i>Grumilea megistosticata</i>	4417
Mukurue	<i>Albizia gummifera</i>	15547
Museringu	<i>Strombosia scheffleri</i>	9345
Mwerere	<i>Conomparigia holstii</i>	24213
Muirosi	<i>Diospyros abyssinica</i>	849
Musumura	<i>Ilex mitis</i>	25431
Mutuya	<i>Myrianthus holstii</i>	2718
Murembu	<i>Ehretia cymosa</i>	283
Murumandu	<i>Bersana abyssinica</i>	56
Mugumo	<i>Ficus</i> spp.	1368
Mwanda	<i>Olinia usambarensis</i>	6145
Mwathathia	<i>Nuxia congesta</i>	12120
Murango	<i>Faurea saligna</i>	14896
Mororo	<i>Facourtia indica</i>	2492
Mutamaiyu	<i>Olea africana</i>	679
Murari	<i>Schefflera volkensii</i>	481
SUB-TOTAL	PRESENT NON-COMMERCIAL SPP	194 133
GRAND TOTAL		1 064 066

Block area: 5,383 ha

Total Licence area: 14,549 ha

Appendix 3.2.2

ANNUAL ROYALTY PAYMENT RECORDS 1981 - 1988 Nithi Timber Cooperative Society Ltd.

Year	Log Volume Extracted (m ³)	% of Minimum Volume Allocated as Per Licence	Royalty Rates Ksh per (m ³) of log volume
1981	1128	23%	192
1982	2070	41%	192
1983	4240	84%	192
1984	2280	46%	270
1985	1400	28%	293
1986	857	17%	435
1987	1990	40%	435
1988	2102	42%	435

Source: (Kenya Forest Department; Chuka Forest Office Royalty Records)

Appendix 3.2.3

Species recorded during the Forest Inventory on the
East Mount Kenya Sampling Unit
source: Kenya Forest Dept. Forest Inventory, 1967

Scientific Name	Common Name
<i>Ocotea usambarensis</i>	Camphor
<i>Aningeria adolfi-friederici</i>	Muna
<i>Afelia cuanzensis</i>	Mbambakofi
<i>Fagara macrophylla</i>	Muganga
<i>Vitex keniensis</i>	Muhuru
<i>Ekebergia ruepeliana</i>	Mununga
<i>Celtis africana</i>	Murundu
<i>Casearia battiecombei</i>	Muirungi
<i>Olea hochstetteri</i>	Musharagi
<i>Prunus africanum</i>	Mueri
<i>Podocarpus milanjanus</i>	Podo M. (Mubiribiri)
<i>Lovoa succynertonii</i>	Mukongoro (Kik)
<i>Hyphaene parvula</i>	Mkoma
<i>Macaranga</i> spp.	Macaranga
<i>Puntumia latifolia</i>	Mutondo masakariet
<i>Kynalos monospora</i>	Murendetie
Not identified	Mugambanyoni
<i>Rapanea rhododendroides</i>	Mgaita
<i>Brucea antidysenterica</i>	Mutingombe
<i>Ficus</i> spp.	Mugandi
<i>Sorindeia madagascariensis</i>	Mkunguma
<i>Ochna</i> spp.	Mungarima, kipiripait
<i>Apodytes dimidiata</i>	Mugambanyone, muchai
<i>Syzygium guineense</i>	Mukoi
<i>Afrocrania volkensii</i>	Mukorombosi
Not identified	Mukondue
<i>Newtonia buchanani</i>	Mukui
<i>Fagaropsis angolensis</i>	Mukarakati
<i>Grumilea megistosticta</i>	Mukomakoma
<i>Maerua johannis</i>	Mukuriundu
<i>Albizia gummifera</i>	Msai, mukurue
<i>Schrebera alata</i>	Mutoma, lamaityati
<i>Strombosia scheffleri</i>	Museringu
<i>Sapium ellipticum</i>	Musasa, musoso
<i>Cordia abyssinica</i>	Muriga
<i>Trichillia roka</i>	Mururi muule
<i>Canopharyngia holstii</i>	Mwerere, kibombo
<i>Ilex mitis</i>	Musumura
<i>Cassipourea malosana</i>	Musaisi
<i>Zaronga madagascariensis</i>	Musila, muitathua
<i>Croton machrostachys</i>	Mutundu
<i>Neobutonia macrocalyx</i>	Mutuntiki
<i>Myianthus holstii</i>	Mutuya
<i>Ehretia cymosa</i>	Murembu
<i>Ficus</i> spp.	Mugumbo
<i>Ficus mallatocarpa</i>	Mukuyu
<i>Olinia usambarensis</i>	Mwathathia
<i>Nuxia congesta</i>	Mwanda
<i>Faurea saligna</i>	Mwanjati
<i>Schefflera volkensii</i>	Murari
<i>Suregada procera</i>	Rieme
<i>Canthium rubrocostatum</i>	Ruathi

Appendix 3.2.4

SPECIES LICENCED FOR EXTRACTION

(Source Schedule 1 of 10 year Licence to Extract and Mill Timber.
Republic of Kenya, December 1982 - November 1992)

FIRST SCHEDULE

Species	Quantities of round wood from Forest Department Inventory Volume for 33cm DBH plus. (m ³)	Inventory Volume per species as % of available standing timber.
Ocotea unsambarensis	1,066,417	45%
Podocarpus milangianus	350,940	15%
Macaranga spp.	178,982	8%
Syzygium guineense	167,653	7%
Apdytes dimidiata	103,843	5%
Xymalos monospera	115,771	5%
Albizia gummifera	106,341	5%
Strombosia scheffleri	91,019	4%
Prunus africanum	70,006	3%
Conopharyngia holstii	64,172	2%
Casearia battiscombei	37,636	1%
TOTAL	2,352,780 m³	

Appendix 3.2.5

ANNUAL SALES RECEIPTS AND PRODUCTION COSTS for Nithi Timber Coop Society Limited (NTCS)

Source: (NTCS Annual Sales and Production Records 1982 - 1988)

Year	Value of Sales (Total) (KSh)	Production Costs (Total) (KSh)	Production (board feet)	Actual Production Cost per Board Foot (KSh)	Actual Selling Price per Board Foot (KSh)	Sales price vs production costs (KSh)	% of Costs covered by Receipts
1982/83	2,666,237	4,250,951	386,410	11.0	6	-4	54%
1983/84	4,726,777	6,140,176	901,680	6.8	6	-0.8	88%
1984/85	4,400,856	8,477,735	415,735	20.4	7	-13.4	34%
1985/86	2,760,894	6,533,456	293,080	22.3	12	-10.3	54%
1986/87	3,713,214	6,261,979	264,307	23.7	14	-9.7	57%
1987/88 (1st Half)	4,844,480	3,212,780	302,780	10.6	16	+5.4	151%

Appendix 3.2.6

Intrinsic Limits to Regeneration of Camphor (*Ocotea usambarensis*)

Population Structure - Even aged, all stems are found grouped similar diameter classes predominantly 1 metre plus on Mount Kenya (White, 1950).

Abundance - On ridge top sites canopy is almost all camphor, on lower slopes and valley bottoms, camphor is found mixed with other species (White, 1950).

Growth Rates - Estimated growth rates for Camphor

MacDonald (1957) found rings in Juvenile Camphor stems however,

- not yet correlated to annual rings.
- no ring counts found in mature stems.

MacDonald did record the following information;

- @ 11 yrs. 10.20 cm DBH; Height 7.4 metres
- @ 40 yrs. 35.56 cm DBH; Height 30.0 metres

Mean annual increment (MAI): Estimated by Willan, 1961; Wood, 1963; Mugasha, 1980 at about 0.8 cm to 1 cm per year in diameter led to an Age Estimates Formula - $DBH / (DBH * MAI)$

Height Growth: - Mugasha (1980) measured root suckers
@ 15 - 20 yrs. 7 - 15 metres in height.

- Tanzanian Technical Note #26 (Kimario, 1962)

- @ 1.5 yrs 2.0 metres height
- @ 6.5 yrs 6.8 metres height and DBH 10cm

Ring count and known age:

- 49 rings identified in a tree of known age of 45 years (Tanzanian Technical Note #38, Mugasha, 1978).
- Willan, (1961) estimated DBH of 60 cm between the age of 60 and 80 years possible on the southern slopes of Mount Kilimanjaro.

Appendix 3.2.6 (continued)

Successional Status - Camphor is shade intolerant. It is a pioneer species having the ability of re-establishment on site after catastrophic event such as a wind storm. The species exhibits vigorous responses to light from existing root suckers and advantageous dormant buds on stems (White, 1950).

Phenology - Flowering - December to March (Abraham, 1958).
Seeds - June - July (Brenan, 1949).

Root suckering and sprouting occurs from root nodes near the soil surface. Under full canopy, suckers whither at about 1 metre in height. Repeated sprouting at most nodes is often found.

Genetic Variability - No research results available however, field observations indicate that regeneration from sprouting successful and in some areas exclusive. (Authors observations E. Mount Kenya (1985-87 & S. Mount Kilimanjaro 1988).

Autotoxicity - No research results available.

Appendix 3.2.7

Extrinsic Limits to Regeneration of Camphor (*Ocotea usambarensis*)

Light - Regeneration responds to full light conditions and gaps in canopy. Camphor is a light demand definition. Camphor requires complete light for generation survival and growth Baur (1964). Camphor cannot regenerate under their own shade (Whitmore, 1961). Camphor produce a large quantity of seeds that are small in size (less than 2 mm in diameter). Camphor is not present in smaller diameter classes in mature forest (Willan, 1961).

Water - Camphor thrives on well drained sites that receive about 1.5 to 2.2 metres of rain per annum (Trapnell, 1987). Rainfall chart for Embu Forest Station, E. Mount Kenya at 2080 metres amsl.

Fire - Mugasha (1978) does not consider fire a threat to the camphor forest.

Animals - Elephants and bushbucks browse on regeneration (White, 1950; Parry, 1957). Elephants also debark mature trees and consume the bark (Parry, 1957). Colobus monkeys have been observed consuming the maturing seeds (Nyaki, 1987). Insect larvae consume the maturing seeds (Parry, 1957).

Competing Plants - In the forest, the camphor tree responds vigorously to full sunlight. Where a gap occurs in the canopy, the crowns and advantageous shoots from adjacent trees quickly grow and the canopy is rapidly closed. In larger openings, where there are seed sources for plant species such as creeping brambles or Macaranga sp. trees, camphor is overtopped by these species and regeneration or sprouts that may have begun to grow do not survive (Abraham, 1958).

Various species of fungi occur on leaves and on seeds. Fungi reduces the viability of the seeds and reduces the survivability of the root sprouts when it occurs on the leaves of the sprouts (Mugasha, 1978; Dick, 1969). Fungi invades wounds where branches have been broken and where elephants have damaged the bark. The fungi eventually consumes the heartwood (Parry, 1957).

Appendix 3.2.8

Proposed Silvicultural Treatment for the Camphor Forest

source: Willan, 1961

Year	Operation
F - 3	(1) Selection, demarcation and enumeration of felling coupe. Cost about Shs. 2/- an acre. (2) Poisoning of defective, usually overmature, camphorwood trees, which would not be felled by the sawmiller. Cost about Shs. 1/- a tree. (3) Bramble poisoning. Cost about Shs. 3/50 an acre.
F	Felling by Sawmiller
F - F + 1	(1) Digging out of any surviving brambles. (2) Anti-erosion measures, e.g. blocking of logging tracks with brushwood. (3) Thinning of camphorwood coppice shoots to the best two per stump. (4) Poisoning any remaining weed trees in the overstorey. (5) Gap Planting.
F + 10	(1) Assessment. (2) Tree weeding.
F + 15	First thinning to about 400 stems an acre.
F + 20	Second thinning to about 200 stems an acre.
F + 40	Third thinning to about 100 stems an acre.
F + 60	Fourth thinning to about 50 stems an acre.
F + 75	Final Felling. Average g.b.h. 6 feet.

Appendix 3.2.9

Records of Royalty Payments and Log Volumes Processed 1981-1985

Nithi Timber Cooperative Society Ltd.
(Cubic Metres = m³)

Year	Log Volume Received @ Mill m ³	Royalty Rate Ksh per m ³	Royalty Value Ksh	Actual Billing Ksh	Apparent Excess Payment Ksh
1981/82	1128	192	216,576	852,600	636,024
1982/83	2070	192	397,440	564,300	166,860
1983/84	4240	270	1,144,800	1,291,700	146,900
1984/85	2280	293	668,040	727,800	59,760
1985/86	1400	435	609,00	945,400	336,400
Total					1,345,944

Source: (NTCS Production Records and Royalty Billing Records. Forestry Department Royalty Billing Records).

Appendix 3.3 Blackwood Forest Management Criteria Listing

	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
Tenure	1. Security of tenure	Kewero, (1990) public lands are openly accessible to . There is no policy to control of access or exploitation of public lands for forest exploitation or other uses.	There is no security of tenure over public lands for forest management.	For the recognition of the potential value of forest lands and the need for some degree of husbandry for future resource options.	
	2. Threats to tenure	Gazetted forest areas do not contain substantial amounts of mpingo. However if areas were delineated as reserves for mpingo, a threat to such tenure would exist in the present inability of the FD to control the activities within forest reserves areas	All mpingo areas were under threat for alternate uses such as grazing, agriculture or settlement under the present land use policy of Tanzania.	For conditions to be set for land clearance for agriculture whereby mpingo (and other species where deemed necessary) are restricted from felling.	
Forest Management Activities	3. Setting objectives	No management objectives have been set for the mpingo resource (Sargent and Mbwana, 1989) other than a banning of log exports in 1967 and encouraging the recognition of the species as the "national tree" (Mongi, 1987).	There are provisions for the F.D. to regulate the cutting through the provision that any felling and removal must be licenced and royalties paid to the local District however, there are few if any means for enforcement(Moore and Hall, 1987).	For setting of objectives of mpingo exploitation to at least retain ecological diversity and maximize future resource utilization options.	
	4. Yield control (AAC)	Setting AAC based on the usual biological, social and economic parameters is not possible	AAC was not calculated, set or enforced.	For the development of information to enable the better determination of annual cutting levels on the resource over time.	
	5. Area of forest	Mpingo is widely distributed and found as scattered individual trees or small stands throughout Tanzania from sea level to 1,100 masl. The range of the species in eastern Africa from Sudan southward through Uganda, Kenya, Mozambique, Zambia to Angola Appendix 3.3.1 (Egging and Harris, 1939; White, 1983).	The areas of accessible, merchantable mpingo concentrations include the SE region of Tanzania and the Rufiji Basin south of Dar es Salaam (Kewero, 1987).	For establishment of reserves over public lands to, at the minimum, restrict the felling of mpingo.	
	6. Species composition	Mpingo ranges from .004% to .01% by volume. In frequency it ranges up to 2nd most common in some strata (Appendix 3.3.2).	Existing inventory data did not include the areas being harvested by the case study sawmills.	For more detailed inventory of the areas identified by the case study sawmills as the areas where they intend on harvesting in the next 5-10 years.	

Appendix 3.3 Blackwood Forest Management Criteria Listing

<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
7. Age/size and volume distribution	Volume and size distribution is known within limits of inventory parameters (Appendix 3.3.2). No extensive operational/management oriented inventory done. Age distribution unknown.	No extensive operational/forest management inventory done. Volume/Age profiles unknown. No knowledge of age of harvested trees (Moore and Hall, 1987).	For further investigation into the diameter distribution of mpingo including regeneration status, diameter including 0-5, 5-10 cm dbh, stem quality as an inventory that is geared to mpingo physiology.	
8. Growth rates	There is at present no method for determining the age of forest grown trees. Estimates of growth vary with site conditions and available water. Dominant Mean Height increment 0.38-0.8 m/yr. Mean DBH 0.71-1.19 cm. Estimates of DBH 40 cm @ 50-70 yr. (Mugasha, 1983).	The growth rate of Mpingo is not known for the areas which are being actively harvested.	For follow up on existing growth and yield plots. Establishment and tending of growth plots in areas representative of the sites conditions being harvested now and in foreseeable future.	Microscopic observations on wood samples identified the presence of deposits of crystals. Need now to observe crystal deposits in sections from 'known age' trees to determine possible correlation between age and crystal deposits (Gormley, 1991). (Appendix 3.3.3). Known-age trees located in at least three planted plots (Appendix 3.3.4).
9. Quality distribution	Inventory data is restricted to overbark diameter class by species. No data available on log quality distribution. Site, frequency of fire, and presence of stem borers are known to contribute to the log quality but no assessment in inventories completed. (Appendix 3.3.2).	Larger diameter trees were preferred & found in isolated riverine areas. Trees in riverine areas were had less fire and borer damage. Trees found in well drained, drier sites were generally smaller and fire damaged on lower bole (Moyo, 1987).	To include quality parameters in future inventory work. To undertake sample surveys for estimates on quality of mpingo resources inventoried to date.	
10. Relative prices	Royalty rates set at equivalent to other hardwoods; about US \$17.00 per cubic metre.	Royalty payments were rarely enforced (Moore and Hall, 1987).	For a system whereby royalty rates can be collected. Set royalty rate to trees felled not to volume delivered to the mill.	
11. Intrinsic limitations to regeneration	Mpingo can regenerate through root suckers, seeds, cuttings and coppice (Appendix 3.3.5).	Successful regeneration by all possible methods demonstrated in trial plots (Mugasha, 1983; Mugasha, 1983; Moore and Hall, 1987). Mpingo regeneration is not resistant to fire but, established trees can survive annual ground fires (Phillips, 1930a,b).	for trials on vegetative reproduction of "plus trees" as a basis for developing plantation or enrichment planting stock techniques.	Two successful plantation trials have been assessed by the author (Appendix 4b6) The phenotypic variation within each plot suggests that vegetative regeneration capabilities could be exploited to determine the potential for plus tree regeneration.

Appendix 3.3 Blackwood Forest Management Criteria Listing

<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
12. Extrinsic limitations to regeneration	Fire is the primary factor affecting the regeneration of mpingo. Mpingo is not shade tolerant and certain developments in crown closure will lead to the reduction in the incidence of mpingo (Appendix 3.3.6). Mpingo is a tenacious species as demonstrated by its range (Endean, 1962; Kemp, 1963).	Annual fires have interrupted the diameter class distribution of mpingo in the extensive areas visited, there are few trees less than 10 cm diameter. Other factors limiting regeneration do not feature prominently when compared to the effect of fire.	For the exclusion of fire from certain areas to determine the successional outcome on mpingo. To establish early burn trials to determine the effects of light intensity fire on regeneration and successional status over time for mpingo.	
13. Protection	There is no active measures for protection (Nyaki, 1987).	The wide distribution of the species & the lack of information on the areas of concentration, growth rates and successional dynamics of the mpingo ecosystems preclude any rational approach to protection measures, even if the funding were available.	For a comprehensive approach to the needs for the protection of mpingo.	
14. Working plans	The sawmills operate on Public Lands. Some millers apply for a licence to fell and extract forest products. The licence document stipulates the maximum volume which can be removed and the general area of harvesting (Nyaki, 1987)	There are no documents that are aiming for continuity of policy and actives at both prescribing and controlling basic operations in the forest area. Licencing is not strictly adhered to and no follow up to validate areas of activity or volumes removed (Mbonde, 1987).	For centralization of the issuing of licences. The licence must specify the location of the harvesting, the standards of utilization (stump height, min. top diam. etc), penalties for non-compliance and a time limit for the removal of all felled trees.	
15. Felling cycles	Felling cycles have been estimated to be between 50 and 80 years depending on site conditions (Mugasha, 1983).	There are no designated cutting cycles in practice. Harvesting practices do not consider the long term implications of there actions on future crop characteristics.	For the development of standard sustained yield management strategies where practical.	
16. Concessions	No concessions allocated or planned for at the time of intervention.	No concessions allocated. Harvesting was undertaken essentially where and when it suited the sawmillers (Mbonde, 1987).	For an organized harvest in prescribed areas to facilitate monitoring of the harvesting standards and follow up management activities.	

Appendix 3.3 Blackwood Forest Management Criteria Listing

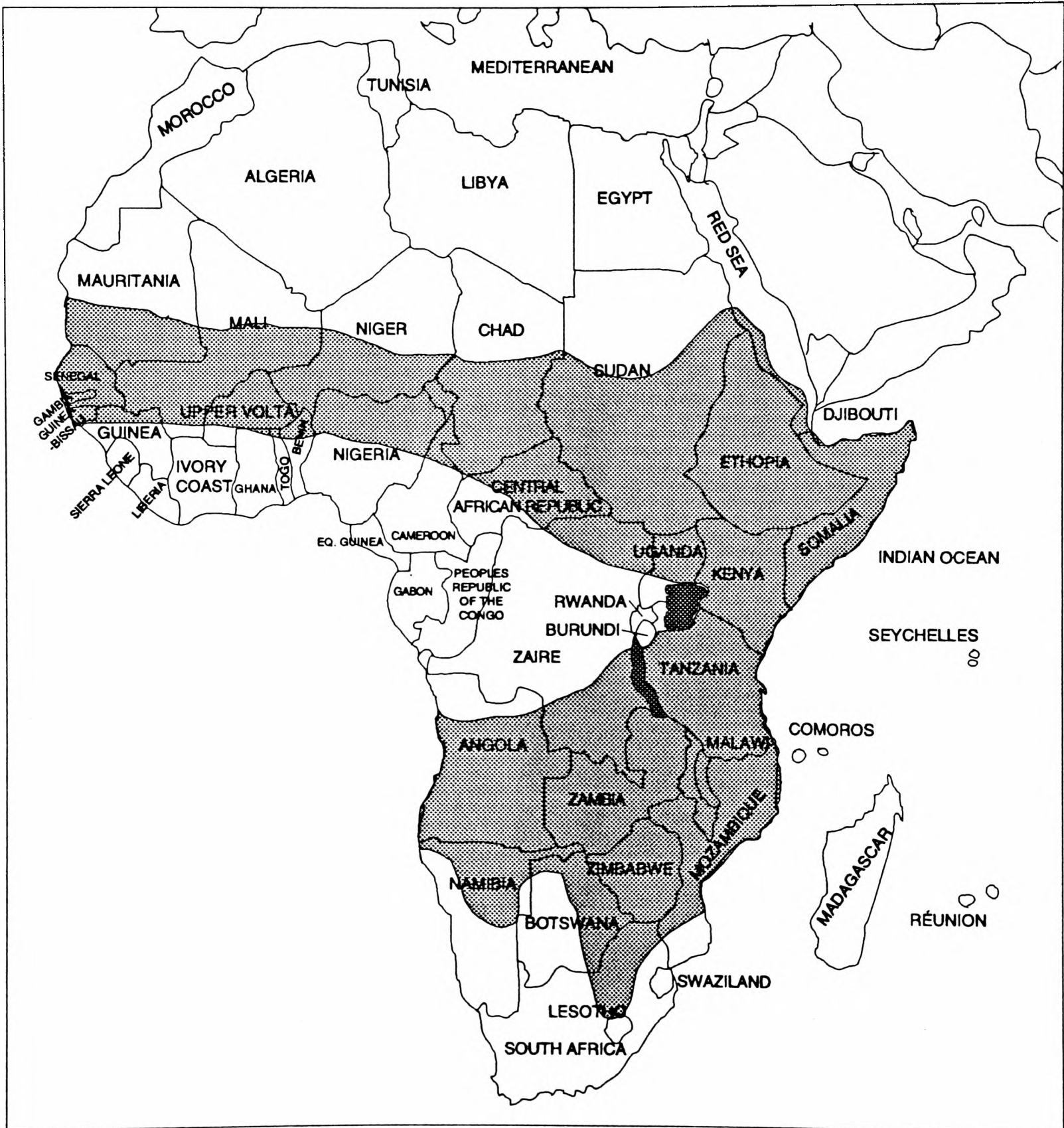
<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
17. Roads	Road construction not necessary to access many areas during dry season (Moyo, 1987; Amin, 1987): Road or trackways through open woodland possible with little, if any, preparation. Value of timber in relation to road building costs for mechanical extraction is low.	Existing tarmac road and murrum roads defined preferred harvest areas. No road construction undertaken. Some areas of mpingo concentration were not exploited because exploitation patterns were defined by the least cost first cut principle.	For the establishment of organized exploitation where harvesting is balanced rather than the present situation of least cost first cut/first come first served.	Tanz. For. Dept. Record 21 (1981) for comparative road costs.
18. Buildings	Buildings and other development is possible on Public Lands in Tanzania upon application to the relevant local authorities either District council or local village leaders (Kewero, 1990).	Buildings for sawmill and storage located permanently near Mingoyo. The possibility of initiating a mobile satellite sawmill facility closer to mpingo concentrations to semi process logs in the forest was an option which may be taken some time in future.	For an investigation of the feasibility of the location of mobile sawmills in the forest to semi process logs with the intent of making greater use of all trees felled.	
19. Boundaries	Present licencing and administration of forest exploitation is through the district offices in some cases.	Boundaries were not clearly defined in the forest. There was the opportunity for the sawmillers to avoid accountability by working two or more districts simultaneously. Districts did not communicate with each other or with the region or headquarters (Mbonde, 1987).	For the administration of the harvesting to be accountable to a more centralized authority.	
20. Sample plots	The existing infrastructure and level of training of forest department personnel present no technical limitation to the establishment of sample plots either in the field for pre/post harvesting/fire exclusion, regeneration plots etc.	No sample plots pre/post harvesting were established. Three known age plots exist (Moore and Hall, 1987). Some limited arboretum trials have been established (Mugasha, 1983).	For the establishment of sample plots and for their monitoring to provide information on pre & post logging performance of the residual stands.	
21. Prediction	n/a			
22. Costings	Production costs are unknown.	Estimates of production costs range from 10-25% of the FOB price Dar es Saalam (Mongi, 1987).	For a greater proportion of the selling price to be allocated towards better harvesting and utilization standards.	

Appendix 3.3 Blackwood Forest Management Criteria Listing

Criteria	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
23. Annual records	Annual records of log extraction are kept by the district offices where harvesting occurs. Annual records of exports of finished product were kept at the district offices from where the finished products were exported.	Centralized annual records were not kept. District records were not readily available on harvesting levels. Annual records were kept on log input, recovery rates and finished product production and export (Moore and Hall, 1987).	For a more accountable FD record keeping system with centralized reporting	
24. Organization of silvicultural work	Results from limited trials indicates that silviculture treatments have potential to improve the regeneration and establishment of a second crop of mpingo.	No operational silvicultural work being undertaken. Forest department lack basic transport and funding to organize silvicultural programmes (Moore and Hall, 1987).	For the development of silvicultural treatments which could be integrated into the harvesting system with the aim of maximizing the potential of the regeneration of mpingo from coppice or root suckers until a more comprehensive strategy for forest management system is developed.	
Silviculture Techniques	25. Regulation of shade and canopy openings	Mpingo is shade intolerant. It is found in open canopy woodlands. The successional status may be held in abeyance due to the regularity of fire. The absence of fire or late burning may result in increasing crown cover, less grassy fuels and change in regeneration succession of certain species (Endean, 1962).	There are no silviculture techniques employed in practice (Moore and Hall, 1987).	
	26. Treatments to select species mix	No definitive information on what strategies would result in which species mixture in areas where mpingo is exploited. The species mix found presently is most likely a sub climax and a result of a combination of effects of fire. It is a dynamic pattern (Trapnell, 1987).	In areas of open canopy, regeneration from mpingo roots was prolific. Fire destroyed mpingo regeneration. Grasses survived and increased fuel loading. Anticipated succession pattern is for a reduction in mpingo population due to logging and increase in grass fuel load. (Lawton, 1978).	
	27. Woody climber cutting	Not applicable, there are no woody climbers present.		
28. Poisoning	n/a			

Appendix 3.3 Blackwood Forest Management Criteria Listing

<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
29. Enrichment planting	The production of planting stock is possible from root cuttings, seed and vegetative cuttings (Mugasha, 1983). Survival of outplanted stock possible with total fire exclusion (Mugasha, 1983 Moore and Hall, 1987)	No enrichment planting was carried out. Regeneration from existing trees was increased when trees were disturbed, however it was destroyed by annual late burns. Protection from fire was not a feasible option therefore no investment in enrichment planting	For the manual disturbance of the roots of the mpingo trees of both the felled and leave trees in the harvesting areas to stimulate sucker production. Operational trials for early burn and total exclusion of fire to help in future forest management prescriptions.	
30. Selection cutting	Felling is indiscriminant and determined by current economic conditions. Felling to a minimum DBH is the theory however there is no practical enforcement and trees are felled and then inspected for quality; only the best are taken (Moore and Hall, 1987).	Felling is to be restricted to trees over 50 cm DBH (Poyry, 1980).	For a restriction that any tree felled must be delivered to the mill regardless of its quality.	
31. Seed tree provision	There are no provisions for seed trees.	Harvesting is a high grading system and therefore, if fire affects abate in harvested areas, there is a greater chance that seed sources will be from trees which did not exhibit the phenotypic characteristics desired by the sawmillers.	For the selection and protection of some plus trees in all areas being harvested.	



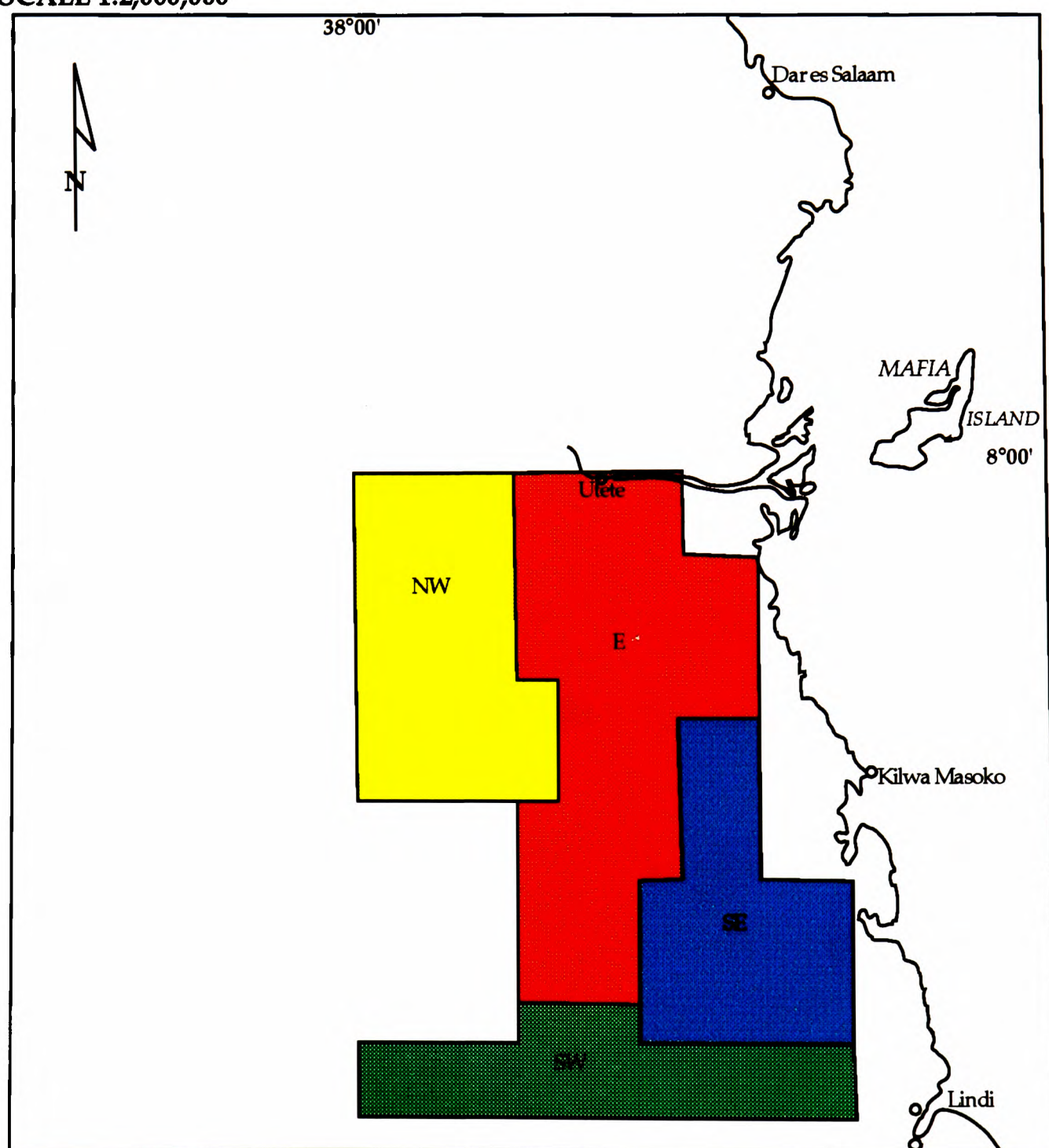
Appendix 3.3.1: Map of Africa showing distribution of ecosystems that support Mpingo, (White, 1983).

Appendix 3.3.2

Map #2
SHULTZ, 1973

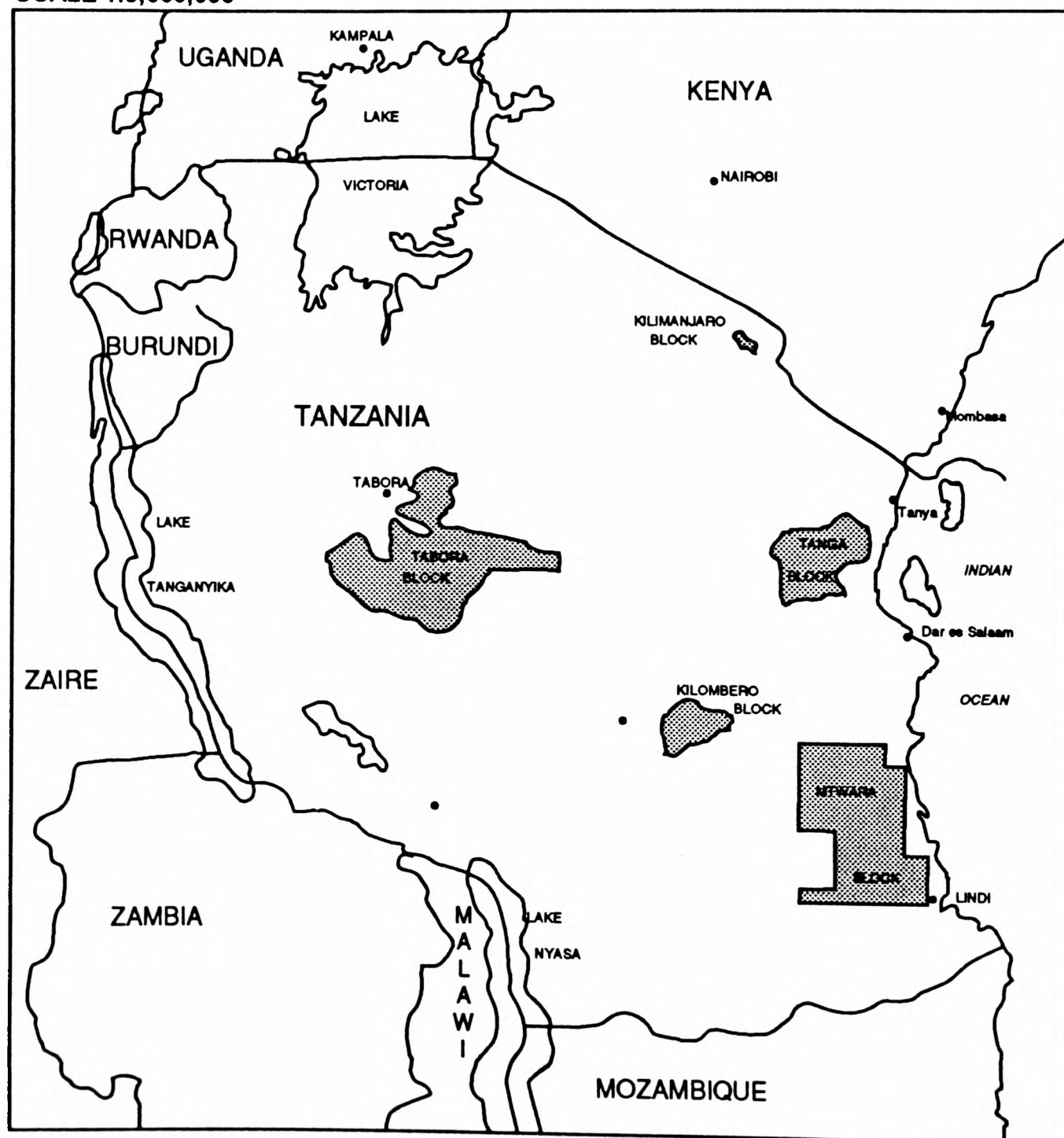
KEY MAP
MTWARA BLOCK

SCALE 1:2,000,000



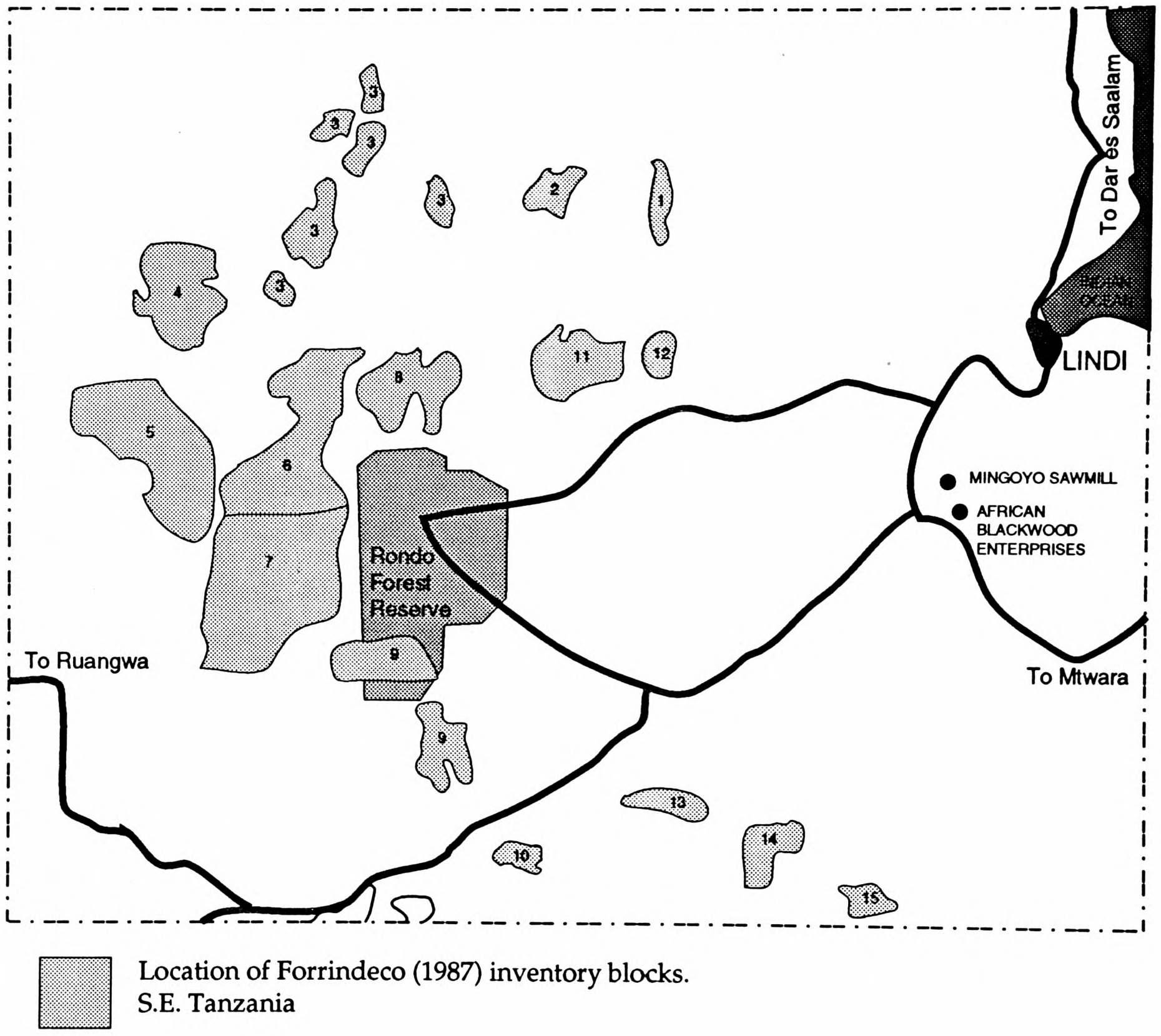
Appendix 3.3.2**Map #1
SHULTZ, 1973****TANZANIA INDIGENOUS FOREST INVENTORY****1971 - 1973**

SCALE 1:8,000,000



Appendix 3.3.2

Map #3
FORRINDECO, 1987



**Diameter Distribution of Measured Trees
Mtwara Block
SHULTZ, 1973**

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**Gross Volume Under Bark
Mtwara Block
SHULTZ, 1973**

SPECIES NAME																
PTEROCARPUS ANCOLENSIS																
BRACHYSTEGIA SPICIFORMIS																
TERMINALIA SERICEA																
BRACHYSTEGIA MICROPHYLLA																
SCLEROCARYA BIRREA																
STERCULIA QUINQUELOBA																
COMBRETUM GUCINZII																
AFCLIA QUANZENSIS																
COMBRETUM ZEYHERI																
DIPLOHYNCHUS MOSSAMBICENSIS																
PSEUDOLACHNOSTYLIS MAPRDUNAEFOLIA																
BURKEA AFRICANA																
DALBERGIA MELANOXYLON																
TAMARINDUS INDICA																
CROSSOPTERYX FEBRIFUGA																
D.B.H.																D.B.H.
15	0.07	0.08	0.07	0.08	0.05	0.06	0.05	0.09	0.05	0.02	0.07	0.07	0.05	0.05	0.07	15
20	0.16	0.19	0.16	0.20	0.11	0.15	0.12	0.21	0.12	0.05	0.16	0.16	0.12	0.13	0.17	20
25	0.28	0.33	0.27	0.35	0.20	0.27	0.22	0.37	0.21	0.08	0.28	0.29	0.21	0.22	0.28	25
30	0.43	0.50	0.42	0.53	0.30	0.41	0.33	0.56	0.32	0.13	0.42	0.44	0.32	0.33	0.43	30
35	0.70	0.82	0.68	0.87	0.49	0.67	0.54	0.91	0.52	0.21	0.69	0.71	0.53	0.54	0.69	35
40	1.01	1.18	0.98	1.25	0.71	0.96	0.78	1.31	0.75	0.30	1.00	1.03	0.76	0.79	1.00	40
45	1.36	1.59	1.33	1.69	0.96	1.30	1.05	1.77	1.01	0.41	1.34	1.39	1.03	1.06	1.35	45
50	1.75	2.05	1.71	2.18	1.24	1.67	1.35	2.28	1.30	0.52	1.73	1.79	1.33	1.37	1.74	50
55	2.18	2.56	2.13	2.72	1.55	2.09	1.68	2.85	1.62	0.65	2.16	2.24	1.65	1.78	2.18	55
60	2.66	3.11	2.60	3.31	1.89	2.54	2.05	3.47	1.97	0.79	2.63	2.72	2.01	2.07	2.65	60
70	3.18	3.72	3.10	3.95	2.25	3.03	2.45	4.14	2.35	0.95	3.14	3.25	2.41	2.48	3.16	70
75	3.73	4.37	3.64	4.65	2.65	3.57	2.88	4.86	2.76	1.11	3.69	3.82	2.83	2.91	3.72	75
80	4.33	5.07	4.23	5.39	3.07	4.14	3.34	5.65	3.21	1.29	4.29	4.43	3.28	3.38	4.32	80
85	4.97	5.82	4.85	6.19	3.53	4.75	3.83	6.48	3.68	1.48	4.92	5.09	3.77	3.88	4.95	85
90	5.65	6.62	5.52	7.04	4.01	5.40	4.36	7.37	4.19	1.69	5.59	5.79	4.28	4.41	5.63	90
95	6.38	7.47	6.23	7.94	4.52	6.09	4.92	8.31	4.72	1.90	6.31	6.53	4.83	4.98	6.35	95
100	7.14	8.36	6.97	8.89	5.06	6.82	5.51	9.31	5.29	2.13	7.07	7.31	5.41	5.57	7.11	100
105	7.95	9.31	7.76	9.90	5.64	7.59	6.13	10.36	5.88	2.37	7.86	8.14	6.02	6.20	7.92	105
110	8.79	10.30	8.58	10.95	6.24	8.40	6.78	11.46	6.51	2.62	8.70	9.00	6.66	6.86	8.74	110
115	9.68	11.34	9.45	12.06	6.87	9.25	7.46	12.62	7.17	2.89	9.58	9.91	7.33	7.56	9.64	115
120	10.61	12.43	10.36	13.21	7.52	10.14	8.18	13.83	7.86	3.17	10.50	10.86	8.04	8.28	10.57	120
125	11.58	13.56	11.31	14.42	8.21	11.06	8.93	15.09	8.58	3.46	11.46	11.86	8.77	9.04	11.54	125
130	12.59	14.75	12.29	15.68	8.93	12.03	9.71	16.41	9.33	3.76	12.46	12.89	9.83	9.83	12.55	130
SPECIES CODE																
	001	003	004	006	013	015	017	022	028	030	042	062	065	070	082	

Appendix 3.3.2

TOTAL VOLUME IN CUBIC METRES AND BY SPECIES IN THE SEPERATE FOREST AREAS for the FORINDECO INVENTORY BLOCKS

SPECIES	MANDAWA	MPUTWA	LICHWACHWAWAN	WANGINDO	TOTAL
Mchenga	36595	1603	25345		63543
Mninga	8465	9198	2727	2329	22719
Mwimdi	9270	15485	1779	5018	31552
Mtanga	2926	9177	314	1896	14313
Mbembakofi	1663	1001	-	2187	4851
Mtundu	790	-	1933	-	2723
Mtondo	5236	-	1228	-	6464
Njiligwi	1959	-	-	-	1959
Nnyenye	1194	-	-	626	1820
Msufipori	505	-	-	1833	2338
Mpangapanga	296	296	348	1682	2326
Mpingo: Volume % of Column Total	270 (.00%)	1088 (0.025%)	-	170 (0.01%)	1528 (0.009%)
Mvule		6002		2027	8029
TOTAL	69,169	43,902	35,008	16,086	164,165

Appendix 3.3.2: Removal Volumes for each commercial tree species found in the four blocks of the Jaako Poyry 1980 Forest Inventory of the Rufigi Basin

TREE SPECIES		Block 1		Block 2		Block 3		Block 4		TOTAL
Local Name	Latin Name	1000 m ³	m ³ /ha	1000 m ³	m ³ /ha	1000 m ³	m ³ /ha	1000 m ³	m ³ /ha	1000 m ³ m ³ /ha
Mninga	<i>Pterocarpus angolensis</i>			39.1	0.5			25.9	0.5	65.0 0.4
Mtondo	<i>Brachystegia spiciformis</i>	119.8	3.3	318.1	3.8			57.0	1.2	494.9 2.8
Myombo	<i>Brachystegia boehmii</i>	35.8	1.0	66.5	0.8	0.2		83.9	1.7	186.4 1.1
Mng'ongo	<i>Sclerocarya birrea</i>	28.7	0.8	13.8	0.2	3.3	0.6	17.8	0.4	63.6 0.4
Mkongo	<i>Afzelia quanzensis</i>	10.5	0.3	33.5	0.4	0.9	0.2	13.2	0.3	58.1 0.3
Mbanga	<i>Aformosia angolensis</i>			1.2				3.8	0.1	5.0
Mgagati	<i>Burkea africana</i>			9.7	0.1			6.5	0.1	16.2 0.1
Mpingo	<i>Dalbergia melanoxylon</i>	8.0	0.2	5.5	0.1	1.1	0.2	11.8	0.2	26.4 0.2
Mneke	<i>Pteleopsis myrtifolia</i>	12.3	0.3	23.4	0.3	0.2		4.9	0.1	40.8 0.2
Mkambala	<i>Acacia nigrescens</i>			8.4	0.1	2.7	0.5	19.4	0.4	30.5 0.2
Mnyamawea	<i>Millettia stuhlmannii</i>	12.3	0.3	21.8	0.3					34.1 0.2
Msufi pori	<i>Bombax rhodognaphalon</i>			7.4	0.1					7.4
TOTAL		227.4	6.2	548.4	1.6	8.4	1.6	244.2	4.9	1,028.4 5.9

Appendix 3.3.2

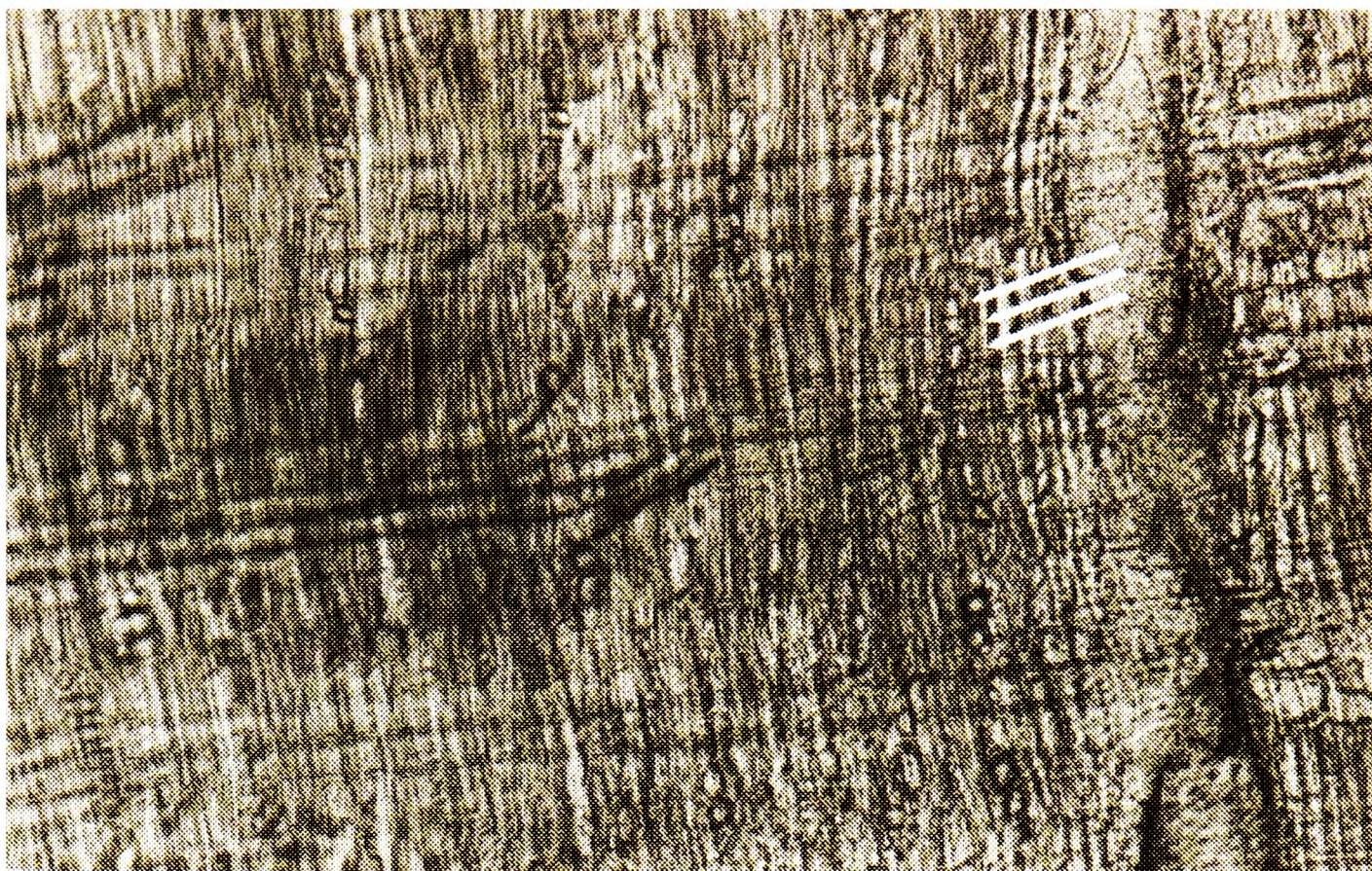
Summary of Forest Inventories that include Mpingo

Date Name	Place	Area	Ranking Mpingo	Standing Volume	m ³ /ha	Comment
(1973) Schultz	Kilimanjaro		not present			montane forest
	Tabora Kilombero Tanga (Map 1)	2.5 million ha	present, not common	3,000 m ³	.0012 m ³ /ha	8th most common species of 259 species found
	Mtwara (see Map 2)	1.8 million ha	in total area it is 18th most common of 259 species it is 2nd & 3rd most common in SE Blocks	800,000 m ³ (3 million trees)	.44m ³ per ha	Did not include areas presently being harvested by Case Study sawmills for mpingo. Access problems because trees widely scattered. Few roads in much of the area. One of top ten most common species.
(1979) Jaako Poyry	Lindi, Mtwara - 28 widely scattered blocks	49,390 ha	recognized as a commercial species, but uncommon. 5 'preferred' species = 99.44% of total volume.	unknown	n/a	This inventory was focused on sawlog species of more than 25 cm DBH for commercial species was used as in similar surveys (see J. Poyry 1980, Rufigi Basin Inventory). Mpingo of average diameter for the area was not included.

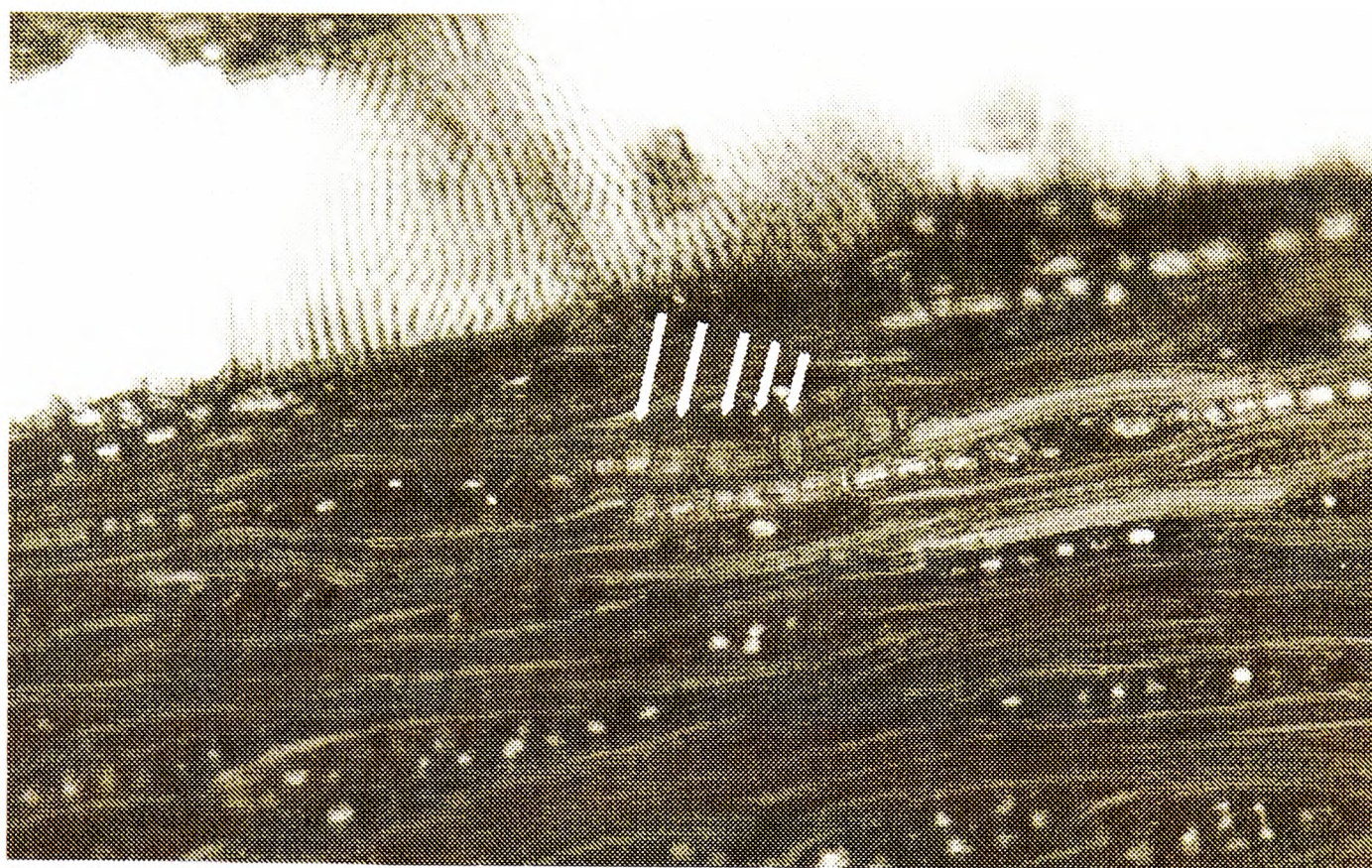
Appendix 3.3.2

Summary of Forest Inventories that include Mpingo

(1980) Poyry	Jaako	Rufigi Basin	174,260 ha inventoried of 1.2 million ha area	present in all blocks	26,000m ³ DDH > 50cm of total 1.03 million m ³ valuable species 10% of total valuable removable species volume		Diameter limits set for Inventory of commercial species > 25 cm DBH resulted in (2.4 mill m ³). Forestry Dept. cutting regulation minimum diameters: mninga 45 cm + all other species 50 cm Removable volume = 1.0 mill/m ³ Total volume of valuable species removable approx. 255,000 m ³
(1987) Forindeco		Mandawa Area Lindi Region (Map 3)	6270 ha	13th of 13 valuable species inventories (refer to Forindeco Table of this appendix)	1,528 m ³ of 164,165 m ³ total or .0093% of total	.24m ³ /ha	Inventory volumes include Diameter class 10 - 24 cm: Volumes of 10- 24 cm class ; 788m ³ 5 % 25-39 cm class ; 152m ³ 10% 40-44 cm class; 588m ³ 39 % . Total = 1528m ³



Appendix 3.3.3a: Micrograph showing crystal deposition in Mpingo heartwood. Magnification 200x (Gourlay, 1991).



Appendix 3.3.3b: Micrograph showing crystal deposition in Mpingo heartwood. Magnification 350x (Gourlay, 1991).



Appendix 3.3.4a: Mpingo trees of known age - Nachingwea, S.E. Tanzania.



Appendix 3.3.4b: Mpingo trees of known age - Handeni, N.E. Tanzania.

Appendix 3.3.5

Intrinsic Limits to Regeneration of Mpingo *Dalbergia melanoxylon*

Population Structure - Many small first year root sprouts in some areas but, there is evidence that these are repeatedly burned back (Moore & Hall, 1987). There were no stems less than 10 cm DBH observed in the field. There is a gap in diameter distribution from 0.5 cm to 10 cm DBH in the field

Abundance - Generally wide spread as scattered individuals or as small stands (Egging, 1939; White, 1983).

Growth Rates - If establishment of regeneration is successful then growth rates of 0.38 metre per year in height and 0.71 - 1.19 cm in diameter are average for the coastal region (Mugasha, 1983).

Successional Status - Mpingo is reported to be

- Shade intolerant
- Fire intolerant usual
- Member of sub-climax due to fire restricting success of certain species.
- A change in annual burning may result in an increase in crown closure and reduction in Mpingo under closed canopy (Scott 1934).

Phenology

Flowering - March (rains) (Brenan, 1949)

Seeds - Oct - Dec (Mugasha, 1983), (Brenan, 1949)

Sprouting - sprouts from root nodes encouraged by physical disturbance of root system. Coppice sprouting occurs after felling.
Sprouts are not fire resistant.

Phenotypic selection is clonal.

Genetic Variability - No studies available.

Autotoxicity - Not evident from field observations.

Appendix 3.3.6

Extrinsic Limitations to Regeneration of Mpingo, *Dalbergia melanoxylon*.

(Conditions which affect regeneration based on the ecological factors.)

Light - Mpingo is not shade tolerant and is classified as a 'light demander' (Phillips, 1930).

Water - Mpingo survives over a great range of available water conditions from moist riparian plains to uplands that receive 200 mm of rain annually (Phillips, 1930; White 1983).

Soil - Mpingo occurs on variety of soil types over its range including those that are classified as Red Alluvial or Gray Alluvial soils (Phillips, 1930). Annual fires consume leaf litter and other ground vegetation so that little organic matter accumulates in the soil (Phillips, 1930).

Weather - Frequent fork lightning occurs during the wet seasons and vegetation does not readily ignite and Phillips (1930) reported that there were "very few" lightning strikes in dry season. This pattern could be describing a naturally occurring "early burn" phenomena.

Competing Plants - In some areas grasses may compete with Mpingo regeneration for water and nutrients. In some areas that are under certain successional status, thickets of associated species such as Brachystegia and Isoberlinia may compete with the Mpingo. (Scott, 1934; Trapnell, 1958; Moore and Hall, 1987).

Fire - Fire stimulates the emergence of root suckers from Mpingo (Phillips 1930) but damages foliage, boles and cambium (this effect is most pronounced on leeward side of the stem), seeds, and regeneration up to three years old (Eggling 1939). The absence of fire may promote regeneration but successional status of Mpingo as a climax species is doubtful. If mpingo is to be managed, then early burning may be key to reducing damage to existing trees and allowing Mpingo to regenerate and thereby maintain sub-climax status.

Appendix 3.3.6 (continued)

Types of Controlled Burns tested and the effects of each on regeneration of Miombo Woodlands (source: Tanzania Technical Note # 40, 1963).

<u>Type of Burn</u>	<u>Result on Regeneration of Miombo Woodlands</u>
1) Exclusion <u>Total</u>	Best regeneration
2) Late Burn and no burn in alternate years - with no burn year after felling	Second best regeneration
3) Early burn - annual	Third best regeneration
4) Late burn every year - for 4 years and a late burn 5th year.	Worst regeneration

From this study it can be suggested that a minimum two year exclusion is required to establish reasonable regeneration stocking - thereafter annual early burn to minimize losses from accidental late burn. After an intense annual burn there is proliferation of root suckers from Mpingo. If fire occurs before foliar flush when the trees are dormant, there is little negative effect to the tree. If fire occurs later damage to the crown occurs. This reduces crown cover and shade, kills regeneration and may eventually destroy a woodland and reduce it to coppice stands (Lawton, 1978).

In summary, fire is the major factor that determines the dynamic vegetation patterns associated with Mpingo. These patterns are determined through the inter-related and combined effects of fire and degree of canopy closure. For example, when there is more fire there is less canopy and less canopy results in greater fine fuel loading and more frequent fire. Less frequent or less intense fire results in higher density of canopy cover and an increase in shade reducing the fine fuel load (grasses). Less fire and increased canopy cover continues until crown breaks up, grasses reappear and woody fuel load increases enough to carry intense fire that results in more frequent fires and less canopy and reduced regeneration.

Animals - Tsetse fly is common in many areas where Mpingo is found, reducing the establishment of settlements and large mammal inhabitation (Scott, 1934; Lawton 1978, 1982). Borers and termites cause damage to wood but, do not inhibit regeneration (Lawton, 1982).

Appendix 4.1: Nithi Timber Cooperative Society Limited - Social Welfare Criteria Listing

<u>Aspect</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
Institutions	Government officials	The enterprise was legally established under Kenyan law as a limited company owned by a cooperative Society. Officials from the Ministry of cooperatives and the forest department were responsible to ensure that certain aspects of the enterprise were undertaken in an accountable manner. Officers from the Ministry of Cooperatives were responsible for the manner in which the business was run and the forest department officials were responsible to ensure that the terms and conditions of the licence were met (NTCSmin75/1).	The activities which were the responsibility of the government officials such as the auditing of the accounts and the meeting of the terms and conditions of the licence had not been undertaken (NTCS/PM/July/85, NTCSmin31/85; 38/85; 48/85).	For the full, accountable participation of the relevant government officials in carrying out their duties which affect the affairs of the enterprise.	
Independent auditing		The administrative regulations for Cooperative Societies requires the auditing of the accounts on an annual basis by an independent qualified accountant. The auditor's report is presented to the membership at the Annual General Meeting and copies must be forwarded to the Ministry of Cooperatives (Githinji, 1985).	The accounts had not been audited for two years and there were no indications that there were any plans to have the accounts audited (NTCS/PM/July/85; NTCSmin51/85).	For the immediate audit of the accounts for the two previous years. For an assessment of the management activities in order to suggest a means by which the auditing of the accounts would be done on a regular basis.	
Public participation		There are two ways in which the public can participate in the affairs of the Society. The most direct means to participate is to become a Society member by purchasing Society shares. The other means is through the democratic political system in Kenya.	The potential for public participation in the affairs of the Society was great. There were over 16,000 members. There had been no official participation of the public for two years because there had been no Annual General Meeting held (NTCS/PM/July 1985).	For the undertaking of regular and well planned Annual General Meetings.	
Associations		The Kenya Timber Workers Employers' Association (KTWEA) functioned as the collective voice for member managers and owners of timber related industries in dealings with institutions which affected the industries, such as the government and trade unions (Njage, 1987).	The Society was not a member of the Kenya Timber Workers' Association. The Society management had to deal one on one with other institutions which affected the enterprise. (NTCSPM Report July 1985).	For the Society to assess the costs and benefits of membership in the KTWEA.	

Appendix 4.1: Nithi Timber Cooperative Society Limited - Social Welfare Criteria Listing

<u>Aspect</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
	Trade unions	All full time employees of the Society were members of the Kenya Woodworkers' Union (except the management employees).	The trade union agreement had lapsed and negotiations had failed to begin to agree on any of the proposals put forth by the union. The Society had to bargain individually with the Union since it was not a member of the KTWEA (NTCS/PM/July/85).	For the Society to investigate the cost benefits of membership in the KTWEA with regards to their role in conducting negotiations with the employees' union on behalf of the Society.	
	Documented policy & procedures	The policy and procedures were to be established by the Board of Directors comprised of one member each from the Ministry of Cooperatives, the financier, the Co-op Union and two from the Society. The board was to meet a minimum of 4 times annually (Oy, 1975).	There were no procedures or policies developed specifically for the operation of the enterprise and documented in a manual. Operations were governed by guidelines which were developed by various institutions (e.g., Employee Union, Ministry of Co-op) for their specific needs with the Society. There was no Board of Directors, rather, there was a Committee of local representatives from the membership of the Society. They had no experience in directing enterprise and were replaced by a government appointed Commission (NTCS/PM Report Aug. 1985).	For the development and documentation of policy and procedures designed specifically for the successful operation of the enterprise which incorporated the regulations of the Employees Union, the Ministry of Co-ops and the Forest Department.	
	Clear goals	The management goal was to extract and process sawlogs from the Licence area in a cost effective manner within the guidelines set out by various government agencies and the employees' union and to sell the timber for the benefit of the shareholders. (Oy, 1975).	The management goals were not clearly defined by the actions of the management commission. There was no apparent expertise in the management of an enterprise among those responsible for management. There were no clear goals for the enterprise (Hemmingson, 1985).	For the establishment of a set of management goals that include solicited input from employees, members, government officials and NGOs.	
People Management	Lines of reporting	The lines of reporting were outlined clearly in an organization chart (Oy, 1975) (Appendix 4.1.1).	The lines of reporting did not follow the original organizational chart. There was no documented organization chart and lines of reporting were found to be informal and steps were skipped. The lines of reporting as found are described in Appendix 4.1.2. (NTCSmin38/85;44/85).	For the establishment of clear lines of reporting and the documentation of an organization chart, job descriptions and procedures for the conduct of internal reporting and discipline in consultation with the workers' union.	

Appendix 4.1: Nithi Timber Cooperative Society Limited - Social Welfare Criteria Listing

<u>Aspect</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
	Accountability of management	The project manager reported to the management commission which was obliged by the Ministry of Cooperative Development Regulations Governing Cooperative Societies, to report to membership of the Society in a general meeting on an annual basis. The management also was to make regular reports to the Ministry of Cooperative Development and the activities in the forest were subject to regular monitoring by representatives of the Forest Department (Njage, 1985).	The management commission had not held a general meeting in over two years and had made no formal attempt to report to the shareholders on the state of the enterprise (NTCS min 44/85).	For an annual general meeting.	
Employment generation		There was direct employment for the local population planned for the logging and timber processing activities. Further direct employment was to be generated through the establishment of sales and value added facilities in Nairobi. Indirect employment generation was expected in the local services and through independent value added enterprises based on the supply of raw materials.	Employment was generated, as planned, in the logging and sawmill operations. Additional employment was generated in on-site value added activities for furniture manufacturing and pre-fabricated housing construction.	For the expansion of the value added activities for the creation of more employment opportunities and for consideration to carrying out the planned establishment of a sales and value added facilities in Nairobi.	
Job satisfaction		The satisfaction of employees in their jobs was not specifically addressed at the proposal stage, however the employees were to have clear lines of reporting, training and job descriptions (Oy, 1975).	Job satisfaction for employees on the whole was not catered for by the management. This situation was exemplified by the absence of a current union agreement, any formal basis for duty selection or for salary increment or clear job descriptions (NTCSmin23/85).	For the establishment of clear job descriptions, lines of reporting, operations procedures, employee appeal procedures (in-house), means for employee contribution to enterprise management, employee training, increments based on merit and experience, a bonus system and employee career paths.	

Appendix 4.1: Nithi Timber Cooperative Society Limited - Social Welfare Criteria Listing

<u>Aspect</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
Market Mechanisms	Pricing system	The pricing system in Kenya for sawnwood was based on the free market forces in the domestic market (Githingi, 1985).	The prices for the sawnwood produced by the Society was set by the Commission. The selling price for sawnwood was less than the production costs (NTCS/PMs Report/Aug/85).	For an investigation into the reasons why the timber was priced below production costs.	There was a glut of camphor timber in the domestic market, most of which was not from licence sources, (Mbinde, 1985). This buyer's market was manipulated by the fraternity of buyers to keep the price low (Bains, 1985).
	Purchasing contracts	The estimated demand for sawnwood of the species and quality produced by the enterprise was higher than the projected national production, therefore, no arrangement for purchasing contracts was considered as all timber would be sold in the general market (Oy, 1975).	The Society bid to supply the Prisons Department through sealed tender. The annual amount required to fill this tender was greater than the maximum potential production of the sawmill. The Society had bid to supply timber at a price lower than cost. (NTCSmin24/85).	For an assessment of the timber tendering procedure to determine what action the Society should undertake to supply the tender in a cost effective manner.	
	Supply contracts	The enterprise was one of the largest indigenous hardwood sawmills in the country and as such would be in a position to establish favourable supply contracts for its various needs with appropriate discounts and credit facilities (Oy, 1975; Hemmingson, 1985).	There were no supply contracts. All suppliers insisted on cash and carry. No services were provided without prepayment. All purchases made by the Society had to be approved by the Ministry of Cooperatives in advance (NTCS/PM/July/85).	For the establishment of a floating fund to be used on the authority of the Project Manager for the purchasing of essential or emergency spares and services. The PM's decisions would be cleared at the next meeting of the Management Commission.	This point of negotiation was intended as a first step in reducing the time and energy spent by the Society's manager to conduct normal day to day business.
Benefit distribution	Stability of currency	The value of the Kenyan shilling for exchange rate purposes was set by international agreements. At the time of the feasibility study the Kenya Shilling was set at seven shillings to the US dollar (Oy, 1975).	The value of the Kenyan Shilling dropped between 1975 and 1985. The value of the Kenya Shilling in 1985 was 16 to the US dollar and this value was expected to continue to decline over time (Kimbui, 1985).	For an assessment of the expected needs of the Society which would require foreign exchange in order to determine the most cost effective strategy for their purchase.	
	Shareholders' share of profits	The profit of the Society was to be divided equally among each share (Githingi, 1985).	The profit of the Society was to be divided equally to each share, however the Society had been running at a loss since it began (NTCSPM Report Aug 1985).	For a report to the shareholders on the status of the enterprise.	

Appendix 4.1: Nithi Timber Cooperative Society Limited - Social Welfare Criteria Listing

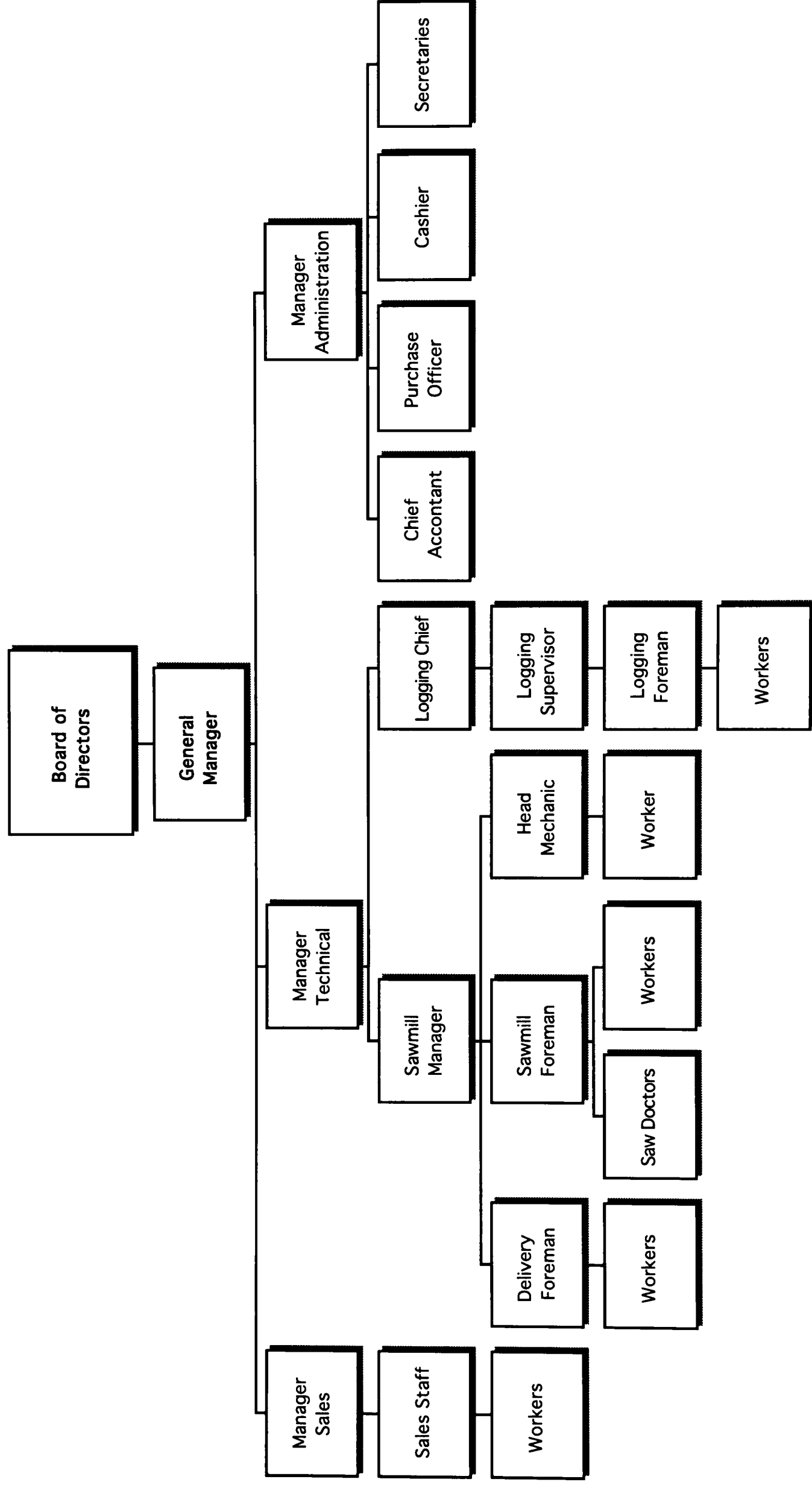
<u>Aspect</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
Indirect Benefits	Employees' share of profits	The employees were not entitled to any share of the Society's profits other than what they would receive as shareholders (Njage, 1985).	The employees received no share of the profit from the operation (Njage, 1985).	For an incentive scheme whereby the employees receive some predetermined and agreed upon portion of the profits generated by the Society's operation.	
	Community's share of profits	The community was eligible for a share in the profits of the enterprise through the taxation process. There was no share of the Society's profits directly to the local community such as through grants for local community projects.	There were no profits to share (NTCSPM Report July 1985).	For the development of a scheme whereby the local community could directly benefit with a share from the profits of the enterprise such as discounts for school and hospital furniture.	
	Local	The establishment of the enterprise would lead to improvements in rural job security and the general quality and enjoyment of life for the employees and their families and would increase the availability and diversification of goods and services (Oy, 1975).	The sawmill provided secure employment for approximately 80 men and women for five years. The supply of sawnwood and sawmill by-products was utilized by craftsmen and small scale industries. The sawmill required up to 20 casual employees (NTCSPM Report Aug. 1985).	For the vigorous expansion of the value added sector of the enterprise such as preservative treatment of those species which unless treated were not readily marketed and for the furniture and prefabricated housing manufacture.	There were a number of schools in the area which graduated skilled carpenters and furniture makers. There was an increasing demand for housing and furniture in on the eastern side of Mt. Kenya as a result of the opening of the first all weather road.
National		An indigenous supply of sawnwood and a reduction in the need to import sawnwood. The conversion of an indigenous, overmature forest to a more vigorous forest for future exploitation. The increase in rural employment opportunities. (Oy, 1975).	Rural employment was created through the supply of sawnwood from the local forest. There was no major impact on the natural forest heritage (Chevangi, 1985).	A forest management method which would use the harvesting activities to predispose the logged area to regenerate into a vigorous crop for future harvesting.	
		The original proposal for the enterprise suggested that the nation would benefit through the receipt of foreign exchange through the export of sawnwood produced by the enterprise (Oy, 1975).			

Appendix 4.1: Nithi Timber Cooperative Society Limited - Social Welfare Criteria Listing

Aspect	Criteria	Technical Limit	Benchmark Situation	Negotiation Aim	Comments
Indirect Costs	International	Internationally accepted forest utilization standards could be imposed on the enterprise with confidence since the management of the enterprise is subject to detailed monitoring and instruction from the Ministries of Environment and Cooperatives. (Oy, 1975).	The utilization of the Mt. Kenya forest resource for the sawnwood through the Society's operations was found to be within the instructions of the local forest officer, however these instructions were a significant modification of the original licence. (NTCSPM Report Aug. 1985).	For the assessment of the implications of the forest department's strategy for individual tree felling on the sustainability of the forest resource and an assessment of the Society's record in carrying out the instructions of the forest department.	
	Local	The people who traditionally exploited the forest area which fell under the forest licence of the enterprise would be restricted to some extent in their access to the forest resource. There would be an increase in the traffic of large lorries in the area (Oy, 1975).	The enterprise was a local political football and the cause of much local debate (NTCSmin31/85).	For the assessment of the operation in order to identify the roadblocks to its success and possible solutions which would be agreeable to those having influence over the activities of the enterprise.	
	National	The original proposal planned for a total conversion of the natural forest into a plantation (Oy, 1975). This would result in a loss of a significant amount of the nation's natural forest heritage (Mwangi, 1985).	The harvesting methods used did not promote a vigorous growth of timber crops for future use (NTCSPM Report Aug. 1985). The export of timber was banned before the sawmill began operations, and there was a low demand in the local market for indigenous hardwoods. The cooperative Society was increasing its debt load and not generating value for the nation (NTCS/PM/July 1985).	For the restriction of uncontrolled exploitation of the forest resource in Kenya in order that the planned and licenced operations could operate in a fair market environment and benefit the nation. For the maintenance of careful ecosystem sensitive approaches to harvesting (NTCS/PM/AUG/85).	
International		The proposed rate of harvesting of the virgin forest area on Mt. Kenya did not give any consideration to the non-timber values of the forest such as wild life habitat, traditional local uses, tourism or genetic resources (Oy, 1975).	The camphor forest under licence to the enterprise has many non-timber values as well as great timber value. International interest in the forest for its flora and fauna is increasing and also the hydrological features of the forest are important to the many people who live in the arid areas below the mountain. They rely on a steady flow of water from the mountain rivers for their quality of their life (Mbinde, 1985).	For a harvesting regime which encourages the regeneration of the original forest ecosystem.	

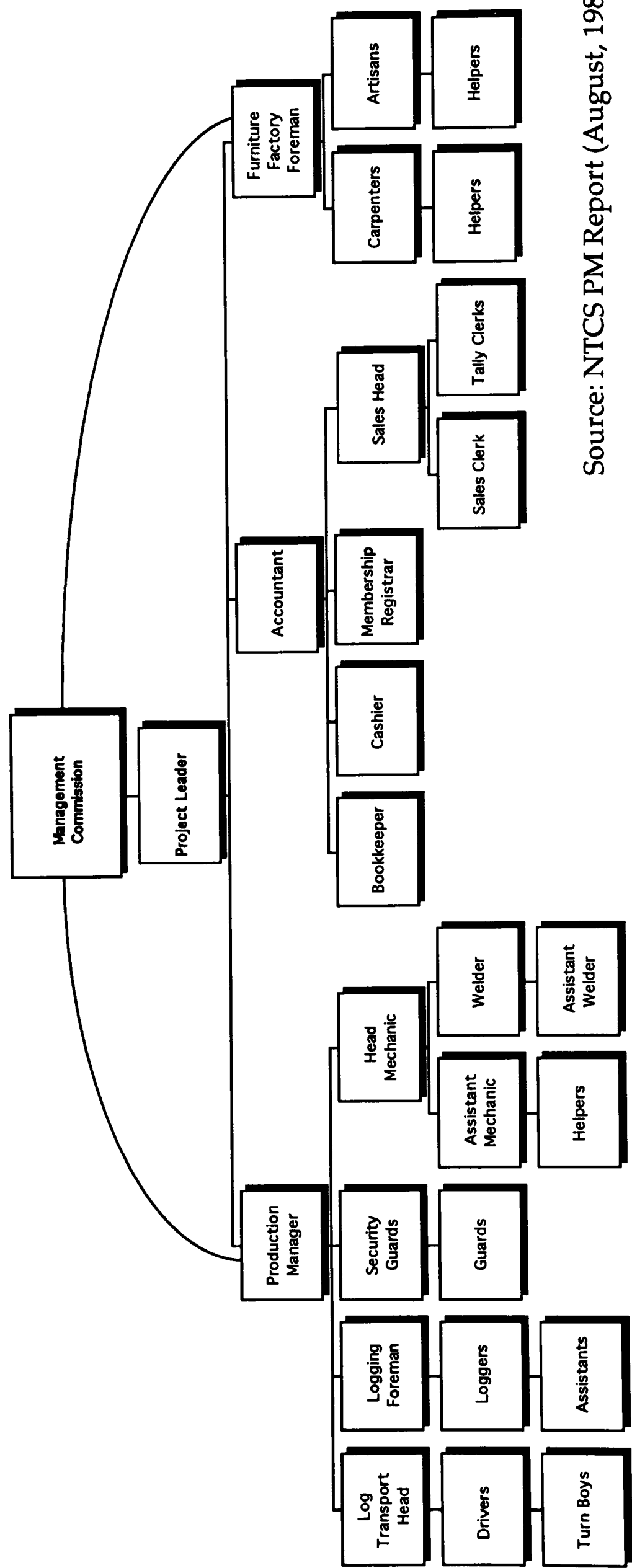
Appendix 4.1.1

Nithi Timber Cooperative Society Organization Chart – Technical Limit



Source: Oy, 1975

Appendix 4.1.2: Nithi Timber Cooperative Society
Organization Chart - Benchmark Situation



Source: NTCS PM Report (August, 1986)

Appendix 4.2: Mingoyo Sawmill - Social Welfare Criteria Listing

<u>Aspect</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
Institutions	Government Officials	All sawmilling in Tanzania was nationalized at independence. The parastatal TWICO managed the sawmills to process Tanzania's timber for local and export markets. As a parastatal, the enterprise was accountable to the government (Moore and Hall, 1987; Kewero, 1987).	The enterprise was to be managed independently with affiliation with the headquarters of the parastatal group TWICO. This new approach was a result of changes in government policy in the mid 1980's. In theory the management was independent, but in practice the headquarters was still involved in the management of the mill such as exporting billets and importing supplies. The export earnings also did not accrue fully and directly to the sawmill management (Moyo, 1987).	For the reduction in administration levels and for a more liberal access by mill management to the foreign exchange earnings to facilitate the purchase of supplies in a timely manner as determined by the management.	
	Independent auditing	The enterprise was subject to auditing by the headquarters staff (Moyo, 1987).	The accounts were regularly reviewed and audited by the headquarters staff (Mongi, 1987).	N/A	
	Public participation	As a parastatal, the enterprise was operated for the greater good of the people of Tanzania (Mbonde, 1987).	Public participation in the activities of the sawmill was possible through the democratic process (Moore and Hall, 1987).	For the development of a mechanism whereby public input into the management of the enterprise could be facilitated.	
	Associations	The employees and the management did not belong to any formal associations (Moyo, 1987).	The employees and management did not belong to any formal associations (Moyo, 1987).	For the development of a mechanism to provide a more formal association of employees and management to facilitate in-house communication between employees and the management and for communications within the industry and consumers.	
	Trade unions	There were no trade unions involved in the enterprise (Moyo, 1987).	There was no formal union of employees. The shift foreman was responsible to communicate between the employees and the management (Moore and Hall, 1987).	For the establishment of a formal association of the employees to facilitate the development of employee concerns and to communicate with the management. This association would not necessarily have to be a formal union organization.	

Appendix 4.2: Mingoyo Sawmill - Social Welfare Criteria Listing

<u>Aspect</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
People Management	Documented policy & procedures	The policy and procedures were developed by the headquarters' staff for implementation by the management of the enterprise (Moyo, 1987).	The change in government policy meant that the local management of the enterprise was responsible for the day to day activities. The management had not yet completed the documentation of the policy and procedures specifically applicable to Mingoyo (Moyo, 1987).	For the development and documentation of policy and procedures specifically designed for the successful operation of the enterprise which incorporates mechanisms for employee and public inputs to the management.	
	Clear management goals	The management goal was to extract mpingo logs from public lands and to process them for export in a cost effective manner within the laws of the nation (Mongi, 1987).	The management goals were clearly understood by all employees (Moore and Hall, 1987).	N/A	
	Lines of reporting	The lines of reporting were clearly outlined in the organizational chart (Mongi, 1987).	The lines of reporting between the management of the enterprise and the headquarters had not been reviewed or assessed for its operational efficiency since the change in policy made the management of each enterprise independently responsible (Moyo, 1987).	For the review of the interface between the headquarters and the local management to determine the specific role and responsibility centres for each employee.	
	Accountability of management	The management reported to the head office which in turn was accountable to the government. The management was accountable to the employees as per the labour laws of Tanzania (Holmes, 1987).	The management was responsible to the head office and ultimately to the voters through the government for the operation of the enterprise.	For management to be more directly accountable at the local level.	
	Employment generation	There was direct employment generated in the logging, transport and sawmilling operations and indirect employment in local services (Moyo, 1987).	There were over 30 permanent jobs directly related to the operation and up to 15 casual positions. The management was planning to expand operations and more direct and indirect employment would be necessary (Moore and Hall 1987).	For the development of a strategy for the expansion of the operation whereby development assistance was linked to certain harvesting and processing standards.	

Appendix 4.2: Mingoyo Sawmill - Social Welfare Criteria Listing

<u>Aspect</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
	Job satisfaction	There were not any procedures or policy designed specifically concerning job satisfaction (Moyo, 1987).	The employees appreciated the opportunity to be gainfully employed in their home area. There were few employment opportunities in the region. The management hired and trained some employees on the job (Moore and Hall, 1987).	For a survey of the employees to determine what conditions would provide them with a greater sense of job satisfaction.	
Market Mechanisms	Pricing system	The pricing system was based on the free market (Mbonde, 1987).	The free market pricing system for the exporters was restricted by the export procedures which required pre-payment and 2-3 month delay in delivery. Some end users did not buy directly from the producers but from agents based overseas (Moore and Hall, 1987). TWICO had a number of standing contracts with various customers but were not prepared to divulge complete details.	For the assessment of the exporting procedures to determine whether or not an alternative system could be developed which would enable all purchasers of billets to deal directly with the producers in order to keep the market as unrestricted as possible. For the centralizing of export licensing and reporting in order to gain an accurate understanding of the trade in mpingo billets from Tanzania to permit the development of a more effective national strategy for the management and marketing of mpingo.	
	Purchasing contracts	All customers were foreign and arranged with the TWICO headquarters for the purchasing of billets. There was a greater demand than supply of billets and all export billets were sold and shipped in 1 m3 lots of approximately 900 sets each (Mongi, 1987).			
	Supply contracts	The enterprise was in a position to independently establish supply contracts (Mongi, 1987).	The enterprise was in theory independent of the TWICO headquarters, however there were certain functions which headquarters performed, such as obtaining supplies from overseas (Moyo, 1987).	For an assessment of the current procedures for obtaining supplies in order to determine a more efficient method which would serve the efficiency of the enterprise better.	
	Stability of currency	The Tanzanian Shilling exchange rate was set by the government of Tanzania. The rate in 1987 was TSh96/= per US\$ (Mongi, 1987).	All the mpingo billets were exported and earned foreign exchange. The producer was permitted to keep half of the foreign earnings in hard currency and the other half was converted to local currency at the official rates (Moyo, 1987).	For direct access by the management to the foreign exchange which their operation earned to facilitate the timely purchasing of spares from overseas in order to reduce inefficiencies in their operations based on inoperable machines. For wages of employees to be linked to the exchange rate to protect the employees against the devaluation of the local currency.	It was expected that the local currency would be devalued against hard currency if there was to be any change in value. This would not have an adverse effect on the enterprise under the present exporting rules of Tanzania.

Appendix 4.2: Mingoyo Sawmill - Social Welfare Criteria Listing

<u>Aspect</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
Benefit distribution	Shareholders' share of profits	There were no shareholders in the enterprise (Moyo, 1987).	As a parastatal, the enterprise in theory was being operated for the greater good of the nation (Mbonde, 1987).	For some degree of more direct accountability to the general public for this operation in order to provide stimulus to the business needs of the enterprise.	
	Employees' share of profits	The employees received wages and benefits package such as housing allowance (Moyo, 1987).	There was no incentive scheme whereby the employees could directly benefit from meeting production goals (Moore and Hall, 1987).	For the implementation of an incentive scheme.	
	Community's share of profits	The community share of the profits is indirectly achieved through the general increase in the nation's economic well being through the increase in foreign exchange earnings. The local district council collects the revenues from the royalty charges (Mbonde, 1987).	There is no means for the community to obtain any direct share of the profits from the enterprise (Holmes 1987).	For the development of a mechanism whereby the local community would receive a direct share of the profits from the enterprise. The share could be based on the enterprise meeting harvesting standards established to ensure a sustained supply of mpingo.	
Indirect Benefits	Local	The sawmill provided direct employment for 20 permanent employees from the local area in the sawmill and up to 15 casual positions. The sawmill was also a source of fuel wood and a focus for local service industries (Moyo, 1987).	The enterprise had provided employment for over 1 year and was planning to expand its operation which would require additional employees from the local area (Moyo, 1987).	For the assessment of the possibility of expansion of the operation to include processing of the waste material from the sawmill operation into export items.	
	National	The enterprise was subject to corporate taxes and income tax was paid by the employees. The export of the finished goods provided the government with foreign exchange (Mbonde 1987).	The enterprise generated approximately US\$250,000 in 1987 (Moyo, 1987).	N/A	
International		The enterprise supplied a significant proportion of the raw material on which the clarinet manufacturers depend (Moore and Hall, 1987).	There are valued added benefits which are associated with the musical instrument manufacture and the industries associated with the cultural use of the instruments which, to be the best, require the mpingo wood (Nagel, 1987).	For an investigation into mechanisms which would enable the return of a portion of the positive externalities enjoyed internationally as a result of the final product manufacture and use to be returned to the resource and producers.	

Appendix 4.2: Mingoyo Sawmill - Social Welfare Criteria Listing

<u>Aspect</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
Indirect Costs	Local	Worker health and safety regulations are outlined in government regulations for the sawmilling industry (Moyo, 1987).	Worker safety and health is at extreme risk. Eye and limb protection do not exist in the mill and poorly maintained circular saw blades require processing techniques that compound the risks of injuries (Moore and Hall, 1987).	For the improvement of worker health and safety conditions.	
	National	The mpingo resource is not being managed to ensure that there is a sustained supply of suitable trees. There is no comprehensive national programme to coordinate the mpingo resource based on industries to ensure that Tanzania has an international advantage (Holmes, 1987).	Tanzania has an international advantage in mpingo sales, however this advantage is not at present based on factors under the control of the nation. The war conditions in Mozambique which have curtailed that nation's export of mpingo may change (Moyo, 1987).	For a national strategy to ensure that the industries based on the mpingo resource operate in concert with the needs of the market and with respect to the long-term optimization of the benefits to the people of Tanzania obtained from mpingo.	
	International	International standards were not incorporated into the management strategy for this sector (Mbonde, 1987).	The unregulated harvest of mpingo and the potential of this practice to compromise the sustained management of this natural renewable resource has led to concern at the international level (Zentilli, 1987).	For the development of a mechanism to facilitate the input of international community values into the development of interventions into this enterprise that would be compatible with sustaining the benefits derived from this enterprise both nationally and internationally	

Appendix 4.3: African Blackwood Enterprise Social Welfare Criteria Listing

<u>Aspect</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
Institutions	Government officials	The enterprise was legally established under Tanzanian law as a privately owned enterprise and, as such, various government officials were responsible for certain aspects of the business such as export of goods, import of supplies, log supply and taxation (Holmes, 1987).	The efficiency of the enterprise was reduced by delays in obtaining supplies from overseas due to the long lead times required by government offices, for importing goods and log supplies were sometimes interrupted by local forest department (Amin, 1987).	For the more rapid processing of import orders for industrial spare parts and for the export of goods by the government agencies involved.	Also, the government's procedure for exporting goods required the customer to deposit 90% pre-payment with the central bank. Export processing of goods was slow which meant that the customers' money was tied up for more than 2 months. These practices do not result in market conditions that favour a free market.
	Independent auditing	As a private enterprise the business was subject to auditing by the taxation offices of the government of Tanzania (Amin, 1987).	The enterprise had not been subject to audit by the government officials (Amin, 1987).	For an audit of the enterprise and of the status of tax payments expected to be generated from the enterprise.	
	Public participation	Public participation in the affairs of a private enterprise are limited to participation in the democratic system through which policy and procedures governing private enterprise are determined in Tanzania (Holmes, 1987).	There was no direct public participation in the affairs of the enterprise. The participation of the interventionist in the affairs of the enterprise was at the discretion of the owner (Moore and Hall, 1987).	For an assessment of the role of private enterprise in the mpingo processing industry and its contribution of benefits to society in order to establish a base line for possible changes in the policy and procedures of private enterprise in Tanzania.	
Trade unions	Associations	The enterprise was not a member of any associations (Amin, 1987).	The enterprise was not a member of any associations (Amin, 1987).	For the formation of a mpingo billet exporters' association which could speak to the government as a united voice with regard to the common problems of exporting and importing, the potential problem of competition from other countries.	
	Trade unions	There was no trade union organized for the employees of this enterprise (Amin, 1987).	There were few if any alternative industrial employment opportunities in the region where the sawmill was located. The employees were paid on a bonus system. The enterprise attracted and kept the sawmill workers with the most skill and experience (Amin, 1987; Moyo, 1987).	For a more formal assessment of the terms and conditions, benefits and job security and provisions for health care that the employees had at the enterprise.	
Documented policy & procedures	Documented policy & procedures	The enterprise was subject to the policy and regulations of Tanzania which governed logging and sawmilling enterprise (Mbonde, 1987).	The enterprise was reported to be operating within the law (Moore and Hall, 1987).	For the incorporation of harvesting standards having the objective of reducing the volume of mpingo left in the forest into a written corporate document which would become part of the in-house standards of the enterprise.	

Appendix 4.3: African Blackwood Enterprise Social Welfare Criteria Listing

<u>Aspect</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
People Management	Clear management goals	The management goals of the enterprise were clear. The primary goal was to keep the sawmill operating at capacity and efficiently maximize the production of mpingo billets for export. The second goal was to develop other markets for mpingo by-products (Amin, 1987).	The primary goal was incorporated into a bonus system and was clearly understood and shared by the employees. The owner had sole responsibility for developing the second goal and no pro-active market search had been undertaken (Moore and Hall, 1987).	For a social and environmental concerns to be included with economic objectives in the management goals.	
	Lines of reporting	The lines of reporting were established by the owner. Workers reported to their foreman (sawmill or logging and transport) to the assistant manager and owner (Amin, 1987).	The lines of reporting were followed and communications between the employees and the owner were considered to be good in as much as the objectives of the enterprise were being met (Amin, 1987).	N/A	
	Accountability of management	The management of the private enterprise was accountable to the government agencies responsible for taxation, export and import, to the employees and to the customers (Mbonde, 1987)	The management of the enterprise was considered to be accountable by the various government agencies as required by law and good business practice, however the laws governing resource use in particular were cited as being inadequate (Moore and Hall, 1987).	For the review of the laws governing the exploitation of the forest resource on public lands with the purpose of determining a method of setting standards by which the management of the enterprises can be assessed for their accountability.	
	Employment generation	There was a planned increase in employment opportunities for skilled workers in the enterprise based on planned expansion of production (Amin, 1987).	There were 38 employees, all of whom were engaged in the billet operation. The required expansion of the physical plant, which would be necessary to increase in capacity for log transport and the sawmill facilities, was not underway and no date was set (Moore and Hall, 1987).	For an assessment of the international market for mpingo billets to determine the demand, alternative sources and expected capacity of the Tanzanian producers as a basis for advising the Tanzanian government on possible export quotas for each producer.	
	Job satisfaction	The employees were provided with the tools and the opportunity to meet and exceed production goals to their financial benefit (Amin, 1987).	The employees were considered to be the best mpingo sawyers and within the local context they were fairly treated and paid. There had been some migration of labour to another sawmill but the entrepreneur was able to encourage the skilled workers to return (Moyo, 1987).	For a survey of the workers to determine what conditions would provide them with a greater sense of job satisfaction.	

Appendix 4.3: African Blackwood Enterprise Social Welfare Criteria Listing

<u>Aspect</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
Market Mechanisms	Pricing system	The pricing system was based on the free market (Mbonde, 1987; Nagel, 1987).	The free market pricing system for the exporters was restricted by the export procedures which required pre-payment and often 2 to 3 months delay in delivery. Some end users preferred not to buy direct from the sawmills and used agents based overseas (Mbonde, 1987; Nagel, 1987).	For the assessment of the exporting procedures to determine whether or not an alternative system could be developed whereby smaller volume purchasers could have more ready access to the suppliers in order to keep the market open and reduce the impact of agents operating as a middle man on the pricing system.	
	Purchasing contracts	All customers were foreign and arranged directly with the entrepreneur or with his own agency in the U.K. for the purchase of billets. It was reported that there was a greater demand than supply of billets and all export grade billets were sold and shipped in 1 m ³ lots of approx. 900 sets (Mongi, 1987). The enterprise was the largest producer of mpingo billets in Tanzania. The objective of the owner was to maximize the use of locally available supplies and expertise (Amin, 1987).	The exact details of the customers and demand levels were not divulged by the entrepreneur. This information was considered to be a private matter. Accurate cross checking was not possible because the export file for timber was incomplete (Moore and Hall, 1987).	For the centralizing of export licensing and reporting in order to gain an accurate understanding of the trade in mpingo billets from Tanzania to permit better planning.	The entrepreneur was not in favour of reporting his customers and export volumes to the government because his main competitors were government owned parastatal sawmills. It was doubted that sensitive business information would be kept private.
	Supply contracts	The enterprise was built with used equipment which had been adapted for the sawmill purposes. Almost all supplies could be found or made locally. For some supplies such as saw blades, the entrepreneur was subject of the regulations governing imports (Mongi, 1987).	The entrepreneur reported that the key import items were high quality saw blades for the locally fabricated benchsaws. There had been some delay in obtaining these items and plans had been made to establish a supply contract for them (Amin, 1987).	For the streamlining of government requirements for the importation of goods for production machinery.	
	Stability of currency	The Tanzanian Shilling exchange rate was set by the government of Tanzania.	All mpingo billets were exported, there was no local market. Payment was in US dollars. The government allowed the entrepreneur to retain half the export value in foreign exchange and the other half was exchanged into local currency (Amin, 1987).	Determine preventative maintenance and supply needs and order in advance to minimize effect of inflation and maintain working efficiency.	
Benefit distribution	Shareholders' share of profits	This enterprise was owned by one individual and there were no shareholders (Amin, 1987).	There were no shareholders (Amin, 1987).	Encourage the selling of shares to the communities where the wood is harvested.	

Appendix 4.3: African Blackwood Enterprise Social Welfare Criteria Listing

<u>Aspect</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
<u>Indirect Benefits</u>	Employees' share of profits	The employees were paid a premium wage compared to the wages paid to the employees at other sawmills and there were cash bonus incentives available based on productivity (Amin, 1987).	The profits of the enterprise were not disclosed, however it was possible to estimate that the employees' share of the profit from the mpingo billet production was insignificant (Moore and Hall, 1987).	For a greater proportion of the profits from the mpingo trade being allocated for the greater benefit of the people in the area where it is harvested and processed and to the management of the resource as a base for sustained development.	
	Community's share of profits	The local District Councils collect the royalty for the volume of logs delivered. The local services benefit from the multiplier effect generated by the wage earners at the mill, all of whom live near to the mill (Mbonde, 1987).	The licensing system for the harvesting of mpingo trees was open to local interpretation and there were no harvesting standards or utilization limits established for the mpingo harvest. The royalty rate was less than US\$10/m ³ (Moore and Hall, 1987).	For the establishment of centralized licensing for harvesting which specified the exact location of harvesting, the volume permitted for removal and other harvesting specifications and penalties for non-compliance, increased royalty rates chargeable on all felled trees in order to increase the local community's share of the profits generated by the enterprise.	
	Local	The sawmill provided employment for 38 full time employees and a ready supply of fuel wood for the employees. The entrepreneur was planning to expand the operation which would provide more employment and income and a need for services in the area (Amin, 1987).	The enterprise had provided steady employment for more than one year (Amin, 1987).	For an assessment of the possibility of expansion of the operation to include processing of the waste material from the sawmill operation into export items.	
<u>International</u>	National	The enterprise was subject to corporate taxes and income tax was paid by the employees. The export operation provided the nation with foreign exchange (Mbonde, 1987).	The enterprise generated foreign exchange earnings of approximately US\$250,000. in 1987.	N/A	
	International	The enterprise supplied a portion of the raw material on which the clarinet manufacturing and clarinet musicians depend (Nagel, 1987).	There are value added benefits which are associated with the musical instrument manufacture and the industries associated with the cultural use of the instrument which, to be at its best, requires the mpingo wood.	For an investigation into mechanisms which would enable some of the positive externalities enjoyed as a result of the final product manufacture and use to be returned to the resource and the producers.	

Appendix 4.3: African Blackwood Enterprise Social Welfare Criteria Listing

<u>Aspect</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
Indirect Costs	Local	The harvest is not controlled and as a result more trees are felled than are transported to the sawmill, and also, the amount of benefits to the local district are reduced due to poor monitoring levels (Holmes, 1987).	The harvesting is following a pattern of the least expensive trees are felled first so that over time the expense of harvesting trees will increase. The lack of control over the harvest also means that the utilization standards are low and more trees are felled than are processed which exaggerates the former condition.	For the improvement of worker health and safety conditions.	
	National	The mpingo resource is not being managed to ensure that there is a sustained supply of suitable trees. There is no comprehensive national programme to coordinate the mpingo resource based industries to ensure that Tanzania has an international advantage (Holmes, 1987).	Tanzania has an international advantage at present, however, this advantage is not based on factors under the control of the nation but due to the war in Mozambique which is restricting the production of mpingo there (Holmes, 1987).	For a national strategy to ensure that the industries based on the mpingo resource operate in concert with respect to the international market place and with respect to the long-term optimization of the benefits to the people of Tanzania obtained from mpingo.	
	International	The unregulated harvest of mpingo and the potential of this practice to compromise the sustained management of this natural renewable resource has led to concern at the international level (Zentilli, 1987).	The investigation of the state of the mpingo resource and industry was initiated by the United Nations Environment Program as a pilot case in response to the growing concern for the future of tropical timber resources (Zentilli, 1987).	For the development of a mechanism to facilitate the input of international community values into the development of interventions into this enterprise that would be compatible with sustaining the benefits derived from this enterprise both nationally and internationally	

Appendix 5.1: Nithi Timber Cooperative Ltd. Sawmilling Management Criteria Listing

<u>Process level</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
Control of access	Degree of Access to Resource	Access to resource was outlined in the regulations of the 10 Year Timber Extraction Licence. The annual volume of logs allowed to be extracted was between 5,000 to 10,000 m ³ . A felling plan (2 yr) was to be developed by the Kenya Forest Department (F.D.) in consultation with NTCs (Rep. of Kenya, 10 Licence to Extract Timber, Nov. 1982).	The access to the resource was restricted by the Forest Department without formal amendment to the existing licence (NTCSmin18/85 7/86). Access to the resource was limited to the dry season periods because the forest road is impassable during rains (PM Report July 1985).	A) For adherence to the original Licence agreement. B) To ensure that any changes in the existing tenure agreement are approved by all relevant authorities.	
	Harvest + Transport	The total merchantable volume of those species which are allowed to be extracted as per the First Schedule of the 10 Year Licence: 2,352,780 m ³ (Appendix 3.2.4).	Annual Royalty Payment Records for the period 1981 to 1985 indicate that the minimum volume of logs licensed for extraction was never removed (Appendix 3.2.2). The Society had no felling plans. The F.D. would only permit the extraction of severely degraded butt logs and top logs from trees which were felled by other parties in the past. The Society was not allowed to fell. The prime logs from these downed trees had been processed by pitsawyers before the licence had been granted (Appendix 6.1.1).	For adherence to the Licence and for the development of felling plans. For the selection of trees to be felled in a co-ordinated manner with the enterprise to facilitate harvesting and extraction of logs during the dry seasons (Appendix 5.1.2).	
Logging Equipment	Logging Equipment	Logging and log transport equipment of the capacity and number to permit the preparation and extraction of 7,700 m ³ of logs in 154 eight hour shifts. Road construction and maintenance equipment sufficient to build and maintain roads during dry season (Appendix 5.1.3).	The logging and log transport equipment was under capacity. There was no road building or road maintenance equipment. All equipment in total ruin (Appendix 5.1.4).	For the upgrading of logging equipment stable to a rated capacity for known working conditions. For a 2 year lead time on felling plans as per the Licence. For improved mechanics facilities with a lock-up, equipment, spares and supplies.	

Appendix 5.1: Nithi Timber Cooperative Ltd. Sawmilling Management Criteria Listing

<u>Process level</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
The Sawmill	Cost of logs delivered to the sawmill per m ³	From the feasibility study the cost per m ³ of logs delivered to the mill was estimated at Ksh 105/= or US\$15.00 per m ³ for 14,000 m ³ /year (1975 exchange rate of approximately Ksh 7 per US\$) (Oy, 1975).	Average cost per m ³ for harvesting and delivering logs to the sawmill from 1982 to 1985 Ksh.321/= (Appendix 5.1.5). Costs per m ³ were higher due to log transport during rains on poorly maintained roads and unscheduled log and unscheduled tree selection by Forest Officer.	A) For a minimum two year lead time on tree selection within mutually agreed felling plans as stipulated in the Licence. B) For a minimum selection of 5,000 m ³ of merchantable logs per year with a two year lead time to facilitate road construction etc.	
	Ownership of the enterprise	This enterprise is a limited company and a Cooperative Society with over 16 thousand members having a total investment of Ksh3,783,827.35, (an average of Ksh234/= per member). The membership investment represents approximately 37% of the total initial cost of equipping the Society (Cooperative Bank of Kenya, 1985).	The management of the Society by a committee elected from the membership failed. A special commission of local officials chosen by the Minister of Cooperative Development was given responsibility for the management of the Society. No membership meeting had been held for over two years as of June 1985 (NTCS min.43/85). The membership register is a record of available information only because a number of receipt books went missing between 1974 and 1979 (NTCSMC/ ADMN. NO.1/79).	For the facilitation of inputs from the membership (i.e. the owners). For a final adjudication and update on the membership register.	
Physical Plant		The planned sawmill was to have an initial breakdown bandsaw with a 50" capacity and a log carriage, a bandsaw resaw with power feed, a multi-blade bench circular saw edger and circular saw end trimmers on the trimming table and a mechanical sort table (Oy, 1975).	The sawmill was built with a 50" capacity initial breakdown bandsaw, a 40" capacity pony saw, 2 power feed bandsaw resaws and two power feed cross cutters on the roller lines. There was no sorting table. All bandsaw blades needed replacement (PM Report, July 1985).	For facilities for sorting and storing sawnwood. For a supply of new blades. For a waste wood removal system within the mill. For the servicing of the generators to improve fuel efficiency and for connection to the national power grid.	NTCS/PM/July/85
Availability of capital		The Co-operative Bank of Kenya Limited is the only external financier of the Society. One of the aims of the Bank is to promote and support Cooperative enterprises (Kimbui, 1985; Mulli, 1985).	The original loan to the Society was for Ksh10,129,670/=. A further overdraft facility to a maximum of Ksh5,500,000/= was given in 1984. No loans had been repaid by June 1985 the total debt to the Bank was Ksh17,726,562/= (NTCSmin 51/85).	For compensation from the Ministry of Environment for breach of contract based on the restriction of access to the raw materials as per the 10 Year Licence which led to uneconomical production levels, inefficiencies and an increased debt load.	The Financier was supportive of the Society and its aims (Mulli, 1985).

Appendix 5.1: Nithi Timber Cooperative Ltd. Sawmilling Management Criteria Listing

<u>Process level</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
Return on net assets/Price-earnings ratio	Rate of Return on Investment (ROI) before capital and tax costs: 48% ROI after capital and tax costs: 20% (Oy, 1975).		The enterprise accumulated a debt of Ksh6,926,425.40 by 1985 (NTCSmin51/85).	For a full investigation and report of the reasons for the poor performance of the enterprise.	
Mill log input capacity (e.g. m ³ /shift or m ³ /year).	The input capacity of "average" logs (i.e. logs having some defect such as heart rot or buttress) into the sawmill was rated at 25m ³ /8 hour shift or 7150m ³ per year based on a 44 hour work week (Hemmingson, 1984).		The rated log input capacity was seldom met (App 5. 1.5) The log input per shift exceeded the rated capacity during short test periods where smaller diameter, defect free logs were used exclusively. Production reached 27m ³ /day (Hemmingson, 1984).	A) For cooperation of the F.D. to permit a planned logging operation. B) For the implementation of preventative maintenance program in the mill. C) For the implementation of new reporting structure within the operation.	
Sawnwood production m ³ /shift, by species	The sawmill sawnwood production was rated at 18 m ³ (Oy, 1975) and at 11.25 m ³ /8 hour shift (Hemmingson, 1984).		The sawmill production records indicate that the annual average level of productivity ranged from 32% (1982) to 84% (1984) of the minimum licensed production capacity i.e. 5,000 m ³ logs/year (Appendix 5.1.6; 5.1.7; 3.2.5).	For the same issues as for previous criterion.	
Sales m ³ /year by species sawnwood, shorts	The domestic market could absorb the maximum production of sawnwood (Oy, 1975). Maximum sawnwood production was estimated as: Prime grade timber (all species): 4,500 m ³ /year and shorts 3,500 m ³ /year (Hemmingson, 1984).		Approximately 1,000m ³ of unsold sawnwood was on-site in June 1985. Annual sales were less than annual production (on average 300 m ³ less per year) and sales prices were less than production costs (NTCSmin 1982-1985, Appendix 3. 2.5).	Same as for the previous two criterion.	The Auditors' comments for the years 1983/84 and 1984/85 regarding sales orders, deliveries and invoices were that internal controls were found to be weak and that the closing stock figures were also poorly controlled (NTCS ex/min6/86).
Production cost: currency units/m ³	Production cost was estimated as Ksh424/= per m ³ (Ksh1/= per board foot), (Oy, 1975).		The average production cost of the Society's operation from 1982 to 1985 was Ksh1909/m ³ (Appendix 3. 2.5).	Same as above and for better record keeping.	
Timber recovery rate: log input/ sawnwood output	The estimated average recovery rate is 45% (Oy, 1975).		The average recover rate was 45% for Camphor and 60% for Podo. The sawlog qualities of camphor were highly variable based on heart rot, buttressing and sweep and handling options were restricted because of the large dimensions of the logs. Podo logs were defect free and smaller sized which facilitated better recovery rates (Hemmingson, 1984).	A) For a greater component of better quality trees in the Forest Department selection process to offset the expense of milling poor quality logs. B) To ensure that logs were graded and stored to facilitate the scheduling of log input by grade and species.	

Appendix 5.1: Nithi Timber Cooperative Ltd. Sawmilling Management Criteria Listing

<u>Process level</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
	Production methods: quality control, handling	Sawmilling was to be mill run method, followed by timber grading then stickered and stacked under cover for air-drying before sale or sold as unseasoned commercial timber. Bandsaws to be used to attain a better sawn surface and dimension quality control.	Sawing was not mill run. Sawing was governed by order specifications. All defect was removed from sawnwood before it left the end trimmer resulting in reduced timber recovery rate and increased the production of shorts.	For mill run sawmilling, grading and sorting of logs in the yard with respect to the initial breakdown characteristics of each log to permit judicial log input choice dependent on flow or bottlenecks downstream in the mill. See checklist in (Appendix 5.1.8).	Finished timber was haphazardly and randomly piled. Sawnwood thickness dimension for the nominal 1" dimension was set at 1.25".
	Operating time available	The sawmill operation was planned for a 5.5 day work week (48 Hours Total) or 277 days (286 work days minus 9 national holidays) NTCS min 6/82.	The work year used for the purposes of planning was 250 work days. The operations were "down" for two days a month for the employees to go to the bank. Other down times were attributable to lack of preventive maintenance, employee unrest, no logs (Pm Report, July, 1985).	A) For a preventative maintenance programme including scheduled parts purchasing, B) For accountable employee reporting structure and C) For felling plans with a two year lead time.	
	Production Efficiency: (m ³ /employee/year)	The planned production efficiency was for 45m ³ /employee/year.	Average Production efficiency on an annual basis did not exceed 21.2 m ³ /employee for 1984 (Appendix 5.1.9).	A full investigation and report for the reasons for the low production efficiency with recommendations for actions which would increase the efficiency.	
	Overheads, Depreciation/ m ³	The cost of assets is written down to a residual value by equal installments over the estimated useful life of the item. The Factor machinery life was 10 years and the logging equipment was 5 years. (Oy, 1975)	The sawmilling equipment had been used to about 50% of its rated capacity over the first 3 years of operation. The Society had not decreased its original loans and had increased its debt load and interest arrears. The logging equipment needed to be replaced. (PM Report July 1985).	A) For a reappraisal of the depreciation charges based on the actual levels of wear on the sawmill equipment. B) For a renegotiation of the loans and interest charges. C) For the replacement of worn equipment which was reducing production efficiency.	
Value Added	Seasoning (drying)	The first phase of operations was to include air drying of stickered and stacked timber in sheds as well as the sale of unseasoned commercial sawnwood. At a later stage a drying kiln may be included in the operation if found to be feasible (Oy, 1975).	There was no stickering and stacking of sawnwood. Sawnwood was either transferred directly from the mill to waiting customers' vehicles or strewn or piled haphazardly in the open on the earth (NTCS/PM/July 4/85).	For the stickering and stacking of sorted sawnwood for daily production purposes. For the provision of covered storage. For the provision of sawnwood handling equipment for the storage area. For the restriction of "hot loading" timber from mill deck to the customers' vehicles.	

Appendix 5.1: Nithi Timber Cooperative Ltd. Sawmilling Management Criteria Listing

<u>Process level</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
Grading		Mill run timber greater than 6 feet in length could be graded as prime, second, third and fourth grade sawnwood by a grader trained and licensed by the Forest Department. Sawnwood less than 6 feet in length was graded as shorts. Offcuts 6'+ one sawn side.	Sawnwood was all prime grade by default. No sawnwood with defects was produced. All defects were removed before the planks left the trimmer benches which resulted in reduced timber recovery rate and an increase in the production of shorts material.	For mill run production, licensed timber grading at the trimmer benches and sorting of graded timber.	
		The timber was to be end trimmed and squared using the two circular saw cross cut trimmer benches before the sawnwood left the mill (Oy, 1975).	End trimmer saws were used to cut defects from sawnwood resulting in only prime grade sawnwood output and shorts (NTCS/Project Manager's Report July 1985).	For the end trimmer to be used for squaring and trimming ends only.	
Cutting to order		The sawmill was designed to operate on a mill run basis although the flexibility of the sawmill layout could permit cutting to order at an extra production cost (Oy, 1975; Hemmingson, 1984).	The sawmill cut to customer order specifications exclusively. The thickness of the nominal 1" board was set at 1.25" which was at least 0.125 inches greater than market standard. Extra wide boards (24"-44") were produced as log quality permitted and although the production of the extra wide boards meant that there was a reduction in productivity and therefore an increased cost the extra wide boards were sold at the regular price per board foot measure (NTCS/PM Report Sept./85).	For mill run production or for premium pricing on custom orders. Reduce the width setting to 1.125".	
		Two bandsaws were available with power feed for resawing or edging as necessary depending on the output of squared or partially processed material (either directly from the headrig or from the pony saw).	The roller bench set-up allowed for the flexible use of the two resaw/edger bandsaws so that bottlenecks downstream from the headrig and the pony saw could be reduced (NTCS Project Manager's Report, September, 1985).	For more efficient use of available tools.	
Planing, shaping, molding		No planing, shaping or molding were planned for this operation (Oy, 1975).	Planing, shaping and turning services were offered by the enterprise at a small scale (Appendix 5.1.10). The prices set for these services were not based on studies to determine the actual costs of the service (NTCS/Project Manager's Report, August, 1985).	For studies to assess a cost effective strategy for these value added services.	

Appendix 5.1: Nithi Timber Cooperative Ltd. Sawmilling Management Criteria Listing

<u>Process level</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
	Treatment with preservatives	Reference to the possible development of an impregnation plant was made for a later phase of the enterprise (Oy, 1975).	There were no preservative treatment facilities and no plans for the same to be built (NTCS Project Manager's Report, July, 1985).	For the investigation into the development of a treatment facility to treat some of the licensed species which were fast growing and regenerated easily but were less favoured in the market because they are subject to insect and fungal attack such as <i>macaraga</i> spp.	
	Final product production	The only final product planned was charcoal. It was to be produced from the offcut material from the sawmill and from the reject grade logs and branch material usually left in the forest and non commercial species (Oy, 1975).	Final product production did not include charcoal. Offcuts were sold as local building material at a price in excess of fuel wood prices. Final products did include furniture and prefabricated houses. (Appendix 5.1.11).	For an appraisal of the potential for the conversion of sawmill waste into a final product form. For an appraisal of the furniture factory to establish costs and productivity to establish costs and determine suitable productivity bonus.	The majority of the final products components could be made from low grade timber and shorts.
Market Studies	Extent of market survey national & international	The national and international markets were assessed in the feasibility study. Trends in both the national and international markets showed an increase in demand for sawnwood (+60% 10 yr). All sawnwood was expected to be sold in Nairobi without problems (Oy, 1975). Further research was recommended into the market for kiln dried, treated, planed, or shaped sawnwood and for charcoal (Oy, 1975).	Exports of sawnwood was banned in Kenya prior to the opening of the enterprise. There was an export demand with higher prices (foreign \$) (Hemmingson, 1984). There was a glut of camphor sawnwood in the market. Demand was very low. (NTCS/Project Manager's Report, Aug. 1985). No formal pro-active market studies were undertaken by the Society regarding the development of the existing finished product facility or for its expansion.	For permission to export sawnwood. For the enforcement of the Forest Access rules to reduce the uncontrolled extraction of camphor by unlicensed operators so that the availability of timber in the market would reflect the licensed volumes.	
	Description of end products to be researched			A) For the assessment of possible end products such as air dried, planed, shaped or finished products such as school, office, church and household furniture for the local market and for knock down furniture for the expatriate market. B) For the assessment of the feasibility of expansion of the existing facility to enable the production of the end products to the required standards efficiently. For the restriction of uncontrolled access to the forest reserves for the purpose of timber production.	
	Identification of competitors: existing and potent	Specific competitors were not identified, however it was determined that demand exceeded supply. Demand trends indicated that the increase in demand would not be met by expected supply (Oy, 1975).	The market for sawnwood had a very low demand. Competition was from uncontrolled harvesting from the Forest Reserves of Kenya for camphor and from imports from Tanzania and Uganda of equal or better quality substitutes (Keen, 1986).		

Appendix 5.1: Nithi Timber Cooperative Ltd. Sawmilling Management Criteria Listing

<u>Process level</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
	National economic advantage over competitors Built in costs structure as a limiting factor	This criterion does not apply to this enterprise at this time because there is no exporting of sawnwood from Kenya.			
		The enterprise was subject to overhead costs on capital, government taxes and employee benefits. This built-in cost factor was accounted for in the financial analysis which assumed full production. Built in costs did not hinder profitability (Oy, 1975).	The enterprise did not operate at full capacity at all times. The built in cost structure and management methods further limited the enterprise. The market price of sawnwood did not reflect the built in cost structure of a fully accountable enterprise (PM Report July 1985).	For the restriction of access to the forest resource by those operators who were not accountable and do not pay taxes and other usual overheads. For the provision of the log supply as indicated in the 10 year Licence to permit full production.	
	Prices	Price was set at 25% over the projected production cost (Oy, 1975).	Price was set lower than production costs (Appendix 5.8) (NTCS min.36/85 PM Report July/85).	For the increase in log supply to enable an increase in production and efficiency and a reduction in the proportion of overheads per m3 of sawnwood. For the elimination of the sources of illegal sawnwood which was deflating the market prices.	
Marketing	Direct sales and shipment: specialization	Sales were to be direct. Unseasoned timber was to be shipped to Nairobi wholesalers in the first phase. In the second phase the enterprise was to establish a sales yard in Nairobi for the storage, value added processing and distribution (Oy, 1975). The feasibility study called for the eventual establishment of a distribution and storage yard in Nairobi (Oy, 1975).	A sales agent was on contract at 10% commission to the enterprise. The sales agent did not actively seek out new customers and claimed commission for repeat customers and for customers who made orders independent of him (NTCS min 15/86). There was no facilities for indirect selling methods other than the sales agent. There was on-going interest in the establishment of indirect selling facilities in Nairobi and in the local market towns (NTCS/PM/Aug/85).	A) For the payment of commission to sales agent only on introduction orders. B) For the cancelling of the sales agent contract. For increased effort in direct sales.	
	Indirect sales and shipment: diversification			For the cancellation of the sales agent's contract and to develop in-house expertise for a sales yard locally and in Nairobi.	
	Customer relations practices and pricing practices	Sales is the direct responsibility of the Sales Manager who reports directly to the General Manager who in turn is responsible for customer relations through sales and service policy (Oy, 1975).	Customer relations practices were unsatisfactory. There were no written sales and customer relations procedures. Pricing practices did not reflect the production costs. Unsecured credit sales were permitted. Unpaid bills amounted to over Ksh500,000/.	For the establishment of procedures for sales and customer relations to ensure inhouse accountability and customer satisfaction.	

Appendix 5.1: Nithi Timber Cooperative Ltd. Sawmilling Management Criteria Listing

<u>Process level</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
	Market position, degree of customer loyalty/time	Demand was expected to exceed supply. The market share of the enterprise would not be relevant since demand exceeded supply (Oy, 1975).	There was a glut of camphor timber in the market and in excess of 1,000m3 of unsold timber at the enterprise with no ready market (NTCS/PM/July/85, Aug/85, Sept/85).	For the restriction of uncontrolled access to the forest resource.	The demand in Kenya for sawnwood was estimated at 200,000m3 in 1985 projected to increase by 87% by the year 2000 and by 153% by the year 2010. The production of sawnwood from indigenous hardwood was estimated at 100,000m3/year (Republic of Kenya, 1985).

Appendix 5.1.1

Nithi Timber Cooperative Society Ltd.
Annotated Minutes of the Management Commission
regarding Log Supply (Feb. 1987 - May 1985).

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|------------|--|
| Feb. 87 | 8/87 - Minister of Natural Resources says NTCS must expand its operations.
5/87 - District Forest Officer (DFO) reports that there is no shortage of logs.
6/87 - Deputy Commissioner of Cooperative Development promised to discuss log supply issue with Minister of Natural Resources. |
| Nov. 86 | 110/86 - Logs allowed to be removed from forest, but no trees to be felled. |
| Nov. 86 | 104/86 - Invitation to Minister of Natural Resources to go to Nithi
104/86 - Project Manager to seek meeting with Minister of Natural Resources. |
| Sept. 86 | Special Meeting Provincial Cooperative Officer -
Log supply issue to be drawn to the attention of the Minister of Cooperatives. |
| Aug 86 | 76/86 - Removal of attention Logs allowed through a special letter of permission from Chief Conservator of Forests.(CC)
Supply - 30 days @ 20 cubic metres/day of logs input. |
| June 86 | 86/76 - Mt. Kenya Forest closed 19 May 1986 by Chief Conservator of Forests - no exemptions.
General Manager of the Cooperative Bank of Kenya sends letter to Minister of Cooperative Development and to the Minister of Natural Resources to request a joint meeting with the Project Manager. |
| March 86 | 86/53 - Logging halted due to rains.
- Some logs and felled trees remain in forest.
- Transport Breakdowns at NTCS lower rate of log delivery. |
| Feb. 14/86 | 86/31 - Auditors reports for Fiscal Years 1983-84 & 1984-85
No internal log costing records. |

Appendix 5.1.1 (continued)

- Feb. 19/86 35/86 - Forester selected 55 trees since last meeting of Jan. 30/86.
- All trees felled and cross cut.
 - Field review of logging rules with local forester and NTCS employees initiated by P.M. before felling of trees.
 - Logging inspected by DFO - no problems found. more trees allowed to be selected for felling by the local forester after DFO inspection.
 - Log Transport costs- KS200 - 250/trip .(Mugambe, W., 1986)
- Jan. 30/86 15/86 - DFO reports of meeting with Chief Conservator of Forests about log supply for NTCS where it was decided that only decadent class trees will be allowed to be felled although it was recognized that a percentage of mature class trees having less defect was required to allow the sawmill to operate efficiently.
- DFO apologizes for delay in selection of trees for felling. and promises to immediately select 100 trees for felling.
 - Final forest management plans not finished by Forest Department.
 - DFO to ask Minister of N.R. for reduction in royalty fees to reflect the low value of the trees selected by the Forest Department for felling by NTCS.
- Jan. 16/86 4/86 - Outgoing Chairman asked DFO to allow selection to occur.
- 7/86 - DFO said President of Kenya decreed no felling of indigenous trees was to be allowed
- DFO said independent Pit Sawyers should be allowed onto NTCS Licence area to fell the over mature and decadent logs and then NTCS would be given high quality mature class of trees to fell.
 - Forest Inventory available so age class and locations are known. DFO states that logging can therefore be planned and should be allowed by the President.
 - DFO - NTCS should ask for mature trees from CC and offer over mature and decadent class trees to local pit sawyers.
- Nov. 17/85 - General Meeting held - Log Supply claimed to not be a problem to NTCS by Chairman of NTCS.
- July/85 24/85 - P.M. discussed log supply and quality with CC.

Appendix 5.1.1 (continued)

- May 31/85 18/85 - DFO said too many old and rotten logs in forest.
 Society will not be permitted to fell any new trees
 all downed logs are collected and sawn.
- DFO suggested one way to get selection would be to give Pit Sawyers the downed logs and NTCS could then get permission to fell fresh trees.
 - The DFO suggested that the Society "surrender" the Northern half of the Licence to Pit Sawyers and to do so in writing to the CC.

NTCS/MC/ADMIN. NO 1/150 - letter from the Project Manager to the Chairman advising the Chairman against the decision to surrender logging rights unilaterally. The unilateral surrender would constitute an amendment of the 10 year Logging Licence contrary to policy governing the administration of the Licence.

Appendix 5.1.2

Nithi Timber Cooperative Society Ltd.
SUGGESTED LOGGING SCHEDULE

LOGGING SCHEDULE				
Time Period	Activity	Logs required at the mill:		Total # of logs transported for the period
		for on going use	for use during following RAINY Season	
Jan 1- Mar 15 11 weeks DRY Season	logging and sawmilling	352	352	704
March 16- May 31 11 weeks RAINY Season	sawmilling only	352	0	0
June 1- Oct 1 17 weeks DRY Season	logging and sawmilling	544	419	960
Oct 1 - Dec 31 13 weeks RAINY Season	sawmilling only	416	0	0

Total Requirement of logs for 52 week period.....1667 Logs*

*[eg. for a minimum annual requirement of 5000 cubic metres of logs where the average log volume is 3 cubic metres; *1667 logs must be delivered at the mill.*]

Appendix 5.1.3

NTCS - Listing of Planned Equipment

LOGGING AND LOG TRANSPORT EQUIPMENT

- Two Crawler tractors (size of a Caterpillar - D.7) equipped with winch with 50 metre cable for skidding to road side and with a push blade to be used for road construction .
- One Front End Loader with a capacity to lift logs of 2 tons plus.
- Two 4 X 4 wheel drive Lorries for Log Transport: rated at 80 m³/8 hr shift @ 6 km one way trip.
- Ten Chain saws (9-12HP) 90cm Bars (5 in service - 5 as reserve) rated for 10 m³/day (felling and crosscutting).
- Two 4 X 4 Personnel Vehicles for supervision and employee transport

ROAD CONSTRUCTION AND MAINTENANCE

- One D5 Crawler Tractor
- One Road Grader
- One tipping Lorry - 10 ton capacity, 4 X 4 wheel drive.
- One Pickup truck for supervision of maintenance crew.

Source: (Oy, 1975)

Appendix 5.1.4

NTCS Benchmark Situation of Logging Equipment

<u>Logging equipment on-site (June 1985)</u>	<u>Comment</u>
1 Timber Jack 450 Turbo Articulated Frame Skidder with brush blade and 50' winch.	no batteries no winch no engine no spare tire not operational
1 Komatsu Front End Loader (max capacity 3 m_ log)	no alternator not working
4 Single axle trailers for log transport	under engineered broken axles broken springs broken hitches less than 1 trip per draw-bar 2 operable trailers on site
2 Chain Saws (90 cm bars)	1 working chainsaw
3 4 x 4 wheel drive farm tractors	1 wrecked beyond repair 2 working intermittently
1 Seven Ton 2 wheel drive Lorry	Lorry in working order No battery
1 Toyota Land Cruiser Pick Up	Working-however not licensed for use on public roads because of poor safety condition.

Source: NTCS PM Report July 4/85

Appendix 5.1.5

NTCS - COSTS FOR HARVESTING AND LOG TRANSPORT

Fiscal Year	Delivery Log Cost KS/m³	Harvesting & Royalty Rates KS/m³	Kenya Shillings for one US\$	Cost in US\$	Adjusted Cost to 1988 US\$
1982-83	435	192	10	\$43.50	74
1983-84	214	270	11	\$19.45	32
1984-85	315	293	16	\$19.70	21
1985-86	1514	435	16	\$94.64	90
1986-87	882	435	17	\$51.88	52
1987-88	542	435	17	\$31.88	32

Source: NTCS Internal Memos:CS/1636/22/8/86 and
CS/1636/31/3/88

Appendix 5.1.6

NTCS - ANNUAL AVERAGE DAILY LOG INPUT* (1981-1988)

Year	Average Daily Log Volume Input (m ³)	Percent of Mill capacity
1981	4.50 m ³	18 %
1982	8.28	33
1983	16.29	65
1984	9.12	36
1985	5.6	22
1986	3.43	14
1987	7.96	32
1988	8.41	34

* at 250 Production Days per annum.

Source: NTCS Production Records 1981-1988

Appendix 5.1.7

NTCS - MONTHLY PRODUCTION RECORDS
(recorded as cubic metres of sawnwood per month)

	1981 - 1982	1982 - 1983	1983 - 1984	1984 - 1985	1985 - 1986	1986 - 1987	1987 - 1988	1988 - 1989
OCT		32.9	71.1	174.3	81.2	213	0	462.3
NOV	0	0	54.7	37.5	56.7	32	0	102.9
DEC		13.4	38.3	13.9	56.7	No access to forest	0	0
JAN	0	52.3	125.3	113.2	0	-	0	342.5
FEB	0	0	275	196.6	89	-	0	111.4
MAR	0	183.7	278.1	139.3	137	-	0	227.8
APR	0	133.3	96.60	163.4	151	-	0	
MAY	0	75.6	265.5	41.6	0	-	0	
JUNE	61.4	109.7	229.5	1.7	0	Interv ention period ends	0	
JULY	76.7	65.4	240.1	0	0	480	0	
AUG	47.9	86.0	258.9	97	0	401	415.4	
SEPT	77.8	57.0	188.6	0	118	0	432.7	
TOTAL	263.8	909.2	2121.6	978.2	689.6	245.0		
% of Potential Capacity	32%	36%	84%	39%	27%	(40%) period		

Source: NTCS Production Records 1982- 1986

Note: Shaded area represents data obtained
during post-study period follow up.

Appendix 5.1.8

Sawmill Production Manager Inspection Checklist

LOG YARD

Log scalling

- Accuracy (electronic or manual)

- Deduct allowance

- Tally

- Housekeeping

- Log damage

Log handling

- Housekeeping

- Damage

- Decking

- Rotation of stock

- Sprinkling

- Fire prevention

- Inventory practices

- Road bed maintenance

LOG DECKS

Log scaling

Log handling

Housekeeping

Singulation

Debarking

- Percent bark retained

- Percent wood removed

- Piece count

- Housekeeping

- Fire prevention

- End damage

- Set accuracy

Bucking

- Length accuracy

- Squareness of cut

- Buck out defects

- Buck to longest straight length

Log flow

Appendix 5.1.8 (continued)

HEADRIG

Low flow on headrig deck
 Log piece count on headrig deck
 Breakdown patterns
 Set accuracy (between piece size control)
 Within-piece size control
 Smoothness of cut

Percent shims or waste
 Log damage
 Actual vs target size
 Housekeeping
 Saw kerf
 Saw condition
 Throughput rate-lines/min
 Downstream flooding

PONY AND RESAWS/EDGERS

Infeed surge area control
 Outfeed surge area control
 Repeat those shown for headrig where applicable

TRIMMER

Surge control
 Squareness of cut
 Smoothness of cut
 Overtrimming
 Undertrimming
 Slashing to waste
 Grading accuracy
 Piece count rate
 return to rip, split or reman
 Housekeeping

GREEN CHAIN

Grading accuracy
 Pulling accuracy
 Excessive damage
 Housekeeping

Appendix 5.1.8 (continued)**GREEN AND DRY STORAGE**

Housekeeping
Load damage
Spilled loads
Stacking neatness
Protecting loads
Proper tallying and ticketing
Proper arrangement
Inventory
Rotation of stock

Source: Williston, (1981)

Appendix 5.1.9

NTCS - PRODUCTION EFFICIENCY

ANNUAL AVERAGE PRODUCTION (m³/PER EMPLOYEE) (BASED ON 100 EMPLOYEES)

Year	Sawn Timber m ³ Employee
1982	7.9 m ³ /employee
1983	9.1
1984	21.2
1985	9.8
1986	6.9
1987	6.2
1988	7.1

Appendix 5.1.10:

Rates of casual labourers payment in the carpentry Workshop for items completed

1.	School desk	KSH 8/" Each
2.	School chairs	KSH 7/" Each
3.	Baby cots	KSH 30/" Each
4.	Ordinary doors	KSH 10/" Each
5.	Dining tables - Big	KSH 25/" Each
6.	Dining tables - Small	KSH 50/" Each
7.	Dining chairs	KSH 15/" Each
8.	Bed stands	KSH 3/" Each
9.	Boards stands	KSH 1/50 Each
10.	Curtain boxes	KSH 5/" Each
11.	Forms/benches	KSH 10/" Each
12.	Half Panel doors (frames)	KSH 40/" Each
13.	Half panel doors (without frames)	KSH 30/" Each
14.	Normal stools	KSH 0/" Each
15.	Coffee table	KSH 30/" Each
16.	Sugar dishes ~ with tops	KSH 10/" Each
17.	Sugar dishes without tops	KSH 8/" Each
18.	Bed and Table stands	KSH 3/" Each
19.	Bed decorators	KSH 1/50 Each
20.	Special sugar dishes (tray)	KSH 12/" Each
21.	Ordinary bed with panel	KSH 45/" Each
22.	Ash trays	KSH 5/" Each
23.	Ordinary bed	KSH 10/" Each
24.	Bed rack	KSH 5/" Each

Appendix 5.1.11:

Workshop Charges

	Planning	Rebating	Champer	Weather Board	Moulding	Mortising	Curtain Boxes
12"X1	CTS	CTS	CTS	CTS	CTS	CTS	CTS
12"X1"	60	30	20	40	30		40
10"X1"	60	30	20	40	30		40
9"X1"	60	30	20	40	30		40
8"X1"	60	30	20	40	30		40
	CTS	CTS	CTS	CTS	CTS	CTS	CTS
6"X1"	30	20	20	40	30		40
5"X1"	30	20	20	40	30		40
4"X1"	30	20	20	40	30		40
3"X1"	30	20	20	40	30		40
	CTS	CTS	CTS	CTS	CTS	CTS	CTS
2"X1"	20	20	20	40			40
10"X0.5"	20	20	20				
1"X1"	20	20	20				
	CTS	CTS	CTS	CTS	CTS	CTS	CTS
2" X 2"	30	20	20				
3" X 2"	30	40	20				
4" X 2"	60	40	20				
5" X 2"	60	40	20				
6" X 2"	60	40	20				
4" X 3"	60	40	20				
6" X 3"	60	40	20				
5" X 3"	60	40	20				
6" X 4"	60	40	20				
8" X 2"	60	40	20				
	CTS	CTS	CTS	CTS	CTS	CTS	CTS
8" X 3"	60	60	20				
8" X 4"	60	60	20				

Appendix 5.1.11 (continued)

Price List for Furniture

1.	School Lockers (1 Desk and 1 Chairs)	KSH 197/" Pair
2.	Ordinary Bed with panel and 6 X 1.5 rails	KSH 285/" Each
3.	Ordinary Bed with panel and 3 X 2 rails	KSH 240/" Each
4.	Modern table with moulded legs	KSH 27/65 Per SQ Feet
5.	Wooded Sugar dish-Big size	KSH 45/" Each
6.	Wooded Sugar dish-Small size	KSH 35/" Each
7.	Wooden ash tray	KSH 25/" Each
8.	Modern dining table with curved legs(39/" sq feet)	KSH 390/" Each
9.	Ordinary table	KSH 25/" per sq feet
10.	Ordinary Stools	KSH 25/" Each
11.	School desk alone	KSH 137/" Each
12.	School chair alone	KSH 60/" Each
13.	Ordinary bed (8/90 per sq feet)	KSH 160/" Each
14.	Coffee table ordinary (20/" per sq feet)	KSH 120/" Each
15.	Modern coffee table with moulded legs	KSH 22/" per sq feet
16.	Modern coffee table with curved legs	KSH 30/" per sq feet
17.	Modern bed (double) 35/" per sq feet	KSH 840/" Each
18.	Small chair 1X1X1.5	KSH 55/" Each
19.	Bed decorators	KSH 7/50 Each
20.	Modern baby cot	KSH 30/65 per sq feet
21.	Ordinary baby cot	KSH 18" per sq feet
22.	Dining chairs	KSH 75/" Each
23.	Half panel camphor doors 3" X 6"	KSH 360/" Each
24.	Half panel podo doors 3" X 6"	KSH 220/" Each
25.	Door frames	KSH 15/" per sq feet

Appendix 5.2: Mingoyo Cooperative Sawmilling Management Criteria Listing

<u>Process level</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
Control of access	Degree of Access to Resource	About 30% of forested lands are legally reserved forests which are administered by the government. The rest is forested public lands which is available for free use by the public. In principle, forestry officials are to licence timber harvesters (Kewero, 1991).	Harvesting activities were undertaken exclusively on public lands and were not restricted through licensing or regulation of access or harvesting practices by the forest officials (Moore and Hall, 1987; Kewero, 1990).	For the centralization of the issuance of licenses to cut and remove forest products from public lands. Include specifications of the exact location of harvests, the volumes to be removed, the time limit of activity and penalties for under utilization.	Forest Department collected royalties based on log deliveries to the mill yard and did not make field inspections. Harvesting standards such as minimum diameter, stump height and penalties for poor utilization were not known and therefore not enforced (Moore and Hall, 1987).
Harvest + Transport	Total available volume (i.e. Target Log component)	The total available volume of mpingo logs that meet the specific requirements for the musical instrument blocks has not been determined (Mongala, 1986).	Standing volumes in the Lindi and Mtwara regions are estimated at over 2 million m ³ (Forindeco, 1987). These figures are from a forest inventory survey and do not indicate operationally available mpingo volumes near mill exist (Moore and Hall, 1987).	For the survey and mapping of the general distribution of mpingo in Tanzania and for the identification of concentrations which are economically accessible. Have these areas gazetted as forest reserves to facilitate management control and conduct operational inventories within these new Forest Reserves to assist in guiding the determination of Annual Allowable Harvest Rates (Moore and Hall, 1987).	
	Logging Equipment	Felling and log preparation: three chainsaws. Log movement to pick-up point: skidding using farm tractor. Log loading: manual (up to 10 labourers). Log transport: 3 Lorries (7 Ton capacity), 2 wheel drive (Moyo, 1987).	Felling and log preparation: manual using cross cut saws fabricated from discarded bandsaw blades. Log movement: manual. The tractor was in disrepair. One lorry was operable for log transport. It was unreliable and broke down regularly (Moyo, 1987).	For the repair of log transport vehicles and establish a maintenance programme for the transport lorries. Log transport is the limiting factor to this operation at present. The result is that many trees are felled, but only the best logs are taken.	Up to 40% of the available volume of logs produced in the forest are not extracted (Moore and Hall, 1987).
	Cost of logs delivered to the sawmill per m ³	The average cost of log delivery was estimated to be about Tsh3,600/= (Moyo, 1987).	The cost of log delivery was an estimate of the operating cost per trip of the one operating lorry and only included the day to day operating costs of the lorry.	For the establishment of record keeping of the logging section to determine actual costs of log delivery.	

Appendix 5.2: Mingoyo Cooperative Sawmilling Management Criteria Listing

<u>Process level</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
The Sawmill	Ownership of the enterprise	The sawmill is owned by a Government of Tanzania parastatal organization Tanzania Wood Industry Corporation (TWICO) (Mongi, 1987).	The sawmill is owned by TWICO, but it is managed as an individual enterprise under the overall direction of TWICO (Moore and Hall, 1987). The main objective of TWICO is to plan, implement, coordinate, stimulate and control a rational development of the forest-based industry in Tanzania while at the same time striving for the best possible continuous utilization of the country's forest resources (Kewero, 1990).	For a greater degree of autonomy in the management of the day to day activities of the enterprise and for a greater degree of accountability of the TWICO organization in meeting its mandate through the forest-based industries.	
	Physical Plant	Electric power may be supplied from either a diesel generator or from the national power grid. There are 2 initial breakdown saws (24" diameter) and 2 resaw circular bench saws (12" diameter) and one band saw (2" blade width) (Moyo, 1987).	The band saw is inoperable because there are no serviceable blades. The initial breakdown sawblades are severely worn (e. g. 34 and 47 of possible 60 teeth found broken). Power is supplied by the diesel generator because the power grid is unreliable (Moyo, 1987).	For blade supply and blade sharpening, maintenance equipment and supplies within a saw machine upgrading and maintenance program.	Initial breakdown saw kerf was at least 5 mm wide. The heavy, irregularly shaped logs were manually fed through the 24" circular bench saw. The blades were not in good repair and there was excessive vibration and poor control on the log feed.
	Availability of capital	TWICO is the primary source of capital which is obtained primarily from the government. Private investment and joint ventures are encouraged. (Moore and Hall, 1987; Kewero, 1990).	The government cannot adequately supply either the foreign exchange or the local currency to support the investments necessary for upgrading and improving TWICO facilities. Recent changes in export rules now allow an exporter to retain 50% of production value as foreign exchange (Moore and Hall, 1987).	For a one time injection of capital (either grant or loan) to fund repairs so that the sawmill can operate with economic efficiency. Increased production and export earnings would provide sufficient operating capital for repayments and maintenance.	
	Return on net assets/Price-earnings ratio	Projected costs of production were estimated as US\$1,500 and the expected selling price Free-On-Board (F. O. B.) Dar es Salaam was US\$13,500 (Moyo, 1987).	Mingoyo is earning a long-term rate of return higher than its cost of capital based on estimates of average production, average production costs (US\$2,100/m ³) and the average selling price of their product (US\$13,500./m ³) (Moyo, 1987).	For an accounting and record keeping system on production costs associated with the costs of mpingo production exclusively.	The mpingo processing operation shared building facilities, power supplies, some labour and administration activities with the general hardwoods sawmilling operation. These overheads were not strictly accounted for each of the operations (Moyo, 1987).
	Mill log input capacity (e.g. m ³ /shift m ³ /year)	The average log input capacity was estimated at 1 m ³ per shift or 500 m ³ per year (Moyo, 1987).	The best recorded log input was 1.11 m ³ per shift. The average log input was estimated at 0.57 m ³ per shift or the equivalent of 285 m ³ per year (recorded figures for the first half of 1987 (Moore and Hall, 1987).	For the upgrading and maintenance of the sawmill equipment.	

Appendix 5.2: Mingoyo Cooperative Sawmilling Management Criteria Listing

<u>Process level</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
	Sawwood production m ³ /shift, by species	The production capacity was estimated at 0.07 m ³ of prime grade mpingo billets per shift or 35 m ³ of final export grade billets per year (Moyo, 1987).	The production records indicated that production of prime grade mpingo billets ranged from 0.02 - 0.09 m ³ per shift or approximately 20 m ³ per year. (Moore and Hall, 1987).	For the upgrading and maintenance of the sawmilling equipment and for the analysis and quantification of the mpingo produced but not exported.	
	Sales m ³ /year by species sawwood, shorts	The export market was expected to absorb the total projected annual production of mpingo billet (Mongi, 1987; Moyo, 1987).	All prime grade mpingo billet production was sold to the export market. For the first half of 1987 a total of 10 m ³ of prime grade billets were produced and all were exported. Other grades were not sold and were converted to charcoal for local sale	For the upgrading and maintaining of the sawmill equipment to increase recovery rates of prime grade billets.	
	Production cost: currency units/m ³	The production cost for prime grade mpingo billets was estimated as US\$1,500. (Moyo, 1987).	The reported production cost for the first half of 1987 was US\$2,100.	For more comprehensive record keeping to accurately determine the breakdown of production costs.	
	Timber recovery rate: log input/sawwood output	The estimated timber recovery rate for the sawmill was 0.07 m ³ of final product per cubic metre of log input (i.e. 7% recovery rate).	The actual timber recovery rate of prime grade billets ranged from 2% to 9%. The average was 7% (Moore and Hall, 1987).	For a technical review of the sawmilling process upon which to base an advisory program for the upgrading of processing techniques, the selection and use of equipment and for saw maintenance for the increase in recovery rates.	
	Production methods: quality control, handling	To transport all logs as soon as possible after felling and to process all logs delivered to the sawmill within a period of two shifts from log form to final product. To end seal all prime grade billets produced with hot wax.	Delays in the transport of some logs resulted in defects associated with uneven drying such as end star shakes and end splitting of logs leading to reduced recovery rates. Inappropriate initial breakdown methods and poor blade repair led to wide kerfs.	For a technical review of the sawmilling process as stated in previous criterion.	
	Operating time available	The sawmill was set up for 2 shifts per day of 8 hours each. The work week was 5 days. The management expected the mill to be operational for 500 shifts per year (Moyo, 1987).	Maximum operating time actually available was not tested because the log deliveries were never sufficient to permit the sawmill to operate continually, therefore any down times for maintenance or other reasons was not a factor restricting production.	For the improvement of logging sector and log transporting equipment	

Appendix 5.2: Mingoyo Cooperative Sawmilling Management Criteria Listing

<u>Process level</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
Value Added	Production Efficiency: e.g. m ³ /employee/year	The sawmilling of mpingo billets employed 20 sawmill workers and approximately 5 administration and 5 logging personnel were attached to the mpingo sawmilling section of Mingoyo. The expected production efficiency was 1.16 m ³ /employee/year.	The actual production efficiency was 0.66 m ³ /employee/year.		
	Overheads, Depreciation/ m ³	Figures not supplied.	Overheads and depreciation was estimated to be about 2% of the gross sales based on the 4 bench saws and the poor maintenance program (Moore and Hall, 1987).	For a specific accounting and record keeping system for the mpingo operation.	
	Seasoning (drying)	Mild drying conditions are essential since the wood is liable to split and check. Seasoning is best done in the billet form for a period of two to three years in a sheltered place under full shade (Bryce, 1967).	The billets are sealed by dipping the ends in a hot wax bath immediately after being produced. The billets are then immediately put into storage under full shade until they are shipped. The billets are usually shipped within a few months.	For a system whereby the identification of the date of manufacture can be traced for each billet or lot of billets and for special express shipment of billets in crates to avoid incorrect storage while on route to the purchasers to reduce rejections.	
End trimming	Grading	Every billet is graded in the sawmill to export specifications. Colour, defect from cracks, insects and fungus and dimensions are checked rigorously. Billets are regraded in the storage area both before storage period and before final shipment (Moyo, 1987).	Rejects rates are reported from the export customers to be from 10% to 15% before processing and approximately 15% during processing of the billets into the final musical instrument part (Nagel, 1987).	For a system to identify process steps as indicated in previous criterion.	A system whereby the causes for billet rejection can be communicated to the producer is necessary to enable the producers to correct any defects which are associated with their end of the process (i. e. production, grading, storage and shipping).
	End trimming	The billets are end trimmed to specific lengths according to the order (Moyo, 1987).	End trimming of the billets was accurate and square on the samples inspected and measured (Moore and Hall, 1987).	None required at this time.	
	Cutting to order	At all times the first priority of the production process is to produce the maximum number of the "bell" billets used for the manufacturing of the cone shaped section of the clarinet at the opposite end from the mouthpiece.	At all times the bell billets were the first priority of the sawmillers. The bell billet production was the limiting factor in export shipments. The other dimensions could be easily produced from the semi-processed material left from bell production.		Bell billet production was greatly dependent on the quality and size of the logs. Large diameter logs with few defects were required to obtain a greater proportion of bells per log. Better log selection and more efficient log hunting is necessary.

Appendix 5.2: Mingoyo Cooperative Sawmilling Management Criteria Listing

<u>Process level</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
	Resawing/ Edger	Resawing is restricted to the production of the billets for export.	Resawing of non-export quality billets and by-products of the billet production process are not resawn. All wood material, except the export grade billets, are considered to be waste. It is either dumped or the larger pieces are converted into charcoal.	For the a survey and analysis of the material which is currently considered to be waste or by-product to establish its quantity and its qualities. There may be material which could be obtained for use if the by-product materials were resawn.	
	Planing, shaping, molding	Not applicable for this operation.			
	Treatment with preservatives	Mpingo wood is not known to be used in situations where treatment might improve its utility (Bryce, 1987).			
	Final product production	The product of this operation is billet material for export which is sawn to customer specifications.	The product of this operation is billet material for export. It is sawn to industry wide specifications for use in the manufacture of musical instruments. Some billets were produced to specification, however the end use was unknown. Charcoal was made with off cuts.	For the investigation of further local processing of the billet material for the end-users.	
Market Studies	Extent of market survey: national-international	An international market survey conducted on behalf of TWICO indicated that the market for musical instrument billets could absorb between 200 and 300 m ³ annually (Mongi, 1987). There is no local or national market for sawn mpingo wood products (Moore and Hall, 1987).	Export records indicate that the supply of mpingo has fluctuated on an annual basis. The average is approximately 50 m ³ of billets per year.	For a survey of end users for the purpose of establishing direct sales.	
	Description of end products to be researched	Further research was intended by the management into end products such as knife handles and parquet flooring which could be produced from the wood leftover from the production of the billets (Mongi, 1987).	No pro-active market research was done. Lack of in-house expertise, time, the difficulties of travelling to distant markets and the recognized need for the improvement of the existing operation further reduced activities for new product research.	For a survey of the export markets to identify potential uses for mpingo wood which could be produced within the enterprise organization (Moore and Hall, 1987).	

Appendix 5.2: Mingoyo Cooperative Sawmilling Management Criteria Listing

<u>Process level</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
	Identification of competitors: (existing and potential)	There are four operating sawmills producing billets for export in Tanzania including Mingoyo. There were reports of two new mills in the Dar es Salaam area and one in Arusha which were in development stages. There is no other known source of billets.	All billets which were produced were sold quickly. At present the market absorbs the total production of billets from all sawmills, however, if output increases, competition for market share between the producers may result.	For the establishment of harvesting and utilization standards which lead to better mpingo forest management. Assign export quotas to those producers who best meet the standards or exceed them with novel ideas and techniques to maximize sustained development based on the mpingo resource. For a survey to determine other sources of mpingo such as northern Mozambique that may also supply mpingo logs to billet makers in Europe and Japan. For a survey of all sawmill capacity: actual, potential and planned.	
	National economic advantage over competitors	Mingoyo is in Tanzania which has an economic advantage over the only other nation which is known to have been a major source of mpingo for the manufacture of musical instruments. Tanzania is comparatively stable and does not permit the export of logs.	The greatest threat to the success of Mingoyo which could be identified is from competition from other producers within Tanzania.	For the establishment and monitoring of harvesting and utilization techniques which lead to sustained yield of the mpingo resource within Tanzania. The market for mpingo billets is exclusively in the developed world where this style of resource management would be favoured.	
	Built in costs structure as a limiting factor	The Mingoyo enterprise is a parastatal and is to benefit from the connections with central headquarters of TWICO and other parastatal organizations. Mingoyo must also contribute to the overheads of the headquarters (Moyo, 1987).	The exact breakdown of the limitations associated with the parastatal organization compared to any potential benefits were not identified. Hidden costs such as the inefficiencies associated with lack of capital and delays in parts purchasing based on headquarters' bureaucracy were noted as a competitive disadvantage. This disadvantage was becoming critical as privately owned sawmills were increasing production.	For greater autonomy for the local management in the day to day running of the mill and greater access to capital for spare parts purchasing. For a refinement of the exporting methods which include full prepayment to Central Bank by the buyer.	
	Prices	The expected market price F.O.B. Dar es Salaam for 1987 was US\$13,500/m ³ of billets (Amin, 1987)	The actual selling price ranged from US\$11,500 to US\$13,500/m ³ . There were differences in the number of billets per m ³ on the export records.	For the assessment of the export record keeping with the aim of improving the information available and ensuring consistency in the number of billets per m ³ .	

Appendix 5.2: Mingoyo Cooperative Sawmilling Management Criteria Listing

<u>Process level</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
Marketing	Direct sales and shipment: specialization	The product was highly specialized and sales were to be direct to musical instrument manufacturers (Mongi, 1987).	Some sales were direct to customers, however some customers were stockists, not end users.	For an investigation into the role of the stockists in the market in order to determine if there is an advantage to the producers to develop methods of making direct sales of the billets to the instrument manufacturers exclusively.	Direct selling methods are where the producer solicits business from the end users without the intercession of a distributor or a wholesaler. Orders are large and the products are of standard specification and not subject to frequent modification (FAO, 1973).
	Indirect sales and shipments: diversification	Mingoyo does not utilize the services of agents or distribution merchants for their products (Moyo, 1987).	Mingoyo's export records indicated that billets were sold to some customers who were wholesalers located in Europe.	For a survey of end users to determine their needs. For an assessment, based on the information gathered from the end users' survey, to determine the best course of action for Mingoyo regarding the marketing method to be employed.	Indirect selling methods, utilizing the services of agents or distributors are used where the buying habits of individual end users are characterized by the irregular demand for relatively small orders of a variety of specifications and grades (FAO, 1973).
	Customer relations practices and pricing practices	All customers are in the export market. Supply contracts are individually negotiated with the producer. Once a price is settled, the buyer must then arrange through the Central Bank of Tanzania to make a full prepayment in hard currency (Mongi, 1987).	Direct purchasing arrangements lacked any element of customer protection therefore some end users did not deal with the sawmill. These end users bought from wholesalers in Europe (Mongi, 1987).	For an assessment of the marketing mechanisms for mpingo billets and for the development of a system of sales which is convenient for the both the customer and for the producer and the Tanzanian Government.	
	Market position, degree of customer loyalty/time	At present, demand exceeds supply.	There are indications that supply of billets could exceed demand.	For the development of good customer relations as soon as possible in order to establish a record of good service and develop customer loyalty before the market becomes a buyers' market rather than the sellers' market it is at present.	It is important that the producer uses his position of advantage wisely and cultivates good customer relations during the times where demand exceeds supply in order to establish customer loyalty for times when supply exceeds demand.

Appendix 5.2.1

Mingoyo Sawmill - Results of a 5 shift period study

Log Volume Input per Shift (m³)	Final Product Volume Output per Shift (m³)
0.73m ³	0.0652
1.11m ³	0.0706
0.85m ³	0.0598
0.95m ³	0.0753
0.89m ³	0.0862
TOTAL 4.54m³	0.3571m³

Source: Hall, (1988)

Appendix 5.3: African Blackwood Enterprises (A.B.E.) Sawmilling Management Criteria Listing

<u>Process level</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
Control of access	Degree of access to Resource	Forest reserves do not have abundant mpingo supplies and account for less than 30% of the forest land base. There is no restriction on access to the rest of the land base. This land base is public lands and is where mpingo is found and harvested (Kewero, 1987).	Officially a licence was required from the district forest officer for the harvesting of mpingo. The licence specified only the general area of operation and total annual volume to be removed. The royalty was charged only for log volume delivered to the mill. The forest officers had no incentive or transport to monitor the field activities. The forest department was not in control of the harvesting activities (Moore and Hall, 1987).	For the centralization of the issuance of licences to harvest and remove forest products from public lands and include specification of the exact location, volumes to be felled, time limits and penalties for poor utilization. Balance low vs. high cost log source areas over time.	
Harvest + Transport	Total available volume (i.e. Target Log component)	The total available volume of mpingo logs which meet the specific requirements for the musical instrument billet production has not been determined. What inventory data is available indicates that suitable mpingo trees are widely scattered (Holmes, 1987).	Standing volumes in the Lindi and Mtwara regions are estimated at over 2 million m ³ (Forindeco, 1987), however these figures do not indicate the volumes which are operationally available. Accessible volumes near the mill are low due to overharvesting (Amin, 1987).	For the survey and mapping of the general distribution of mpingo in Tanzania and for the identification of concentrations which are economically accessible. For the gazetting of these areas as forest reserves to facilitate forest department control and for operational inventories within these new Forest Reserves to assist in the determination of annual allowable cuts (Moore and Hall, 1987).	
Logging Equipment		Felling is done using two man hand saws. Log collection and loading is done manually and log transport is done with 7 Ton lorries.	Felling, log collection and loading are done manually. There are usually only two lorries operational for the transport of logs (Amin, 1987).	For the upgrading of the log transportation. Currently log transport is the limiting factor to sawmill production which results in the felling of more trees than are transported to permit the selection of only the highest grade of logs for transport.	Up to 40% of the log volume produced in the forest is not extracted and transported to the mill (Moore and Hall, 1987).
Cost of logs delivered to the sawmill per m ³		The average cost of log delivery was estimated at Tsh4,800/= per m ³ or about US\$50. The haul distance was over 220 km round trip.	The cost of log transport is expected to increase steadily over time as the access to commercially suitable areas of mpingo become more difficult to get to. Also, as mpingo near all-weather roads is exhausted, the transport of logs may be restricted to the dry seasons only which may further increase the present habit of transporting only highest grade logs to the mill site (Mbonde, 1987).	For the establishment of record keeping of the logging section to determine actual costs of log delivery.	

Appendix 5.3: African Blackwood Enterprises (A.B.E.) Sawmilling Management Criteria Listing

<u>Process level</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
The Sawmill	Ownership of the enterprise	The enterprise is owned outright by a private entrepreneur who is on-site and manages the complete operation. Private ownership of enterprises such as a sawmill in Tanzania was permitted beginning in 1986 and could compete with parastatals (Mbonde, 1987).	The sawmill was owned by a single, local entrepreneur with no formal or previous sawmilling or logging experience (Amin, 1987).	For a comprehensive review of the enterprise in order to establish a benchmark assessment and to identify areas of potential improvement.	
	Physical Plant	The logs are cross cut manually by the initial breakdown sawyers into 22" lengths. There are 4 initial breakdown saws (24" circular bench saws), 6 resaws (12" bench saws) and 1 band saw with table (1.5" blade). Power is diesel engine/pulley shaft system.	The cross cutting of logs and billet production was on a bonus system. All four breakdown saws and the band saw were in full operation. There were only 4 of the resaws operational until all available logs were broken down then all resaws were used (Amin, 1987).	For a technical assessment of the operation in order to determine possible improvements in the processing system. For example, the hand feeding of irregular logs into the circular bench saw puts the maximization of the recovery rate and the workers at risk.	
	Availability of capital	The entrepreneur was self-funded and had local and foreign currency available.	In practice there were often delays in obtaining spares necessary for uninterrupted operations due to importing procedures. A long lead time was required and when unexpected spares were required delays could reduce efficiency (Amin, 1987; Holmes, 1987).	For a review of the importation rules for industrial spares to identify options for streamlining these government controls.	
	Return on net assets/Price-earnings ratio	Costs were estimated at US\$1,500 per m ³ . Sales prices averaged US\$12,500 per m ³ (Amin, 1987).	The verification of actual costs was not possible. The owner did not wish to reveal the actual figures, however he did suggest that the costs are similar to the costs of production of the parastatal, Mingoyo.	For a review of the cost of production in conjunction with a technical review aimed at assisting the owner to reduce costs and increase efficiency.	
	Mill log input capacity (e.g. m ³ /shift m ³ /year) Sawwood production m ³ /shift, by species	The input capacity for logs was estimated at 1250 m ³ annually or 5 m ³ per shift. Mpingo is the only species processed. Sawwood produced is in billet form. Based on the average recovery rate for mpingo of 7% and the estimated annual input of logs, the annual sawwood production would be 87.5 m ³ or 0.35 m ³ /shift.	The reported actual log input was 1150 per year and an average of 4.6 m ³ per shift. The reported figures of sawwood production for the first half of 1987 indicate an annual production of 50 m ³ and a shift production of sawwood of 0.2 m ³ (Moore and Hall, 1987).	For a comprehensive study of log input capacity aimed at establishing the causes for limits to input. For a survey to determine the factors which restrict the level of production of billets.	

Appendix 5.3: African Blackwood Enterprises (A.B.E.) Sawmilling Management Criteria Listing

<u>Process level</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
	Sales m ³ /year by species sawnwood, shorts	The export market was expected to absorb more than the projected level of production for all producers in Tanzania. The export market was expected to demand 200 m ³ /year. Annual production for 1987 in Tanzania was estimated at 88 m ³ (Mbonde, 1987).	The export market absorbed all the prime grade billets which were produced by the sawmill. For the first half of 1987 the amount of billets exported was 25 m ³ . Other grades were not sold. Lower grade billets were stored for possible reprocessing and some billet and offcuts were converted into charcoal for the local market.	For the assessment of the system of harvesting and processing mpingo in order to determine possible means of increasing the production of billets while reducing the volume of trees felled to obtain logs.	
	Production cost: currency units/m ³	The planned production cost was not disclosed by the sawmill management.	The reported production cost per cubic meter of prime grade mpingo billets was US\$1,500 (Amin, 1987).	For the establishment of record keeping system for production costs to enable the management to monitor more accurately the level of efficiency.	
	Timber recovery rate: log input/sawnwood output	The estimated average recovery rate for the overall industry for mpingo billets was 7% (Mbonde, 1987).	The actual recovery rate was estimated to range from between 4 and 7% (Amin, 1987).	For a technical review of the logging and sawmilling process upon which to base an advisory program for the upgrading of processing techniques, for the selection of standing trees for felling and use and maintenance of equipment for the increase of the recovery rate of the sawmill.	
	Production methods: quality control, handling	The production methods were geared to transport all logs as soon as possible after felling and to process all logs delivered into final product within 48 hours. To seal the ends of all prime grade billets with hot wax and store under shade.	There were delays in transporting logs which led to some degrade at the ends of the logs. Logs were cross cut before being broken down in the mill by the initial break-down sawyers. This enabled the sawyers to breakdown the non uniform logs based on their experience of the characteristics of mpingo logs. The sawyers were on a production bonus and were careful to process logs in such a manner as to maximize the recovery rate and thereby maximize their bonus from the resource at hand.	For a technical review of the logging and sawmilling process upon which to base an advisory program for the upgrading of processing techniques and the selection of standing trees for felling.	
	Operating times available	The sawmill was set up for 1 shift per day and a 5-day work week. There was no electric lighting in the mill which restricted sawing activities to within twelve daylight hours.	The employees were on a bonus system for production of billets and within limits, if the log supply was irregular, the length of shifts would be adjusted to maintain or better the minimum level of production (Amin, 1987).	For the improvement of the logging sector and log transport equipment to ensure constant supply of logs of the highest grade.	

Appendix 5.3: African Blackwood Enterprises (A.B.E.) Sawmilling Management Criteria Listing

<u>Process level</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
	Production Efficiency: e.g. m ³ /employee/yr.	The expected production was 87.5 m ³ per year and the employee number was 38, therefore, the production efficiency was expected to be 2.3 m ³ per employee.	Production efficiency based on actual production of fm during the first half of 1987 was forecast at 1.32 m ³ per employee. Many sawyers had gained experience in mpingo processing before working at African Blackwood Enterprises (Amin, 1987).	For a technical review of the sawmilling process upon which to base an advisory program for the upgrading of processing techniques.	
	Overheads, Depreciation/ m ³	Figures for this aspect of this privately owned enterprise were not disclosed (Moore and Hall, 1987).	The depreciation/m ³ was estimated as a small proportion of the overheads. The equipment was locally fabricated and the building was an abandoned sisal mill which was isolated, not serviced with power or water and was owned outright by the entrepreneur.		
Value Added	Seasoning (drying)	Mild drying conditions are essential since the wood is liable to split and check. Seasoning is best done in the billet form for a period of two to three years in a sheltered place under full shade (Bryce, 1967).	The billets are sealed by dipping the ends in a hot wax bath immediately after being produced. The billets are then immediately put into storage under full shade until they are shipped. The billets are usually shipped within a few months.	For a system whereby the identification of the date of manufacture can be traced for each billet or lot of billets and for special express shipment of billets in crates to avoid incorrect storage while on route to the purchasers to reduce rejections.	
	Grading	Every billet is graded in the sawmill to export specifications. Colour, defect from cracks, insects and fungus and dimensions are checked rigorously. Billets are regraded in the storage area both before storage period and before final shipment. Buyers were involved in training (Amin, 1987).	Reject rates are reported from the export customers to be from 10% to 15% before processing and approximately 15% during processing of the billets into the final musical instrument part (Nagel, 1987).	For a system to identify process steps as indicated in previous criterion.	A system whereby the causes for billet rejection can be communicated to the producer is necessary to enable the producers to correct any defects which are associated with their end of the process (i.e. production, grading, storage and shipping).
	End trimming	The billets are end-trimmed to specific lengths according to the order (Moyo, 1987).	End trimming of the billets was accurate and square on the samples inspected and measured (Moore and Hall, 1987).	None required at this time.	
	Cutting to order	At all times the first priority of the production process is to produce the maximum number of the "bell" billets used for the manufacturing of the cone shaped section of the clarinet at the opposite end from the mouthpiece.	At all times the bell billets were the first priority of the sawmillers. The bell billet production was the limiting factor in export shipments. The other dimensions could be easily produced from the semi-produced material left from bell production (Amin, 1987).	Bell billet production was greatly dependent on the quality and size of the logs. Large diameter logs with few defects were required to obtain a greater proportion of bells per log. Better log selection and more efficient log hunting is necessary.	

Appendix 5.3: African Blackwood Enterprises (A.B.E.) Sawmilling Management Criteria Listing

<u>Process level</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
	Resawing/ Edger	Resawing is restricted to the production of the billets for export.	Resawing of non-export quality billets and by-products of the billet production process are not resawn. All wood material, except the export grade billets, are considered to be waste. It is either dumped or the larger pieces are converted into charcoal (Amin, 1987).	For the survey and analysis of the material which is currently considered to be waste or by-product to establish its quantity and qualities. There may be material which could be obtained for use if the by-product materials were resawn.	
	Planing, shaping, molding	Not applicable for this operation.			
	Treatment with preservatives	Mpingo wood is not known to be used in situations where treatment might improve its utility (Bryce, 1987).	Not applicable for this operation.		
	Final product production	The product of this operation is billet material for export which is sawn to customer specifications.	The product of this operation is billet material for export. It is sawn to industry wide specifications for use in the manufacture of musical instruments. Some billets were produced to specification, however the end use was unknown. Charcoal was made with off cuts. (Amin, 1987).	For the investigation of further local processing of the billet material for the end-users.	
Market Studies	Extent of market survey: national/ international	An international market survey conducted on behalf of TWICO indicated that the market for musical instrument billets could absorb between 200 and 300 m ³ annually (Mongi, 1987). There is no local or national market for sawn mpingo wood products (Moore and Hall, 1987).	Export records indicate that the supply of mpingo has fluctuated on an annual basis. The average was approximately 50 m ³ of billets per year (Nyaki, 1987).	For a survey of end users for the purpose of establishing direct sales.	
	Description of end products to be researched	Further research was intended, by the management, into end products such as knife handles and parquet flooring which could be produced from the wood left over from the production of the billets (Mongi, 1987).	No pro-active market research was done. Lack of in-house expertise, time, the difficulties of travelling to distant markets and the recognized need for the improvement of the existing operation further reduced activities for new product research. Over 50 m ³ of low grade mpingo billets were held in storage on speculation that a commercial market would become evident over time (Amin, 1987).	For a survey of the export markets to identify potential uses for mpingo wood which could be produced within the enterprise organization (Moore and Hall, 1987).	

Appendix 5.3: African Blackwood Enterprises (A.B.E.) Sawmilling Management Criteria Listing

<u>Process level</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
	Identification of competitors: (existing and potential)	There are four operating sawmills producing billets for export in Tanzania including A.B.E. There were reports of two new mills in the Dar es Salaam area and one in Arusha which were in development stages. There is no other known source of billets.	All billets which were produced were sold quickly. At present the market absorbs the total production of billets from all sawmills, however, if output increases, competition for market share between the producers may result (Moore and Hall, 1987).	For the establishment of harvesting and utilization standards which lead to better mpingo forest management. Assign export quotas to those producers who best meet the standards or exceed them with novel ideas and techniques to maximize sustained development based on the mpingo resource. For a survey to determine any other sources of mpingo such as northern Mozambique that may also supply mpingo logs to billet makers in Europe and Japan. For a survey of all sawmill capacity: actual, potential and planned.	
	National economic advantages over competitors	A.B.E. is in a country with many advantages over Mozambique (the other nation which is known to have been a major source of mpingo for the manufacture of musical instruments). Tanzania is comparatively stable and does not permit the export of logs.	The greatest threat to the success of A.B.E. which could be identified is from competition from other producers within Tanzania (Mbonde, 1987).	For the establishment and monitoring of harvesting and utilization techniques which lead to sustained yield of the mpingo resource within Tanzania. The market for mpingo billets is exclusively in the developed world where this style of resource management would be favoured.	
	Built in cost structures as a limiting factor	There were no obvious built in cost structures which may have limited the enterprise.			
	Prices	The price in 1987 was expected to be US\$13,500 (Mongi, 1987).	The sale prices which were recorded on the export files at Forest Department Headquarters (FOB Dar es Salaam) ranged from US\$11,500 to 13,500. The average price was about US\$12,500. The number of billets per m ³ was inconsistent on the records.	For the assessment of exporting procedures and the documentation of exports with the aim of establishing an accurate record keeping system for exports and a consistent number of billets per m ³ .	
Marketing	Direct sales and shipment: specialization	Direct sales would be an appropriate method of sales.	The entrepreneur sold billets both directly to end users and to his own agent in the UK (Amin, 1987).	No negotiation aims required at this time.	
	Indirect sales and shipments: diversification	There was a connection with a wholly owned agency in UK.	There was a direct connection with a wholly owned and operated distribution agency in the UK.	To establish a marketing connection for the USA and Japan.	

Appendix 5.3: African Blackwood Enterprises (A.B.E.) Sawmilling Management Criteria Listing

<u>Process level</u>	<u>Criteria</u>	<u>Technical Limit</u>	<u>Benchmark Situation</u>	<u>Negotiation Aim</u>	<u>Comments</u>
	Customer relations practices and pricing	Prices were set by negotiation.	The entrepreneur was able to have more control over the marketing of his production by having his own distribution agency in the UK and to provide the customer with an easier means of purchasing billets than the procedures necessary for direct purchase (Amin, 1987).	None required at this time.	
	Market position, degree of customer loyalty/time	There was a free market situation.	The market is a producer's market at present, however the total market is limited. This enterprise is making the effort to establish a good market position by offering the customer a dependable supply, a flexible supply and short delivery times.	None required at this time.	

Appendix 6.1.1: Camphor Forest Management Criteria Rating - Post Intervention -Case Study 1

Frame	Criteria	TL	BM	Negotiation Aim	Roundtable #1	Roundtable #2	Roundtable #3	Roundtable #4	Roundtable #5
Tenure	1. Security of tenure	+1	-1	For adherence to the Terms and Conditions of the Licence. All changes to be done in consultation with the Licensee and with respect to the existing tenure arrangements.	-1	The District Forest Officer conceded that the Forest Inventory (1985) indicated that there was more than enough timber on the Licence area to support the sawmill for the planned life of the project (NTCSmin41/85).	+1	Minister of Natural Resources closes Mt. Kenya Forest Reserve indefinitely to logging (Kenya Legal Notice #89, May 25/86).	-1
	2. Threats to tenure	+1	-1	Not an issue which affects this enterprise at this time.	+1	President's Forest Boundary Tea Belt successfully established (World Bank Kenya Forest Sector Review 1987).	+1	Minister of Natural Resources closes Mt. Kenya Forest Reserve indefinitely to logging (Kenya Legal Notice #89, May 25/86).	-1
Forest Management Activities	3. Setting objectives	+1	-1	Larger openings of perhaps 5 to 6 trees to allow light to penetrate canopy and to reduce crown closure, combined with some stand tending or enrichment planting (Parry, 1957; Willan, 1961; Hallsworth 1983 p.132) preserve inherent bioeconomic productivity.	-1		-1		-1
	4. Yield control (AAC)	+1	-1	Negotiate for compliance with existing Licence.	-1	The District Forest Officer conceded that the Forest Inventory (1985) indicated that there was more than enough timber on the Licence area to support the sawmill for the planned life of the project (NTCSmin41/85).	+1		-1
	5. Area of forest	+1	+1	Retain Licence area.	+1		+1		+1
	6. Species composition	+1	-1	For compliance with the Licence.	-1		-1		-1

Appendix 6.1.1: Camphor Forest Management Criteria Rating - Post Intervention -Case Study 1

7.	Age/size and volume distribution	+1	-1	To balance selection process with selection from the mature age class as well as the over mature and decadent age classes.	-1	The District Forest Officer agreed to consult with the Chief Conservator of Forests regarding the amendment of current tree selection practices (NTCSmin41/85).	+1	DFO authorizes selection of trees for felling in mature, over mature and decadent age classes (NTCS min 7/86).	+1	No tree selection or felling permitted because Minister of Natural Resources closes Mt. Kenya Forest Reserve indefinitely to logging (Kenya Legal Notice #89, May 25/86).	-1
8.	Growth rates	-1	-1	For the establishment of Growth and Yield plots and for the updating and re measurement of the permanent sample plots on Mt. Kilimanjaro.	-1		-1		-1		-1
9.	Quality distribution	+1	-1	Negotiate for a more balanced distribution between volumes of low quality and better quality logs based on recovery rates and production costs at the sawmill and actual market prices.	-1	The District Forest Officer agreed to consult with the Chief Conservator of Forests regarding the amendment of current tree selection practices (NTCSmin41/85).	+1		+1	Minister of Natural Resources closes Mt. Kenya Forest Reserve indefinitely to logging (Kenya Legal Notice #89, May 25/86).	-1
10	Relative prices	+1	-1	Selling price must reflect costs plus profit. For better control of access to the Gazetted forests to reduce the competition in the market place from illegally produced timber.	-1		-1	Project Manager's report and recommendations on Timber Production Costs vs. Selling Prices accepted (NTCSmin22/86). Price for prime grade increased 50% (NTCSmin39/86) and again by 72% (NTCSmin88/86).	+1	Timber sales price continues to increase as effects of successful forest closure (Kenya Legal Notice #89, May 25/86) reduces the availability of timber in the market (PM Report June/87).	+1
11.	Intrinsic limitations to regeneration	+1	-1	Larger openings with stand tending and enrichment planting where required to ensure regeneration of camphor and the successful replacement of camphor into the canopy.	-1		-1		-1		-1
12	Extrinsic limitations to regeneration	+1	-1	Creation of larger gaps, tending of regeneration and enrichment planting where necessary.	-1		-1		-1		-1
13.	Protection	n/a	n/a	n/a	n/a		n/a		n/a		n/a
		a	a						a		a

Appendix 6.1.1: Camphor Forest Management Criteria Rating - Post Intervention -Case Study 1

14.	Working plans	+1	-1	For compliance with the terms and conditions of the 10 Year Licence.	-1	The District Forest Officer agreed to consult with the Chief Conservator of Forests regarding the amendment of current tree selection practices (NTCSmin41/85).	+1	DFO authorizes selection of trees for felling in mature, over mature and decadent age classes (NTCS min 7/86).	+1	No tree selection or felling permitted because Minister of Natural Resources closes Mt. Kenya Forest Reserve indefinitely to logging (Kenya Legal Notice #89, May 25/86).	-1
15.	Felling cycles	+1	-1	For larger gaps to encourage the regeneration of camphor.	-1		-1		-1		-1
16.	Concessions	+1	-1	For compliance with forest department regulations on forest use in all areas to reduce uncontrolled harvest.	-1		-1	DFO complies with NTCS Commission request to remove all other timber extractors from the NTCS Licence area and DFO informs commission that 2 year logging plan would be ready soon (NTCSmin16/86).	+1	Non licensed operators are forced out of Forest Reserve and non licensed harvest rate reduced due to forest closure (Kenya Legal Notice #89, May 25/86) remains in effect for over one year for all operators that do not satisfy Forest Department audit (NTCS PM Report May/86).	+1
17.	Roads	+1	-1	For strict road closure during rains, compensation for maintenance costs as per Licence and early notification of approval of road location to permit road construction in dry periods one rainy season before logging to allow for hardening of the road surface.	-1		-1	Forest roads closed off to vehicular traffic during rains and Planned Logging Schedule (App.6.1.2) implemented (NTCSMemo Feb14/86)	+1		+1
18.	Buildings	+1	-1	For employee accommodation facilities in forest.	-1		-1		-1		-1

Appendix 6.1.1: Camphor Forest Management Criteria Rating - Post Intervention -Case Study 1

19.	Boundaries	+1	-1	For the terms and conditions of the Licence to be enforced.		-1	District Forest Officer confirms that there have been no changes in Licence area boundaries (NTCSmin46/85). Chairman and DFO concur that timber extraction within the boundaries of the Licence area is exclusive to the Society and that any changes require mutual agreement (NTCS Chairman's Annual Report Dec/85).	+1		+1	+1
20.	Sample plots	+1	-1	For the establishment of permanent sample plots to monitor regeneration, crown response to openings and growth rates.		-1		-1		-1	-1
21.	Prediction	+1	-1	For adherence to the terms and conditions of the Licence and for larger openings and monitoring for potential enrichment planting/tending to ensure the redevelopment of the forest overtime.		-1		-1		-1	-1
22.	Costings	-1	-1	To determine costs for various forest management options.		-1		-1		-1	-1
23.	Annual records	+1	-1	To have records for felling, log production, log marking (for royalty billing) log transport, log delivery to mill, log input into mill, daily production, daily sales.	Record systems in place (NTCSPM Report July&Aug/85).	+1		+1		+1	+1
24.	Organization of silvicultural work	-1	-1	For compliance with regulations of the Licence in such a manner as to encourage the natural regeneration of the forest.		-1		-1		-1	-1

Appendix 6.1.1: Camphor Forest Management Criteria Rating - Post Intervention -Case Study 1

25.	Silviculture Techniques	Regulation of shade and canopy openings	+1	-1	For logging and transport activities to facilitate any silvicultural work planned by the Forest Department.	-1	-1	-1	-1	-1
26.		Treatments to select species mix	+1	-1	For group selection felling combined with monitoring of opening and subsequent tending.	-1	-1	-1	-1	-1
27.		Woody climber cutting	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
28.		Poisoning	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
29.		Enrichment planting	+1	-1	For pre harvest assessment of root sucker numbers and vigor to determine if selection felling choices could be modified to favour areas with greater potential for regeneration.	-1	-1	-1	-1	-1
30.		Selection cutting	+1	-1	For group selection felling with directional barriers from tops to dissuade elephant traffic.	-1	-1	-1	-1	-1
31.		Seed tree provision	+1	-1	For investigations into local seed production and conditions which could enhance natural regeneration from seedlings.	-1	-1	-1	+1	+1
		TABLE SUMMARY	25/ +1	1/ +1		2/ +1	9/ +1	13/ +1	7/ +1	7/ +1
			3/ -1	27/ -1		26/ -1	19/ -1	15/ -1	21/ -1	21/ -1
			3/ n/a	3/ n/a		3/ n/a	3/ n/a	3/ n/a	3/ n/a	3/ n/a

Appendix 6.1.2: Social Welfare Criteria Rating - Post Intervention - Case Study 1.

Aspect	Criteria	TL	BM	Negotiation Aim	Roundtable #1	Roundtable #2	Roundtable #3	Roundtable #4	
Institutions	1. Government Officials	+1	-1	For the full, accountable participation of the relevant government officials in carrying out their duties which affect the affairs of the enterprise.	-1	NTCS Commission membership changed (NTCSmin 44/85). Former members of the Commission transferred from district (Cooperative Officer ST/2/Vol I/(209); District Officer NTH/ST.3/VOL.II/250).	+1 Relevant government authorities instructed to abide by their duties. (Commissioner of Cooperative Development CON/CS/1636/Vol.7/72).	+1 Mt. Kenya Forest closed (Kenya Legal Notice #89). Chief Conservator of Forests and Minister refuse to recognize rights of legitimate licensee despite excellent post closure forest inspection report of NTCS operations. (PM Report June 11/86).	-1
	2. Independent auditing	+1	-1	For the immediate audit of the accounts for the two previous years. For an assessment of the management activities in order to suggest a means by which the auditing of the accounts would be done on a regular basis.	-1		-1 Audits for previous two years initiated (NTCSmin6/86). New commission of local residents with management experience and of high regard appointed by Commissioner of Cooperative Development (NTCSmin5/86). Management responsibilities to be monitored by new local cooperative officer (Commissioner of Cooperative Development CON/CS/1636/Vol.7/72).	+1	-1
	3. Public participation	+1	-1	For the undertaking of regular and well planned Annual General Meetings.	-1		-1	-1	-1
	4. Associations	+1	-1	For the Society to assess the costs and benefits of membership in the KTWEA.	-1		-1 A cost benefit study of membership in KTWEA undertaken on behalf of Commission (PM Report Mar/86)	+1 Closure of forest postponed decision to join KTWEA (NTCS min83/86) Commission instructs NTCS management to join the KTWEA (NTCS min10/87) on strength of visit to mill site by Minister of Natural Resources and promise of resumption of log supply (NTCS min/10/87).	+1

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5.	Trade unions	+1	-1	For the Society to investigate the cost benefits of membership in the KTWEA with regards to their role in conducting negotiations with the employees' union on behalf of the Society.	-1	-1	-1	A cost benefit study of membership in KTWEA undertaken on behalf of Commission (PM Report Mar/86)	+1	Closure of forest postponed decision to join KTWEA (NTCS min83/86) Commission instructs NTCS management to join the KTWEA (NTCS min10/87) on strength of visit to mill site by Minister of Natural Resources and promise of resumption of log supply (NTCS min/10/87).	-1
6.	Documented policy & procedures	+1	-1	For the development and documentation of policy and procedures designed specifically for the successful operation of the enterprise which incorporated the regulations of the Employees Union, the Ministry of Co-ops and the Forest Department.	-1	-1	-1	Development of a policy manual for NTCS (as suggested in PM Report July/85) initiated in cooperation with representatives from Ministry of Cooperative Development, Ministry of Labour and Union (NTCS Admin. Memo Feb. 14/86).	+1		+1
7.	Clear management goals	+1	-1	For the establishment of a set of management goals that include solicited input from employees, members, government officials and NGOs.	-1	-1	+1	Management goals clearly set out by Commissioner of Cooperative Development after an on-site meeting with the NTCS Commissioner (Commissioner of Cooperative Development CON/CS/1636Vol.7/72).	+1	Policy manual prepared for review by NTCS Commission (PM Report Aug/86).	+1
8.	Lines of reporting	+1	-1	For the establishment of clear lines of reporting and the documentation of an organization chart, job descriptions and procedures for the conduct of internal reporting and discipline in consultation with the workers' union.	-1	-1	-1	Reorganization of lines of reporting, job description and organization chart as per instructions of Commission (NTCS min 12/86; 41/86; 47/86; 47/86; 55/86; PM Report July/86).	+1	Reorganization of reporting structure and new job site descriptions implemented as per instructions of commission(NTCSmin2 8/86; 91/86).	+1
9.	Accountability of management	+1	-1	For an annual general meeting.	-1	-1	-1		-1		-1

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	10.	Employment generation	+1	-1	For the expansion of the value added activities for the creation of more employment opportunities and for consideration to carrying out the planned establishment of a sales and value added facilities in Nairobi.		-1		-1	Training program for external sales outlet initiated (NTCS min40/86). New value added products made for the Nairobi market (NTCS PM Memo Jan. 27/86).	+1	Up to 80% of employees laid off during periods where no logs supplied by government authorities (NTCSmin122/86).	-1
	11.	Job satisfaction	+1	-1	For the establishment of clear job descriptions, lines of reporting, operations procedures, employee appeal procedures (in-house), means for employee contribution to enterprise management, employee training, increments based on merit and experience, a bonus system and employee career paths.		-1		-1	Consultations with employees and Union Steward for input into policy and procedures manual (NTCS Admin. Rec. March/86)	+1	Reorganization of reporting structure and new job site descriptions implemented as per instructions of commission(NTCSmin/86; 91/86).	+1
Market Mechanisms	12.	Pricing system	+1	-1	For an investigation into the reasons why the timber was priced below production costs.		-1		+1	Report on timber pricing vs. production costs prepared for but rejected by Commission (July/85) accepted by Commissioner of Cooperative Development.	+1		+1
	13.	Purchasing contracts	+1	-1	For an assessment of the timber tendering procedure to determine what action the Society should undertake to supply the tender in a cost effective manner.		-1		+1	Negotiations with the Kenya Prisons Department regarding call for timber supply tenders to supply timber opened and tender awarded to NTCS (NTCS min 50/85).	+1		+1
	14.	Supply contracts	+1	-1	For the establishment of a floating fund to be used on the authority of the Project Manager for the purchasing of essential or emergency spares and services. The PM's decisions would be cleared at the next meeting of the management Commission.		-1		-1	Discretionary operating funds for use by PM (as directed by Commissioner of Cooperative Development Nov./85) for purchasing essential supplies and services established by Commission (NTCS 81/86)	+1		+1

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15.	Stability of currency	+1	-1	For an assessment of the expected needs of the Society which would require foreign exchange in order to determine the most cost effective strategy for their purchase.	-1	-1	Report on needs of the Society prepared for chairman of Commission and the financier to be implemented once log supply issue resolved (C.B.K. Memo March/86).	+1	+1
Benefit distribution	Shareholders' share of profits	+1	-1	For a report to the shareholders on the status of the enterprise.	-1	-1	Report on status of shareholder's register prepared. Records found to be incomplete (NTCS min64/86; 86/86).	-1	-1
17.	Employees' share of profits	+1	-1	For an incentive scheme whereby the employees receive some predetermined and agreed upon portion of the profits generated by the Society's operation.	-1	-1	Bonus payment system for logging and manufacturing sections implemented.. Bonus system developed for production section on hold until log supply issue resolved (NTCS min 28/86).	+1	+1
18.	Community's share of profits	-1	-1	For the development of a scheme whereby the local community could directly benefit with a share from the profits of the enterprise such as discounts for school and hospital furniture.	-1	-1		-1	-1
Indirect Benefits	Local	+1	-1	For the vigorous expansion of the value added sector of the enterprise such as preservative treatment of those species which unless treated were not readily marketed and for the furniture and prefabricated housing manufacture.	-1	-1	Investigation into feasibility of establishing a treatment facility undertaken (NTCS PM .Report March/86). Fuel wood supplied to local residence for disabled students by Society from sawmill offcuts as a community service (NTCSPMReport March/86)..	+1	-1
20.	National	+1	-1	A forest management method which would use the harvesting activities to predispose the logged area to regenerate into a vigorous crop for future harvesting.	-1	-1		-1	-1

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21.	International	+1	-1			-1		-1		-1
					For the assessment of the implications of the forest department's strategy for individual tree felling on the sustainability of the forest resource and an assessment of the Society's record in carrying out the instructions of the forest department.					
Indirect Costs	Local	-1	-1		For the assessment of the operation in order to identify the roadblocks to its success and possible solutions which would be agreeable to those having influence over the activities of the enterprise.	-1		-1	+1	-1
22.										
23.	National	-1	-1		For the restriction of uncontrolled exploitation of the forest resource in Kenya in order that the planned and licensed operations could operate in a fair market environment and thereby benefit the nation (NTCS/PWAUG/85).	-1		-1	+1	+1
24.	International	-1	-1		For a harvesting regime which encourages the regeneration of the original forest ecosystem.	-1		-1	-1	-1
	TABLE SUMMARY	20/+1	0/+1			0/+1	4/+1	17/+1		11/+1
		4/-1	20/-1			20/-1	20/-1	7/-1		13/-1

Appendix 6.1.3: Economic Sphere Criteria Rating - Post Intervention - Case Study 1

Process level	Criteria	TL	BM	Negotiation Aim	Roundtable #1	Rate #1	Roundtable #2	Rate #2	Roundtable #3	Rate #3	Roundtable #4	Rate #4
Control of access	1. Degree of Access to Resource	+1	-1	A) For adherence to the original Licence agreement. B) To ensure that any changes in the existing tenure agreement are approved by all relevant authorities.		-1		-1	DFO complies with NTCS Commission request to remove all other timber extractors from the NTCS Licence area and DFO informs commission that 2 year logging plan would be ready soon (NTCSmin7/86; 16/86).	+1	Degree of access to forest resource area changed without agreement of Licencee. Minister of Natural Resources closes Mt. Kenya Forest Reserve indefinitely to logging (Kenya Legal Notice #89, May 25/86).	-1
Harvest + Transport	2. Total available volume (i.e.. Target Log component)	+1	-1	For adherence to the Licence and for the development of felling plans. For the selection of trees to be felled in a coordinated manner with the enterprise to facilitate harvesting and extraction of logs during the dry seasons (Appendix 6.1.1).		-1		-1		-1		-1
	3. Logging Equipment	+1	-1	For the upgrading of logging equipment stable to a rated capacity for known working conditions. For a 2 year lead time on felling plans as per the Licence. For improved mechanics facilities with a lock-up, equipment, spares and supplies.		-1		-1	DFO complies with NTCS Commission request to remove all other timber extractors from the NTCS Licence area and DFO informs commission that 2 year logging plan would be ready soon (NTCSmin7,86; 16/86). Plans to upgrade logging equipment are made (NTCSmin103/86).	+1	Logging equipment not upgraded as planned as Minister of Natural Resources closes Mt. Kenya Forest Reserve indefinitely to logging (Kenya Legal Notice #89, May 25/86).	-1
	4. Cost of logs delivered to the sawmill per m3	+1	-1	A) For a minimum two year lead time on tree selection within mutually agreed felling plans as stipulated in the Licence. B) For a minimum selection of 5,000 m ³ of merchantable logs per year with a two year lead time to facilitate road construction etc.		-1		-1	DFO complies with NTCS Commission request to remove all other timber extractors from the NTCS Licence area and DFO informs commission that 2 year logging plan would be ready soon (NTCSmin7/86; 16/86).	+1	No two year plan for logging and no guarantee of any amount of log volume to be supplied to NTCS as Minister of Natural Resources closes Mt. Kenya Forest Reserve indefinitely to logging (Kenya Legal Notice #89, May 25/86).	-1

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The Sawmill	5.	Ownership of the enterprise	+1	-1	For the facilitation of inputs from the membership (i.e. the owners). For a final adjudication and update on the membership register.		-1		-1	Audits for previous two years initiated (NTCSmin6/86). New commission of local residents with management experience and of high regard appointed by Commissioner of Cooperative Development (NTCSmin5/86).	+1		+1
	6.	Physical Plant	-1	-1	For facilities for sorting and storing sawnwood. For a supply of new blades. For a waste wood removal system within the mill. For the servicing of the generators to improve fuel efficiency and for connection to the national power grid.		-1		-1	Funding for the maintenance needs of the enterprise and of the Project Manager to make the necessary expenditures granted by Commission (NTCSmin28/86). Inquiries regarding the cost of hook up to the national power grid made (NTCS/Corr/ PM/ Feb. 7/86).	+1		+1
	7.	Availability of capital	+1	-1	For compensation from the Ministry of Environment for breach of contract based on the restriction of access to the raw materials as per the 10 Year Licence which led to uneconomical production levels, inefficiencies and an increased debt load.		-1		-1		-1		-1
	8.	Return on net assets/Price-earnings ratio	+1	-1	For a full investigation and report of the reasons for the poor performance of the enterprise.		-1		-1	Audits for previous two years initiated (NTCSmin6/86). New commission of local residents with management experience and of high regard appointed by Commissioner of Cooperative Development (NTCSmin5/86).	+1	Minister of Cooperative Development orders a full investigation and report to his office by Headquarters staff into the Nithi Timber Society (Report to the Minister- NTCS Ltd. March 1987).	+1

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9.	Mill log input capacity (e.g. m3/shift or m3/year).	+1	-1	A) For cooperation of the F.D. to permit a planned logging operation. B) For the implementation of preventative maintenance program in the mill. C) For the implementation of new reporting structure within the operation.	-1	-1	-1	A) DFO complies with NTCS Commission request to remove all other timber extractors from the NTCS Licence area and DFO informs commission that 2 year logging plan would be ready soon (NTCSmin16/86). B) Preventative maintenance program developed (NTCS PMReport July/85) implemented (NTCS PMReport Aug/86). C) Reorganization of reporting structure and new job site descriptions implemented as per instructions of commission(NTCS min28/86).	+1	+1
10.	Sawnwood production m3/shift, by species	+1	-1	For the same issues as for previous criterion.	-1	-1	-1	A) DFO complies with NTCS Commission request to remove all other timber extractors from the NTCS Licence area and DFO informs commission that 2 year logging plan would be ready soon (NTCSmin16/86). B) Preventative maintenance program developed (NTCS PMReport July/85) implemented (NTCS PMReport Aug/86). C) Reorganization of reporting structure and new job site descriptions implemented as per instructions of commission(NTCS min28/86).	+1	+1

Appendix 6.1.3: Economic Sphere Criteria Rating - Post Intervention - Case Study 1

11.	Sales m3/year by species sawnwood, shorts	+1	-1	Same as for the previous two criterion.	-1	-1	-1	A) DFO complies with NTCS Commission request to remove all other timber extractors from the NTCS Licence area and DFO informs commission that 2 year logging plan would be ready soon (NTCSmin16/86). B) Preventative maintenance program developed (NTCS PMReport July/85) implemented (NTCS PMReport Aug/86). C) Reorganization of reporting structure and new job site descriptions implemented as per instructions of commission(NTCS min28/86).	+1	+1
12.	Production cost: currency units/m3	+1	-1	Same as above and for better record keeping.	-1	-1	-1	A) DFO complies with NTCS Commission request to remove all other timber extractors from the NTCS Licence area and DFO informs commission that 2 year logging plan would be ready soon (NTCSmin16/86). B) Preventative maintenance program developed (NTCS PMReport July/85) implemented (NTCS PMReport Aug/86). C) Reorganization of reporting structure and new job site descriptions implemented as per instructions of commission(NTCSmin28/86).	+1	+1
13.	Timber recovery rate: log input/sawnwood output	+1	-1	A) For a greater component of better quality trees in the Forest Department selection process to offset the expense of milling poor quality logs. B) To ensure that logs were graded and stored to facilitate the scheduling of log input by grade and species.	-1	-1	+1	A) The District Forest Officer agreed to consult with the Chief Conservator of Forests regarding the amendment of current tree selection practices (NTCSmin41/85). B) Logs were stored in log yard as per log grade to facilitate flexibility in log feed into mill (NTCSAdmin.Memo Oct7/85).	+1	-1

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14.	Production methods: quality control, handling	+1	-1	For mill run sawmilling, grading and sorting of logs in the yard with respect to the initial breakdown characteristics of each log to permit judicial log input choice dependent on flow or bottlenecks downstream in the mill. See checklist in (Appendix 6.1.8).	-1	-1	-1	Log storage by grade, mill-run sawing and storage of sawn timber by grade and dimension in timber yard initiated (NTCS PM Memo Jan. 20/86).	+1	+1
15.	Operating time available	+1	-1	A) For a preventative maintenance programme including scheduled parts purchasing. B) For accountable employee reporting structure and C) For felling plans with a two year lead time.	-1	-1	-1	A) Preventative maintenance program developed (NTCS PM Report July/85) implemented (NTCS PM Report Aug/86). B) Reorganization of reporting structure and new job site descriptions implemented as per instructions of commission (NTCS min. 12/86) C) DFO informs commission that 2 year logging plan would be ready soon (NTCS min 16/86)	+1	-1
16.	Production Efficiency: (m3/employee /year)	+1	-1	A full investigation and report for the reasons for the low production efficiency with recommendations for actions which would increase the efficiency.	-1	-1	-1		+1	+1
17.	Overheads, Depreciation/ m3	+1	-1	A) For a reappraisal of the depreciation charges based on the actual levels of wear on the sawmill equipment. B) For a re negotiation of the loans and interest charges. C) For the replacement of worn equipment which was reducing production efficiency.	-1	-1	-1	Essential equipment and supplies for efficient operation were purchased and PM empowered by commission to undertake the steps necessary to ensure efficient operation and to report actions taken to the commission rather than request permission in advance (NTCS min 12/86).	+1	+1

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Value Added	18.	Seasoning (drying)	+1	-1	For the stickering and stacking of sorted sawnwood for daily production purposes. For the provision of covered storage. For the provision of sawnwood handling equipment for the storage area. For the restriction of "hot loading" timber from mill deck to the customers' vehicles.		-1	All negotiation aims met except formal covered storage for sawn timber which required significant expenditures (NTCS Admin. Memo. 15/12/85).	+1		+1	+1
	19.	Grading	+1	-1	For mill run production, licensed timber grading at the trimmer benches and sorting of graded timber.		-1	Timber grading initiated at trimmer bench (NTCS Admin. Memo. 15/12/85).	+1		+1	+1
	20.	End trimming	+1	-1	For the end trimmer to be used for squaring and trimming ends only.		-1	End trimmer used to square ends of timber and no longer used to cut out defects (NTCS Admin. Memo. 15/12/85).	+1		+1	+1
	21.	Cutting to order	-1	-1	For mill run production or for premium pricing on custom orders. Reduce the thickness setting to 1.125".		-1	Thickness setting reduced to 1.125" as per PM instructions (NTCS Admin. Memo. 15/12/85).	+1	Log storage by grade, mill-run sawing and storage of sawn timber by grade and dimension in timber yard initiated (NTCS PM Memo Jan. 20/86).	+1	Premium prices set for custom orders (NTCSmin 112/86)
	22.	Resawing/ Edger	+1	+1	For more efficient use of available tools.		-1	Heading crew trained in log selection and approaches to heading operation to reduce bottlenecks downstream in mill (NTCS Admin. Memo. 20/12/85).	+1		+1	+1
	23.	Planing, shaping, molding	-1	-1	For studies to assess a cost effective strategy for these value added services.		-1	Cost benefit review done on these services undertaken resulting in their cessation (NTCS Admin. Memo Dec. 20/85).	+1		+1	+1
	24.	Treatment with preservatives	+1	-1	For the investigation into the development of a treatment facility to treat some of the licensed species which were fast growing and regenerated easily but were less favoured in the market because they are subject to insect and fungal attack such as <i>macaranga</i> spp.		-1		-1	Investigation into feasibility of establishing a treatment facility undertaken (NTCS PM Report March/86).	+1	+1

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25.	Final product production	+1	-1	For an appraisal of the potential for the conversion of sawmill waste into a final product form. For an appraisal of the furniture factory to establish costs and determine suitable productivity bonus.	-1	-1	-1	Bonus payment system introduced to encourage carpenters and craftsmen to utilize low grade timber and mill waste in furniture and housing components (NTCS Admin. Memo 13/1/86).	+1	+1
26.	Extent of market survey : National and International	+1	-1	For permission to export sawnwood. For the enforcement of the Forest Access rules to reduce the uncontrolled extraction of camphor by unlicensed operators so that the availability of timber in the market would reflect the licensed volumes.	-1	-1	-1		-1	-1
27.	Description of end products to be researched	+1	-1	A) For the assessment of possible end products such as air dried, planed, shaped or finished products such as school, office, church and household furniture for the local market and for knock down furniture for the expatriate market. B) For the assessment of the feasibility of expansion of the existing facility to enable the production of the end products to the required standards efficiently.	-1	-1	-1	Report to determine feasible end products initiated Jan. 20/86(NTCS PM Report Aug. 86).	+1	+1
28.	Identification of competitors: existing and potential	+1	-1	For the restriction of uncontrolled access to the forest reserves for the purpose of timber production.	-1	-1	-1	DFO assures commission that NTCS Forest Licence regulations are in effect and that NTCS has exclusive rights to the timber resource on the licence area (NTCS min 7/86).	+1	+1
29.	National economic advantage over competitors	+1	-1	For the investigation of end products to be made from low grade timbers.	-1	-1	-1		-1	-1

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30.	Built in costs structure as a limiting factor	+1	-1	For the restriction of access to the forest resource by those operators who were not accountable and do not pay taxes and other usual overheads. For the provision of the log supply as indicated in the 10 year Licence to permit full production.	-1	-1	-1	-1	-1
31.	Prices	+1	-1	For the increase in log supply to enable an increase in production and efficiency and a reduction in the proportion of overheads per m3 of sawnwood. For the elimination of the sources of illegal sawnwood which was deflating the market prices.	-1	-1	-1	DFO selects trees for felling and promises that the two year felling plans would be ready soon (NTCS min 17/86; 35/86).	+1
32.	Direct sales and shipment: specialization	+1	-1	A) For the payment of commission to sales agent only on introduction orders. B) For the canceling of the sales agent contract. For increased effort in direct sales.	-1	-1	-1	Arrangements with sales agent found to be a disadvantage to the society and procedures to cancel contract initiated (NTCS min 33/86; 40/86; 54/86; Auditor's Report 1986).	+1
Marketing	Indirect sales and shipments: diversification	+1	-1	For the cancellation of the sales agent's contract and to develop in-house expertise for a sales yard locally and in Nairobi.	-1	-1	-1	Arrangements with sales agent found to be a disadvantage to the society and procedures to cancel contract initiated (NTCS min 40/86; 54/86; Auditor's Report 1986). Training program for external sales outlet initiated (NTCS min 40/86).	+1
34.	Customer relations practices and pricing practices	+1	-1	For the establishment of procedures for sales and customer relations to ensure in-house accountability and customer satisfaction.	-1	-1	-1	Sales procedures recommended in PM Report July/85; Aug./85; Nov./85; NTCS min 11/86 accepted by commission (NTCS min 22/86).	+1
								Sales agent contract with the society canceled (NTCS min 11/87)	+1

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35.	Market position, degree of customer loyalty/time	+1	-1	For the restriction of uncontrolled access to the forest resource.		-1	-1	DFO assures commission that NTCS Forest Licence regulations are in effect and that NTCS has exclusive rights to the timber resource on the Licence area (NTCS min7/86).	+1	+1
	TABLE SUMMARY	32/ +1	1/ +1			0/ +1	7/ +1		30/ +1	25/ +1
		3/ -1	34/ -1			35/ -1	28/ -1		5/ -1	10/ -1

Appendix 6.2.1: Mpingo Forest Management Criteria Rating - Post Intervention - Case Study 2

Frame	Criteria	TL	BM	Negotiation Aim	Roundtable #1	Rate #1	Roundtable #2	Rate #2	Roundtable #3	Rate #3
Tenure	1. Security of tenure	-1	-1	Kewero (1990), public lands are accessible to anyone. There is no policy to support control of access or exploitation of public lands for forest exploitation or other uses.		-1	Development of UNEP sponsored projects 'Demarcation of Forest Reserves and Construction of Firebreaks in S.E. Tanzania' and Inventory Programme S.E. Tanzania' (White, 1988).	-1		-1
	2. Threats to tenure	-1	-1	For conditions to be set for land clearance for agriculture whereby mpingo (and other species where deemed necessary) are restricted from felling.	District Council Lindi - Mtwara agree to encourage a ban on felling of mpingo trees on public lands that are cleared for agriculture purposes (Nyaki, 1987).	+1		+1		+1
Forest Management Activities	3. Setting objectives	-1	-1	For setting of objectives of mpingo exploitation to at least retain ecological diversity and maximize future resource utilization options.		-1		-1		-1
	4. Yield control (AAC)	-1	-1	For the development of information to enable the better determination of annual cutting levels on the resource over time.	Compilation of all known age trees, all known harvest rates confirm to Tanzanian F.D. that action required to determine and regulate and appropriate cutting levels for mpingo (Mzina, 1988).	+1		+1		+1
	5. Area of forest	+1	-1	For establishment of reserves over public lands which at the minimum restricts the felling of mpingo.		-1	Development of UNEP sponsored project 'Demarcation of Forest Reserves and Construction of Firebreaks in S.E. Tanzania' (White, 1988).	-1		-1
	6. Species composition	+1	-1	For more detailed inventory of the areas identified by the case study sawmills as the areas where they intend on harvesting in the next 5-10 years.		-1	Operational Project developed for 'Inventory and Reserve Programme S.E. Tanzania' (White, 1988).	+1		+1

Appendix 6.2.1: Mpingo Forest Management Criteria Rating - Post Intervention - Case Study 2

7.	Age/size and volume distribution	-1	-1	For further investigation into the diameter distribution of mpingo including regeneration status, diameter including 0-5, 5-10 cm dbh, stem quality (operational).		-1	Development of UNEP sponsored project 'Inventory and Reserve Programme S.E. Tanzania' (White, 1988).	-1	-1
8.	Growth rates	-1	-1	For follow up on existing growth and yield plots. Establishment and tending of growth plots in areas representative of the sites conditions being harvested now and in foreseeable future.		-1	Bagalla Mpingo Forest Reserve and Management Experimental Programme project drafted (White, 1988).	-1	Initial investigation regarding the applicability of microscopic crystal deposition in mpingo wood as an indication of growth rates undertaken App. 4.3.6 (Gourlay, 1991).
9.	Quality distribution	-1	-1	To include quality parameters in future inventory work. To undertake sample surveys for estimates on quality of mpingo resources inventoried to date.	Suggestion to include mpingo commercial needs descriptors in inventory accepted by Forest Department (Mzina, 1987).	+1	Development of UNEP sponsored project 'Inventory and Reserve Programme S.E. Tanzania' (White, 1988).	+1	
10.	Relative prices	-1	-1	For a system whereby royalty rates can be collected. Set royalty rate to trees felled not to volume delivered to the mill.		-1	Development of UNEP sponsored project 'Provision of Central selling facility to Mpingo Merchants in Dar es Salaam' (White, 1988).	-1	
11.	Intrinsic limitations to regeneration	+1	-1	For trials on vegetative reproduction of "plus trees" as a basis for developing plantation or enrichment planting stock techniques.		-1	Development of UNEP sponsored project 'Mpingo Plantation Programme' (White, 1988).	-1	
12.	Extrinsic limitations to regeneration	+1	-1	For the exclusion of fire from certain areas to determine the successional outcome with respect to mpingo. To establish early burn trials to determine the effects of light intensity fire on regeneration and successional status over time for mpingo.		-1	Development of UNEP sponsored projects 'Demarcation of Forest Reserves and Construction of Firebreaks in S.E. Tanzania' & the 'Bagalla Mpingo Forest Reserve and Management Experimental Programme project drafted' (White, 1988).	-1	

Appendix 6.2.1: Mpingo Forest Management Criteria Rating - Post Intervention - Case Study 2

13.	Protection	-1	-1	For a comprehensive approach to the needs for the protection of the specie.		-1	Based on the information and recommendations in the Moore and Hall report on Mpingo (1987), the 'Save the Mpingo' Campaign received funding from FINNIDA through UNEP (Zentilli, 1988).	+1	+1
14.	Working plans	-1	-1	For centralization of the issuing of licences. The licence must specify the location of the harvesting, the standards of utilization (stump height, min top diam. etc), penalties for non-compliance.	Tanzania Forest Department accepted recommendation (Moore and Hall, 1987) to specify harvest standards for mpingo (Nyaki, 1987).	+1	Development of UNEP sponsored project 'Provision of Central selling facility to Mpingo Merchants in Dar es Salaam' (White, 1988).	+1	+1
15.	Felling cycles	+1	-1	For the development of standard sustained yield management strategies where practical.		-1	A strategy for the sustained yield of mpingo was developed as part of the UNEP sponsored project 'Inventory and Reserve Programme S.E. Tanzania' (White, 1988).	+1	+1
16.	Concessions	-1	-1	For an organized harvest in prescribed areas to facilitate monitoring of the harvesting standards and follow up management activities.		-1	Development of UNEP sponsored project 'Provision of Central selling facility to Mpingo Merchants in Dar es Salaam' & UNEP sponsored project 'Inventory and Reserve Programme S.E. Tanzania' (White, 1988).	-1	-1
17.	Roads	-1	-1	For the establishment of organized exploitation where harvesting is balanced rather than the present situation of least cost first cut and first come first served.		-1	UNEP sponsored project 'Inventory and Reserve Programme S.E. Tanzania' & Demarcation of Forest Reserves and Construction of Firebreaks in S.E. Tanzania' (White, 1988).	-1	-1
18.	Buildings	+1	-1	For an investigation of the feasibility of the location of mobile sawmills in the forest to semi process logs with the intent of making greater use of all trees felled.		-1		-1	-1

Appendix 6.2.1: Mpingo Forest Management Criteria Rating - Post Intervention - Case Study 2

19.	Boundaries	-1	-1	For the administration of the harvesting to be accountable to a more centralized authority.		-1	District Council working in partnership with Forest Department Staff in overseeing and reporting on harvesting activities (Nyaki, 1988).	+1	A locally developed mechanism that was based on the interventionists suggestions was put into practice (Nyaki, 1990). despite the withdrawal of funding previously allocated by the donor agency for project implementation (Zentilli, 1990).	+1
20.	Sample plots	+1	-1	For the establishment of sample plots and for their monitoring to provide information on post logging performance of the residual stand.		-1	Bagalla Mpingo Forest Reserve and Management Programme project drafted (White, 1988).	-1		-1
21.	Prediction	n/a	n/a	n/a		n/a		n/a		n/a
22.	Costings	-1	+1	For a greater proportion of the selling price to be allocated towards better harvesting and utilization standards.	Anticipated changes were not evident (Nyaki, 1987).	-1		-1		-1
23.	Annual records	-1	-1	For a more accountable FD record keeping system with centralized reporting.		-1	Development of UNEP sponsored project 'Provision of Central selling facility to Mpingo Merchants in Dar es Salaam' & UNEP sponsored project 'Inventory and Reserve Programme S.E. Tanzania' (White, 1988)	-1	A locally developed mechanism that was based on the interventionists suggestions was put into practice (Nyaki, 1990). despite the withdrawal of funding previously allocated by the donor agency for project implementation (Zentilli, 1990).	-1
24.	Organisation of silvicultural work	+1	-1	For the development of silvicultural treatments which could be integrated into the harvesting system with the aim of maximizing the potential of the regeneration of mpingo from coppice or root suckers until a more comprehensive strategy for silviculture systems is developed.	Silvicultural treatments that could be integrated were developed (Moore and Hall, 1987) and Forest Department, sawmillers and logging foreman informed (Nyaki, 1987).	+1		+1		+1

Appendix 6.2.1: Mpingo Forest Management Criteria Rating - Post Intervention - Case Study 2

Silviculture Techniques	25.	Regulation of shade and canopy openings	-1	-1	For research to determine the successional status of the species and methods to ensure its continued regeneration.		-1	Development of UNEP sponsored project 'Scholarship for Indigenous Forest Research (White, 1988).	-1		-1
	26.	Treatments to select species mix	-1	-1	Refer to negotiation aim for criteria 25.		-1	Development of UNEP sponsored project 'Scholarship for Indigenous Forest Research (White, 1988).	-1		-1
	27.	Woody climber cutting	n/a	n/a	Not applicable as there are no woody climbers present.		n/a		n/a		n/a
	28.	Polsoning	n/a	n/a	n/a		n/a		n/a		n/a
	29.	Enrichment planting	+1	-1	For the manual disturbance of the roots of the mpingo trees both the felled and leave trees in harvest areas to stimulate sucker Operational trials for early to help in future silvicultural prescriptions.		-1	Development of UNEP sponsored project 'Scholarship for Indigenous Forest Research & 'Bagalla Mpingo Forest Reserve and Management Experimental Programme' project drafted (White, 1988).	-1		-1
	30.	Selection cutting	+1	-1	For a restriction that any tree felled must be delivered to the mill.		-1		-1		-1
	31.	Seed tree provision	+1	-1	For the selection and protection of some plus trees in all areas being harvested.		+1		+1		+1
TABLE SUMMARY			11 / +1	1 / +1			6 / +1		10 / +1		10 / +1
			17 / -1	27 / -1			22 / -1		18 / -1		18 / -1
			3 n/a	3 n/a			3 n/a		3 n/a		3 n/a

Appendix 6.2.2: Social Welfare Criteria Rating - Post Intervention - Mingoyo Cooperative Sawmill - Case Study 2

Aspect	Criteria	TL	BM	Negotiation Aim	Roundtable #1	Rating #1	Roundtable #2	#2	Roundtable #3	Rating #3
Institutions	1. Government Officials	+1	-1	For the reduction in administration levels and for a more liberal access by mill management to the foreign exchange earnings to facilitate the purchase of supplies in a timely manner as determined by the management.	There were plans to allow exporting enterprises greater flexibility and access to portions of the foreign exchange earned through export (Holmes, 1987).	+1	Management of TWICO member enterprises were given greater autonomy in management (Mbonde, 1988).	+1		+1
	2. Independent auditing	+1	-1	Auditing was the responsibility of the Headquarter's staff.		n/a		n/a		n/a
	3. Public participation	+1	-1	For the development of a mechanism whereby public input into the management of the enterprise could be facilitated.		-1		-1		-1
	4. Associations	+1	-1	For the development of a mechanism to provide a more formal association of employees and management to facilitate in-house communication between employees and the management and for communications within the industry and consumers.	A mechanism suggested to improve management and employee dialogue through meetings facilitated by the district forester (Moore and Hall, 1987).	+1		+1	Mingoyo has taken proactive approach to marketing mpingo to actual and potential mpingo users (Nyaki, 1990).	+1
	5. Trade unions	+1	-1	For the establishment of a formal association of the employees to facilitate the development of employee concerns and to communicate with the management. This association would not necessarily have to be a formal union organization.		-1		-1		-1
	6. Documented policy & procedures	+1	-1	For the development and documentation of policy and procedures specifically designed for the successful operation of the enterprise which incorporates mechanisms for employee and public inputs to the management.		-1	Management and employees reported that communication at the mill between all employees had improved (Moyo, 1988).	+1		+1

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Business Management	7.	Clear management goals	+1	+1	The goals of management were fully understood by the employees.		+1		+1	+1
	8.	Lines of reporting	+1	-1	For the review of the interface between the headquarters and the local management to determine the specific role and responsibility centres for each employee.		-1	Respective roles of TWICO headquarters staff and Mingoyo managers had been redefined and the greater autonomy of the local managers encouraged (Holmes, 1988).	+1	+1
	9.	Accountability of management	+1	-1	For management to be more directly accountable at the local level.		-1		-1	-1
	10.	Employment generation	+1	-1	For the development of a strategy for the expansion of the operation whereby development assistance was linked to certain harvesting and processing standards.		-1		-1	-1
	11.	Job satisfaction	+1	-1	For a survey of the employees to determine what conditions would provide them with a greater sense of job satisfaction.		-1		-1	-1
Market Mechanisms	12.	Pricing system	+1	-1	For the assessment of the exporting procedures to determine whether or not an alternative system could be developed which would enable all purchasers of billets to deal directly with the producers in order to keep the market as unrestricted as possible.		-1	Management of TWICO member enterprises were given greater autonomy in management (Mbonde, 1988). Results of information re: direct sales of billet production by-products (Hall, 1988b) led to further discussions with Central Bank of Tanzania regarding streamlining purchasing of billets by foreign users (Nyaki, 1989).	+1	+1

Appendix 6.2.2: Social Welfare Criteria Rating - Post Intervention - Mingoyo Cooperative Sawmill - Case Study 2

	13.	Purchasing contracts	+1	-1	For the centralizing of export licensing and reporting in order to gain an accurate understanding of the trade in mpingo billets from Tanzania to permit the development of a more effective national strategy for the management and marketing of mpingo.		-1	Existing export records traced and evaluated against field records. The resulting assessment of these records led to a recognition of the need for central record keeping of exports and production (Saria, 1988).	-1	
	14.	Supply contracts	+1	-1	For an assessment of the current procedures for obtaining supplies in order to determine a more efficient method which would serve the efficiency of the enterprise better.	Current process for obtaining essential supplies documented and assessed and found to be restrictive to managers efforts to improve the level of efficiency of the enterprise (Moore and Hall, 1987).	+1	Enterprise management gained control over purchasing essential supplies for mpingo operations (Mbonde, 1988).	+1	
	15.	Stability of currency	+1	-1	For direct access by the management to the foreign exchange which their operation earned to facilitate the timely purchasing of spares from overseas in order to reduce inefficiencies in their operations based on inoperable machines. For wages of employees to be linked to the exchange rate to protect the employees against the devaluation of the local currency.		-1		+1	Proposal 7 'Mpingo sawmill equipment upgrade project' did not receive funding as per reasons outlined for criterion 3 above however, mill managers were able to improve blade supply and maintenance through greater access to foreign exchange and through the recognition that improved planning for expected needs was essential (Nyaki, 1990).
Benefit distribution	16.	Shareholders' share of profits	+1	-1	For some degree of more direct accountability to the general public for this operation in order to provide stimulus to the business needs of the enterprise.		-1		-1	
	17.	Employees' share of profits	+1	-1	For the implementation of an incentive scheme.		-1		-1	

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Indirect Benefits	18.	Community's share of profits	-1	-1	For the development of a mechanism whereby the local community would receive a direct share of the profits from the enterprise. The share could be based on the enterprise meeting harvesting standards established to ensure a sustained supply of mpingo.		-1	Mechanism developed whereby local community would receive direct share of profits from mpingo export within proposed project 'Forest Reserve Boundary Demarcation and Firebreak Construction S E Tanzania (White, 1988).	+1	A locally developed mechanism that was based on the interventionists suggestions was put into practice (Nyaki, 1990). Despite the withdrawal of funding previously allocated by the donor agency for project implementation (Zentili, 1990).	+1
	19.	Local	+1	-1	For the assessment of the possibility of expansion of the operation to include processing of the waste material from the sawmill operation into export items.		-1	Sawmill analysis conducted to determine the quantities and the production of billets and by-product materials (Hall, 1988a). Survey and report of end users completed that outlined opportunities for direct sales of billet and billet production by product material (Hall, 1988b). Proposed pilot project to integrate a cooperative of traditional Mkonde carvers with the mpingo billet producers to increase efficiency of log utilization and to increase local employment opportunities and Mpingo small log recovery project proposal (Hall, 1988) received initial funding allocation from donor agency (Zentili, 1988).	+1	Staff changes at main coordinating institution (UNEP) resulted in delays in action being taken and in the implementation of this proposal. Funds that had been allocated were lost through as period of donor's fiscal commitment lapsed (Zentili, 1989).	-1

Appendix 6.2.2: Social Welfare Criteria Rating - Post Intervention - Mingoyo Cooperative Sawmill - Case Study 2

20.	National	+1	+1	The enterprise generated approximately \$250,000 (US) during the study period.		+1	Survey and report of end users completed that outlined opportunities for direct sales of billet and billet production by product material (Hall, 1988b). Mpingo Research Scholarship Fund and Mpingo By-product conversion proposals to provide for further indirect benefits from the mpingo-based economic activities through improved management of the resource through domestic research and for better degree of utilization of felled trees (Hall, 1988b).	+1		+1
21.	International	+1	+1	For an investigation into mechanisms which would enable the return of a portion of the indirect benefits enjoyed internationally as a result of the final product manufacture and use to be returned to the resource and producers.	The high degree of positive value derived from the end use of the mpingo resource at the international level was not reflected in linkages from the end users to current mpingo resource management and exploitation techniques that were unsustainable (Moore and Hall, 1987).	-1	Mpingo Campaign to sustain the mpingo resource and to promote its wise use from the forest to the concert hall initiated by UNEP and funding secured from FINNIDA (Zentilli, 1988).	+1	Musicians Union in the U.S.A., North American and European musicians and musical instrument manufacturers contributed funds for the production of a BBC television documentary that was shown in over 40 countries and was aimed at increasing the awareness in the developed world of the needs and opportunities for improving the management of the mpingo resource and emphasizing the direct linkages between the producers and the users and the need for all for equitable participation in the management of the resource (Jones, 1991; Lamb, 1991). Also the IMA has been developed as a mechanism to facilitate the introduction of local and international values into the system of mpingo management..	+1

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Indirect Costs	22.	Local	-1	-1	For the improvement of worker health and safety conditions.	-1	Small grants 'Mpingo sawmill workers' safety upgrading' proposal aimed at initiating a pilot programme to improve safety of mill workers (Hall, 1988b).	+1	Staff changes at main coordinating institution (UNEP) resulted in delays in action being taken and in the implementation of this proposal. Funds that had been allocated were lost through as period of donor's fiscal commitment lapsed (Zentilli, 1989).	-1
	23.	National	-1	-1	For a national strategy to ensure that the industries based on the mpingo resource operate in concert with the needs of the market and with respect to the long-term optimization of the benefits to the people of Tanzania obtained from mpingo.	-1		-1	There is a positive attitude among the producers of mpingo billets and the managers of the mpingo resource to strive for improved use and management of the resource for the betterment of the nation (Nyaki, 1990).	+1
	24.	International	-1	-1	For the development of a mechanism to facilitate the input of international community values into the development of interventions into this enterprise that would be compatible with sustaining the benefits derived from this enterprise both nationally and internationally	-1		-1	Musician's Union in the U.S.A., North American and European musicians and musical instrument manufacturers contributed funds for the production of a BBC television documentary that was shown in over 40 countries and was aimed at increasing the awareness in the developed world of the needs and opportunities for improving the management of the mpingo resource and emphasizing the direct linkages between the producers and the users and the need for all for equitable participation in the management of the resource (Jones, 1991; Lamb, 1991). Also the IMA has been developed as a mechanism to facilitate the introduction of local and international values into the system of mpingo management.	+1

Appendix 6.2.3: Economic Sphere Criteria Rating - Post Intervention - Mingo Cooperative Sawmill -Case Study 2

Process level	Criteria	TL	BM	Negotiation Aim	Roundtable #1	Rate #1	Roundtable #2	Rate #2	Roundtable #3	Rate #3
Control of access	1. Degree of Access to Resource	-1	-1	For the centralization of the issuance of licenses to cut and remove forest products from public lands. Include specifications of the exact location of harvests, the volumes to be removed, the time limit of activity and penalties for under utilization.		-1	Development of UNEP sponsored project 'Provision of Central selling facility to Mpingo Merchants in Dar es Salaam' & UNEP sponsored project 'Inventory and Reserve Programme S.E. Tanzania' (White, 1988)	+1	Mingo harvesting activities undertaken with inputs and monitoring by Regional Forest Officer (Nyaki, 1990).	+1
Harvest + Transport	2. Total available volume (i.e.. Target Log component)	-1	-1	For the survey and mapping of the general distribution of mpingo in Tanzania and for the identification of concentrations which are economically accessible. Have these areas gazetted as forest reserves to facilitate management control and conduct operational inventories within these new Forest Reserves to assist in guiding the determination of Annual Allowable Harvest Rates (Moore and Hall, 1987).		-1	Existing survey work on mpingo amalgamated through UNEP/FINNIDA sponsored project (Moore and Hall, 1987) and development of projects for Inventory and Reserve Programme in S E Tanzania and a Forest Reserve Boundary and Firebreak Construction S E Tanzania (White, 1988).	+1		+1

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3.	Logging Equipment	+1	-1	For the repair of log transport vehicles and establish a maintenance programme for the transport lorries. Log transport is the limiting factor to this operation at present. The result is that many trees are felled, but only the best logs are taken.		-1	The development of a small grant proposal for the upgrade of log transport at a pilot sawmill to demonstrate that log dependant variable in tree felling rates that exceeded the log delivery and processing rates. A proposal that would be funded by end users of mpingo to reduce the ratio of trees felled to trees brought to the mill for processing, received positive reaction from donor agency and from end users (Zentilli, 1988).	+1	Staff changes at main coordinating institution (UNEP) resulted in delays in action being taken and in the implementation of this proposal. Funds that had been allocated were lost through as period of donor's fiscal commitment lapsed (Zentilli, 1989).	-1
4.	Cost of logs delivered to the sawmill per m ³	+1	-1	For the establishment of record keeping of the logging section to determine actual costs of log delivery.		-1		-1		-1
5.	Ownership of the enterprise	+1	-1	For a greater degree of autonomy in the management of the day to day activities of the enterprise and for a greater degree of accountability of the TWICO organization in meeting its mandate through the forest-based industries.		-1	Management of TWICO member enterprises were given greater autonomy (Mbonde, 1988).	+1		+1
6.	Physical Plant	+1	-1	For blade supply and blade sharpening, maintenance equipment and supplies within a saw machine upgrading and maintenance program.		-1		-1	Proposal 7 'Mpingo sawmill equipment upgrade project' did not receive funding as per reasons outlined for criterion 3 above however, mill managers were able to improve blade supply and maintenance through greater access to foreign exchange and through the recognition that improved planning for expected needs was essential (Nyaki, 1990).	+1

Appendix 6.2.3: Economic Sphere Criteria Rating - Post Intervention - Mingoyo Cooperative Sawmill -Case Study 2

7.	Availability of capital	+1	-1	For a one time injection of capital (either grant or loan) to fund repairs so that the sawmill can operate with economic efficiency. Increased production and export earnings would provide sufficient operating capital for repayments and maintenance.		-1		-1	Proposal 7 'Mpingo sawmill equipment upgrade project' did not receive funding (Zentilli, 1990).	-1
8.	Return on net assets/ Price-earnings ratio	-1	-1	For an accounting and record keeping system on production costs associated with the costs of mpingo production exclusively.		-1	Enterprise records system solely for mpingo production in place (Holmes, 1988).	+1		+1
9.	Mill log input capacity (e.g.. m ³ /shift or m ³ /year).	+1	-1	For the upgrading and maintenance of the sawmill equipment.		-1		-1		-1
10.	Sawnwood production m ³ /shift, by species	+1	-1	For the upgrading and maintenance of the sawmilling equipment and for the analysis and quantification of the mpingo produced but not exported.		-1	Sawmill analysis conducted to determine the qualities and the quantities of mpingo production of billets and by-product materials (Hall, 1988a).	+1		+1
11.	Sales m ³ /year by species sawnwood, shorts	+1	-1	For the upgrading and maintaining of the sawmill equipment to increase recovery rates of prime grade billets.		-1		-1	Proposal 7 'Mpingo sawmill equipment upgrade project' did not receive funding as per reasons outlined for criterion 3 above however, mill managers were able to improve blade supply and maintenance through greater access to foreign exchange and through the recognition that improved planning for expected needs was essential (Nyaki, 1990).	+1
12.	Production cost: currency units/m ³	+1	-1	For more comprehensive record keeping to accurately determine the breakdown of production costs.		-1	Enterprise records system solely for mpingo production in place (Holmes, 1988).	+1		+1

Appendix 6.2.3: Economic Sphere Criteria Rating - Post Intervention - Mingoyo Cooperative Sawmill -Case Study 2

13.	Timber recovery rate: log input/sawn wood output	+1	-1	For a technical review of the sawmilling process upon which to base an advisory program for the upgrading of processing techniques, the selection and use of equipment and for saw maintenance and the increase in recovery rates.		-1	Sawmill analysis conducted to determine the quantities and the quantities of mpingo production of billets and by-product materials (Hall, 1988a).	+1		+1
14.	Production methods: quality control, handling	+1	-1	For a technical review of the sawmilling process as stated in previous criterion.		-1	Sawmill analysis conducted to determine the quantities and the quantities of mpingo production of billets and by-product materials (Hall, 1988a).	+1		+1
15.	Operating time available	+1	-1	For the improvement of logging sector and log transporting equipment.		-1		-1		-1
16.	Production Efficiency: (m ³ / employee/ year)	+1	-1			-1		-1		-1
17.	Overheads, Depreciation/ m ³	-1	+1	For a specific accounting and record keeping system for the mpingo operation.		-1	Enterprise records system solely for mpingo production in place (Holmes, 1988).	+1		+1
18.	Seasoning (drying)	+1	-1	For a system whereby the identification of the date of manufacture can be traced for each billet or lot of billets and for special express shipment of billets in crates to avoid incorrect storage while on route to the purchasers to reduce rejections.		-1	Sawmiller initiated a system to identify production lots by date and improve shipping methods aimed at reducing degrade during shipment of billets (Mbonde, 1988).	+1		+1
19.	Grading	+1	-1	For a system to identify process steps as indicated in previous criterion.		-1	System in place used 0.25 cubic metre wooden crates marked with production dates to store and ship billets (Mbonde, 1988).	+1		+1
20.	End trimming	+1	+1	None required at this time.		+1		+1		+1
Value Added										

Appendix 6.2.3: Economic Sphere Criteria Rating - Post Intervention - Mingoyo Cooperative Sawmill -Case Study 2

	21.	Cutting to order	+1	-1	Bell billet production was greatly dependent on the quality and size of the logs. Large diameter logs with few defects were required to obtain a greater proportion of bells per log. Better log selection and more efficient log hunting is necessary.		-1		-1		-1
	22.	Resawing/ Edger	-1	-1	For the a survey and analysis of the material which is currently considered to be waste or by-product to establish its quantity and its qualities. There may be material which could be obtained for use if the by-product materials were resawn.		-1	Sawmill analysis conducted to determine the qualities and the quantities of mpingo production of billets and by-product materials (Hall, 1988a).	+1		+1
	23.	Planing, shaping, molding	n/a	n/a			n/a		n/a		n/a
	24.	Treatment with preservatives	n/a	n/a			n/a		n/a		n/a
	25.	Final product production	+1	-1	For the investigation of further local processing of the billet material for the end-users.		-1	Investigation undertaken and survey of end users resulted in unanimous rejection of further processing beyond the billet stage at this time (Hall, 1998b)	+1	Mingoyo has taken proactive approach to marketing mpingo to actual and potential mpingo users (Niyaki, 1990).	+1
Market Studies	26.	Extent of market survey: national/ inter-national	+1	-1	For a survey of end users for the purpose of establishing direct sales.		-1	Survey and report of end users completed that outlined opportunities for direct sales of billet and billet production by produc material (Hall, 1988b).	+1		+1
	27.	Description of end products to be researched	+1	-1	For a survey of the export markets to identify potential uses for mpingo wood that could be produced within the enterprise organization (Moore and Hall, 1987).		-1	Survey and report of end users completed that outlined opportunities for direct sales of billet and billet production by produc material (Hall, 1988b).	+1		+1

Appendix 6.2.3: Economic Sphere Criteria Rating - Post Intervention - Mingoyo Cooperative Sawmill -Case Study 2

28.	Identification of competitors: existing and potential	+1	-1	For the establishment of harvesting and utilization standards which lead to better mpingo forest management. Assign export quotas to those producers who best meet the standards or exceed them with novel ideas and techniques to maximize sustained development based on the mpingo resource. For a survey to determine other sources of mpingo such as northern Mozambique that may also supply mpingo logs to billet makers in Europe and Japan. For a survey of all sawmill capacity: actual, potential and planned.		-1	Survey work undertaken and reporting other sources of mpingo and present and future sawmill production capacity (Hall 1988a & 1988b). Standards for harvesting and utilization suggested (Moore and Hall, 1987). Innovative methods to help improve enterprise productivity and efficiency through collaboration with donors on specific activities proposed (Hall 1988a).	+1	End users (musical instrument manufacturers and musicians) contacted and found to be supportive of proposed collaborative efforts to improve harvesting and utilization of mpingo resource (Lamb, 1989)	+1
29.	National economic advantage over competitors	+1	-1	For the establishment and monitoring of harvesting and utilization techniques which lead to sustained yield of the mpingo resource within Tanzania. The market for mpingo billets is exclusively in the developed world where this style of resource management would be favoured.		-1		-1		-1
30.	Built in costs structure as a limiting factor	-1	-1	For greater autonomy for the local management in the day to day running of the mill and greater access to capital for spare parts purchasing. For a refinement of the exporting methods which include full prepayment to Central Bank by the buyer.		-1	Management of TWICO member enterprises were given greater autonomy in management (Mbonde, 1988). Results of information re: direct sales of billet production by-products (Hall, 1988b) led to further discussions with Central Bank of Tanzania regarding streamlining purchasing of billets by foreign users (Nyaki, 1989).	+1		+1

Appendix 6.2.3: Economic Sphere Criteria Rating - Post Intervention - Mingoyo Cooperative Sawmill -Case Study 2

31.	Prices	+1	-1	For the assessment of the export record keeping with the aim of improving the information available and ensuring consistency in the number of billets per m ³ .		-1	Existing export records traced and evaluated against field records. The resulting assessment of these records led to a recognition of the need for central record keeping of exports and production (Saria, 1988).	+1	+1
Marketing	32. Direct sales and shipment specialization	+1	-1	For an investigation into the role of the stockists in the market in order to determine if there is an advantage to the producers to develop methods of making direct sales of the billets to the instrument manufacturers exclusively.		-1	Investigation undertaken through UNEP/FINNIDA funding report to F.D. outlined advantages of direct marketing to the producers (Hall, 1988b).	+1	+1
	33. Indirect sales and shipments: diversification	-1	-1	For a survey of end users to determine their needs. For an assessment, based on the information gathered from the end users' survey, to determine the best course of action for Mingoyo regarding the marketing method to be employed.		-1	Investigation undertaken through UNEP/FINNIDA funding of all known end users and known potential producers and Tanzania F. D. to outline end users needs and constraints direct business dealings with producers (Hall, 1988b).	+1	+1
	34. Customer relations practices and pricing practices	-1	-1	For an assessment of the marketing mechanisms for mpingo billets and for the development of a system of sales which is convenient for the both the customer and for the producer and the Tanzanian Government.		-1	Investigation undertaken through UNEP/FINNIDA funding report to F.D. outlined advantages of direct marketing to the producers (Hall, 1988b).	+1	+1
	35. Market position, degree of customer loyalty/time	+1	-1	For the development of good customer relations as soon as possible in order to establish a record of good service and develop customer loyalty before the market becomes a buyers' market rather than the sellers' market it is at present.		-1	Mingoyo has taken proactive approach to marketing mpingo to actual and potential mpingo users (Nyaki, 1990).	-1	+1

Appendix 6.2.4

List Of Mpingo Programme Projects With Total Estimated Cost

	<u>Description</u>	<u>Time Span (years)</u>	<u>Cost (US \$) (1988)</u>
1	Provision of Transport to District Forest Staff, Tanzania, for Implementation of "Save the Mpingo" campaign	1	53, 570
2	Provision of Transport to Regional Forest Staff, Tanzania, for Implementation of "Save the Mpingo" campaign	1	260, 787
3	Mpingo Plantation Programme	8	59,717
4	Provision of Central Selling facility to Mpingo Merchants at Mpingo Cavers' Co-operative, Dar-es-Salaam, Tanzania	1	10,459
5	Bagalla Forest Reserve and Mpingo Management Experimental Programme	10	452,833
6	Inventory and Forest Reservation Programme South-East Tanzania	10	11,023,378
7	Forest Reserve Boundary Demarcation and Firebreak Construction South-East Tanzania	10	4,935,228
8	Scholarship Program for University Forest Programme - (To focus on Forest Fire and its effects on Succession, wood quality and age class distribution.	5	60,000

Source: White, (1988)

Appendix 6.2.5

Recommended Small Grant Projects for the Mpingo Campaign

<u>Title of Project</u>	<u>EstimatedCost (\$US)</u>
1. Mpingo Research Fund	122,550.00
2. Mpingo by-product conversion project	37,018.50
3. Mpingo Small Log Sawmill Recovery Project	39,560.00
4. Mpingo Sawmill Workers Safety Upgrading (Five (5) separate projects @ US\$ 73,542.50)	367,712.50
5. Mpingo Traditional Carvers Co-operative: Pilot Project to Integrate Carvers with the Sawmilling industries	29,382.50
6. Mpingo Sawmill Log Transport Upgrade Project	111,550.00
7. Mpingo Sawmill Equipment Upgrade Project	64,687.50

Source: Hall (1988b)

Appendix 6.3.1: Social Welfare Criteria Rating - Post Intervention - African Blackwood Enterprises - Case Study 3

Aspect	Criteria	IL	BM	Negotiation Aim	Roundtable #1	Rate #1	Roundtable #2	Rate #2	Roundtable #3	Rate #3
Institutions	1. Government Officials	+1	-1	For the more rapid processing of import orders for industrial spare parts and for the export of goods by the government agencies involved.	As a private entrepreneur the owner of this mill was more flexible than counterparts in government managed enterprises and was able to take advantage of changes in Tanzanian laws that gave exporters better access to the foreign exchange their exports earned that could be used to purchase necessary supplies from foreign suppliers (Amin, 1987).	+1		+1		+1
	2. Independent auditing	+1	-1	For an audit of the enterprise and of the status of tax payments expected to be generated from the enterprise.		-1	Representatives from the District Councils where log harvesting was occurring conducted on-going audits of production as a basis for tax assessment (Mariki, 1988).	+1		+1
	3. Public participation	+1	-1	For an assessment of the role of private enterprise in the mpingo processing industry and its contribution of benefits to society in order to establish a base line for possible changes in the policy and procedures of private enterprise in Tanzania.		-1	Information collected from private and parastatal mpingo processors provided base line information to assess comparative roles of both systems of production in Tanzania (Hall, 1988a).	+1		+1
	4. Associations	+1	-1	For the formation of a mpingo billet exporters' association that could speak to the government as a united voice with regard to the common problems of exporting and importing, the potential problem of competition from other countries.		-1		-1		-1

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5.	Trade unions	+1	-1	For a more formal assessment of the terms and conditions, benefits and job security and provisions for health care that the employees had at the enterprise.	-1	-1	-1
6.	Documented policy & procedures	+1	-1	For the incorporation of harvesting standards having the objective of reducing the volume of mpingo left in the forest into a written corporate document that would become part of the in-house standards of the enterprise.	-1	-1	-1
7.	Clear management goals	+1	-1	For a social and environmental concerns to be included with economic objectives in the management goals.	-1	-1	-1
8.	Lines of reporting	+1	+1	Lines of reporting were clear.	n/a	n/a	n/a
9.	Accountability of management	+1	-1	For the review of the laws governing the exploitation of the forest resource on public lands with the purpose of determining a method of setting standards by which the management of the enterprises can be assessed for their accountability.	-1	-1	-1
10.	Employment generation	+1	-1	For an assessment of the international market for mpingo billets to determine the demand, alternative sources and expected capacity of the Tanzanian producers as a basis for advising the Tanzanian government on possible export quotas for each producer.	-1	+1	+1
				Survey of international markets for mpingo billets and billet production by-products and for alternate sources of mpingo timber undertaken and report accepted by Tanzanian Forest Department (Hall, 1988b).			

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	11.	Job satisfaction	+1	-1	For a survey of the workers to determine what conditions would provide them with a greater sense of job satisfaction.		-1	Survey of workers undertaken and report prepared. Safety of workers was a main concern. Proposal on upgrading worker safety prepared. (Hall 1988a).	+1		+1
Market Mechanisms	12.	Pricing system	+1	-1	For the assessment of the exporting procedures to determine whether or not an alternative system could be developed whereby smaller volume purchasers could have more ready access to the suppliers in order to keep the market open and reduce the impact of agents operating as a middle man on the pricing system.		-1	Impact of exporting regulations and procedures assessed. Government officials indicate a willingness to change process to facilitate smaller volume direct buyers (Mbonde, 1988).	+1		+1
	13.	Purchasing contracts	+1	-1	For the centralizing of export licensing and reporting in order to gain an accurate understanding of the trade in mpingo billets from Tanzania to permit better planning.		-1	Existing export records traced and evaluated against field records. The resulting assessment of these records led to a recognition of the need for central record keeping of exports and production (Saria, 1988).	-1		-1
	14.	Supply contracts	+1	-1	For the streamlining of government requirements for the importation of goods for production machinery.	The need to facilitate a rapid processing of supply contracts for enterprises that earn foreign exchange was recognized and government requirements were reported to have been reprioritized (Amin, 1987).	+1		+1		+1
	15.	Stability of currency	+1	-1	Determine preventative maintenance and supply needs and order in advance to minimize effect of inflation and maintain working efficiency.		-1	A technical review of the sawmill operation sponsored by UNEP was made available to the entrepreneur and action was taken by this owner to improve the preventative maintenance program (Amin, 1989).	+1		+1
Benefit distribution	16.	Shareholders' share of profits	+1	-1	Encourage the selling of shares to the communities where the wood is harvested.		n/a		n/a		n/a

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17.	Employees' share of profits	+1	-1	For a greater proportion of the profits from the mpingo trade being allocated for the greater benefit of the people in the area where it is harvested and processed and to the management of the resource as a base for sustained development.		-1		-1	
18.	Community's share of profits	-1	-1	For the establishment of centralized licensing for harvesting that specified the exact location of harvesting, the volume permitted for removal and other harvesting specifications and penalties for non-compliance, increased royalty rates chargeable on all felled trees in order to increase the local community's share of the profits generated by the enterprise.		-1	The District Council assigned officers to monitor harvesting and to collect royalty payments on logs delivered to the mill (Mariki, 1988). A mechanism was developed whereby the local community would receive direct share of profits from mpingo export within proposed project 'Forest Reserve Boundary Demarcation and Firebreak Construction S E Tanzania (White, 1988).	+1	Mechanism not put into practice (Niyaki, 1990). Previously allocated funding from donor agency for project implementation withdrawn (Zentilli, 1990).
19.	Local	+1	-1	For an assessment of the possibility of expansion of the operation to include processing of the waste material from the sawmill operation into export items.		-1	Sawmill analysis conducted to determine the qualities and the quantities of mpingo production of billets and by-product materials (Hall, 1988a). Survey and report of end users outlined opportunities for direct sales of billet and billet production by product material (Hall, 1988b).	+1	Owner followed up on marketing leads provided through UNEP intervention and established direct export sales of billet production by-products (Amin, 1990).
20.	National	+1	+1	The mill generated over \$250,000 (US) during the study period.		+1	Opportunities for direct export sales of mpingo billet production by-products identified (Hall, 1988b).	+1	Owner followed up on marketing leads provided through UNEP intervention and established direct export sales of billet production by-products providing for an increase in employment at the enterprise (Amin, 1990).

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21.	International	+1	-1	For an investigation into mechanisms that would enable some of the indirect benefits enjoyed as a result of the final product manufacture and use to be returned to the resource and the producers.		-1	Mpingo Campaign to sustain the mpingo resource and to promote its wise use from the forest to the concert hall initiated by UNEP and FINNIDA (Zentili, 1988).	+1	Musician's Union in the U.S.A., North American and European musicians and musical instrument manufacturers contributed funds for the production of a BBC television documentary that was shown in over 40 countries and was aimed at increasing the awareness in the developed world of the needs and opportunities for improving the management of the mpingo resource and emphasizing the direct linkages between the producers and the users and the need for all for equitable participation in the management of the resource (Jones, 1991; Lamb, 1991). Also the IMA has been developed as a mechanism to facilitate the introduction of local and international values into the system of mpingo management.	+1
Indirect Costs	22.	Local	-1	-1	For the improvement of worker health and safety conditions.	-1	Small grants 'Mpingo sawmill workers' safety upgrading' proposal aimed at initiating a pilot programme to improve safety of mill workers (Hall, 1988b).	+1	Staff changes at main coordinating institution (UNEP) resulted in delays in action being taken and in the implementation of this proposal. Funds that had been allocated were lost through as period of donor's fiscal commitment lapsed (Zentili, 1989). Owner's efforts to improve worker safety negligible (Nyaki, 1990).	-1

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23.	National	-1	-1	For a national strategy to ensure that the industries based on the mpingo resource operate in concert with respect to the international market place and with respect to the long-term optimization of the benefits to the people of Tanzania obtained from mpingo.	Baseline information was collected to provide a foundation upon which to develop a national strategy (Moore and Hall, 1987).	+1	Sixteen projects were developed for the improvement of the management of the mpingo-based sector of Tanzania (Hall, 1988a & b; White, 1988).	+1	There is a positive attitude among the producers of mpingo billets and the managers of the mpingo resource to strive for improved use and management of the resource for the betterment of the nation (Nyaki, 1990).	+1
24.	International	-1	-1	For the development of a mechanism that would facilitate the inputs of the international community into activities that would identify means by which the use of the mpingo resource could be compatible with sustained benefits to the producers.	Baseline information was collected to provide a foundation upon which to develop a national strategy for the mpingo-based sector of the economy (Moore and Hall, 1987).	+1	Sixteen projects were developed for the improvement of the management of the mpingo-based sector of Tanzania (Appendix 7.2.4, 7.2.5; Hall, 1988a & b; White, 1988).	+1	Musicians' Union in the U.S.A., North American and European musicians and musical instrument manufacturers contributed funds for the production of a BBC television documentary that was shown in over 40 countries and was aimed at increasing the awareness in the developed world of the needs and opportunities for improving the management of the mpingo resource and emphasizing the direct linkages between the producers and the users and the need for all for equitable participation in the management of the resource (Jones, 1991; Lamb, 1991). Also the IMA has been developed as a mechanism to facilitate the introduction of local and international values into the system of mpingo management.	+1
	TABLE	20/	2/			4/		15/		13/
	SUMMARY	+1	+1			+1		+1		+1
		4/-	22			18/		7/		9/
		1	/-1			+1		-1		-1
						2/		2/		2/
						n/a		n/a		n/a

Appendix 6.3.2: Economic Sphere Criteria Rating

Process level	Criteria	TL	BM	Negotiation Aim	Roundtable #1	Rate #1	Roundtable #2	Rate #2	Roundtable #3	Rate #3
Control of access	1. Degree of Access to Resource	+1	-1	For the centralization of the issuance of licenses to harvest and remove forest products from public lands and include specification of the exact location, volumes to be felled, time limits and penalties for poor utilization. Balance low vs. high cost log source areas over time.		-1	Project proposals were developed through a UNEP sponsored programme in collaboration with the government of Tanzania for a central selling facility for mpingo, for the establishment of mpingo forest reserves and for a forest inventory that includes commercial aspects of the mpingo resource and funding was secured through a donor agency (Zentilli, 1989).	+1	Staff changes at main coordinating institution (UNEP) resulted in delays in action being taken and in the implementation of this proposal. Funds that had been allocated were lost through as period of donor's fiscal commitment lapsed (Zentilli, 1989).	-1
Harvest + Transport	2. Total available volume (i.e.. Target Log component)	-1	-1	For the survey and mapping of the general distribution of mpingo in Tanzania and for the identification of concentrations which are economically accessible. For the gazeteting of these areas as forest reserves to facilitate forest department control and for operational inventories within these new Forest Reserves to assist in the determination of annual allowable cuts (Moore and Hall, 1987).		-1	Existing survey work on mpingo amalgamated through UNEP/FINNIDA sponsored project (Moore and Hall, 1987) and development of projects for Inventory and Reserve Programme in S E Tanzania and a Forest Reserve Boundary and Firebreak Construction S E Tanzania (White, 1988).	+1	Staff changes at main coordinating institution (UNEP) resulted in delays in action being taken and in the implementation of this proposal. Funds that had been allocated were lost through as period of donor's fiscal commitment lapsed (Zentilli, 1989).	-1
	3. Logging Equipment	+1	-1	For the upgrading of the log transportation. Currently log transport is the limiting factor to sawmill production which results in the felling of more trees than are transported to permit the selection of only the highest grade of logs for transport.		-1		-1		-1
	4. Cost of logs delivered to the sawmill per m3	+1	-1	For the establishment of record keeping of the logging section to determine actual costs of log delivery.	Record keeping system of logging costs initiated by the owner (Amin, 1987).	+1		+1		+1

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The Sawmill	5.	Ownership of the enterprise	+1	-1	For a comprehensive review of the enterprise in order to establish a benchmark assessment and to identify areas of potential improvement.	A survey of the mpingo based sector in Tanzania initiated by UNEP in collaboration with the Government of Tanzania to establish a comprehensive assessment of this sector including the identity of all mpingo processing enterprises and their ownership pattern (Moore and Hall, 1987).	+1	Technical studies undertaken of the mpingo - based industry to identify areas of potential improvement (Hall, 1988b).	+1	Owner took action on recommendations reported that were aimed at improving the enterprise (Amin, 1990).	+1
	6.	Physical Plant	+1	-1	For a technical assessment of the operation in order to determine possible improvements in the processing system. For example, the hand feeding of irregular logs into the circular bench saw puts the maximization of the recovery rate and the workers at risk.		-1	Technical study undertaken of the mpingo - based industry to identify areas of potential improvement resulting in a number of proposed project proposals focusing on improving employee safety and upgrading of sawmill equipment (Hall, 1988a).	+1	Projects not initiated (Nyaki, 1990). Previously allocated funding from donor agency for project implementation withdrawn (Zentilli, 1990).	+1
	7.	Availability of capital	+1	-1	For a review of the importation rules for industrial spares to identify options for streamlining these government controls.		-1		-1		-1
	8.	Return on net assets/Price-earnings ratio	+1	+1	For a review of the cost of production in conjunction with a technical review aimed at assisting the owner to reduce costs and increase efficiency.		+1		+1		+1
	9.	Mill log input capacity (e.g.. m3/shift or m3/year).	+1	-1	For a comprehensive study of log input capacity aimed at establishing the causes for limits to input.		-1	Technical study undertaken of the mpingo - based industry that reported on log input capacity (Hall, 1988a).	+1	Owner took action on recommendations reported that were aimed at improving the enterprise (Amin, 1990).	+1
	10.	Sawnwood production m3/shift, by species	+1	-1	For a survey to determine the factors which restrict the level of production of billets.		-1	Technical study undertaken of the mpingo - based industry that reported sawmill production capacity (Hall, 1988a).	+1	Owner took action on recommendations reported that were aimed at improving the enterprise (Amin, 1990).	+1

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11.	Sales m3/year by species sawnwood, shorts	+1	-1	For the assessment of the system of harvesting and processing mpingo in order to determine possible means of increasing the production of billets while reducing the volume of trees felled to obtain logs.	-1	Mpingo Campaign resulted in a number of proposals receiving approval for funding from the donor agency that were aimed at improving recovery rates of billets and reducing log harvest rates (e.g. Mpingo by-product conversion project, Small log recovery project sawmill equipment upgrade, Establishment of Mpingo Forest Reserve (Hall, 1988a; White 1988).	+1	Despite staff changes at main coordinating institution (UNEP) and the resulting loss of funding and absence of the implementation of these proposals, the entrepreneur took action on reported recommendations that were aimed at improving the enterprise (Amin, 1990).	+1
12.	Production cost: currency units/m3	n/a	n/a	For the establishment of record keeping system for production costs to enable the management to monitor more accurately the level of efficiency.	n/a		n/a		n/a
13.	Timber recovery rate: log input/ sawnwood output	-1	-1	For a technical review of the logging and sawmilling process upon which to base an advisory program for the upgrading of processing techniques, for the selection of standing trees for felling and use and maintenance of equipment for the increase of the recovery rate of the sawmill.	-1	Technical study undertaken of the mpingo - based industry to identify areas of potential improvement resulting in a number of proposed project proposals focusing on improving mpingo - based sector in Tanzania (Hall, 1988a).	+1	Despite staff changes at main coordinating institution (UNEP) and the resulting loss of funding and absence of the implementation of these proposals, the entrepreneur took action on reported recommendations that were aimed at improving the enterprise (Amin, 1990).	+1
14.	Production methods: quality control, handling	+1	-1	For a technical review of the logging and sawmilling process upon which to base an advisory program for the upgrading of processing techniques and the selection of standing trees for felling.	-1	Analysis of logging and sawmilling industry conducted to determine the qualities and the quantities of log harvest and of mpingo product materials (Hall, 1988a).	+1	Despite staff changes at main coordinating institution (UNEP) and the resulting loss of funding and absence of the implementation of these proposals, the entrepreneur took action on reported recommendations that were aimed at improving the enterprise (Amin, 1990).	+1
15.	Operating time available	+1	+1	For the improvement of the logging sector and log transport equipment to ensure constant supply of logs of the highest grade.	+1		+1		+1

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16.	Production Efficiency: (m3/employee /year)	+1	-1	For a technical review of the sawmilling process upon which to base an advisory program for the upgrading of processing techniques.		-1	Analysis of logging and sawmilling industry conducted to determine the qualities and the quantities of log harvest and of mpingo production of billets and by-product materials (Hall, 1988a).	+1	Despite staff changes at main coordinating institution (UNEP) and the resulting loss of funding and absence of the implementation of these proposals, the entrepreneur took action on reported recommendations that were aimed at improving the enterprise (Amin, 1990).	+1
17.	Overheads, Depreciation/ m3	n/a	n/a			n/a		n/a		n/a
18.	Seasoning (drying)	+1	-1	For a system whereby the identification of the date of manufacture can be traced for each billet or lot of billets and for special express shipment of billets in crates to avoid incorrect storage while on route to the purchasers to reduce rejections.		-1	Owner/entrepreneur initiated a system to identify production lots by date and improve shipping methods aimed at reducing degrade during shipment of billets (Amin, 1988).	+1		+1
19.	Grading	+1	-1	For a system to identify process steps as indicated in previous criterion.		-1	A system to pack billets in 0.25 cubic metre wooden crates marked with production dates to store and ship billets was initiated (Amin, 1988).	+1		+1
20.	End trimming	+1	+1	None required at this time.		+1		+1		+1
21.	Cutting to order	+1	-1	Bell billet production was greatly dependent on the quality and size of the logs. Large diameter logs with few defects were required to obtain a greater proportion of bells per log. Better log selection and more efficient log hunting is necessary.	Billet sawyers also responsible for cross cutting mpingo logs before input into the sawmill. The sawyers are on a production bonus system. Sawyers are experienced in "reading" the logs to maximize bell shaped billet production opportunities. Bell shaped billets are the limiting factor in billet set production. This system was in place to maximize the billet set production from logs delivered. (Amin, 1987).	+1		+1		+1

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	22.	Resawing/Ed ger	-1	-1	For the survey and analysis of the material which is currently considered to be waste or by-product to establish its quantity and qualities. There may be material which could be obtained for use if the by-product materials were resawn.		-1	Analysis of logging and sawmilling industry conducted to determine the qualities and the quantities of log harvest and of mpingo production of billets and by-product materials (Hall, 1988a).	+1	Owner followed up on marketing leads provided through UNEP intervention and established direct export sales of billet production for an increase in employment at the enterprise (Amin, 1990).	+1
	23.	Planing, shaping, molding	n/a	n/a			n/a		n/a		n/a
	24.	Treatment with preservatives	n/a	n/a			n/a		n/a		n/a
	25.	Final product production	-1	-1	For the investigation of further local processing of the billet material for the end-users.		-1	Investigation undertaken and survey of end users resulted in unanimous rejection of further processing beyond the billet stage at this time (Hall, 1988b)	+1		+1
Market Studies	26.	Extent of market survey : National and International	+1	-1	For a survey of end users for the purpose of establishing direct sales.		-1	Survey and report of end users completed that outlined opportunities for direct sales of billet and billet production by product material (Hall, 1988b).	+1	Action taken by the entrepreneur to establish direct sales links for billet and mpingo billet by-product sales (Amin, 1990).	+1
	27.	Description of end products to be researched	+1	-1	For a survey of the export markets to identify potential uses for mpingo wood which could be produced within the enterprise organization (Moore and Hall, 1987).		-1	Survey and report of end users completed that outlined opportunities for direct sales of billet and billet production by product material (Hall, 1988b).	+1		+1

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28.	Identification of competitors: existing and potential	+1	-1	For the establishment of harvesting and utilization standards which lead to better mpingo forest management. Assign export quotas to those producers who best meet the standards or exceed them with novel ideas and techniques to maximize sustained development based on the mpingo resource. For a survey to determine any other sources of mpingo such as northern Mozambique that may also supply mpingo logs to billet makers in Europe and Japan. For a survey of all sawmill capacity: actual, potential and planned.	-1	-1	End users (musical instrument manufacturers and musicians) contacted and found to be supportive of proposed collaborative efforts to improve harvesting and utilization of mpingo resource (Lamb, 1989)	+1
29.	National economic advantage over competitors	+1	-1	For the establishment and monitoring of harvesting and utilization techniques which lead to sustained yield of the mpingo resource within Tanzania. The market for mpingo billets is exclusively in the developed world where this style of resource management would be favoured.	-1	-1		-1
30.	Built in costs structure as a limiting factor	+1	+1	No limits to activity based on built in cost structure.	+1	+1		+1
31.	Prices	+1	-1	For the assessment of exporting procedures and the documentation of exports with the aim of establishing an accurate record keeping system for exports and a consistent number of billets per m ³ .	-1	-1	Existing export records traced and evaluated against field records. The resulting assessment of these records led to a recognition of the need for central record keeping of exports and production (Sania, 1988).	+1

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32.	Direct sales and shipment: specialization	+1	+1	No negotiation aims required at this time.		+1	Opportunities for direct export sales of mpingo billet production by-products identified (Hall, 1988b).	+1	Owner followed up on marketing leads provided through UNEP intervention and established direct export sales of billet production by-products providing for an increase in employment at the enterprise (Amin, 1990).	+1
Marketing	33. Indirect sales and shipments: diversification	-1	+1	To establish a marketing connection for the USA and Japan.		-1		-1	Owner followed up on marketing leads provided through UNEP intervention to establish indirect export sales of billet production by-products in USA and Japan (Amin, 1990).	+1
	34. Customer relations practices and pricing practices	-1	+1	None required at this time.		+1		+1		+1
	35. Market position, degree of customer loyalty/time	-1	+1	None required at this time.		+1		+1		+1
	TABLE SUMMARY	24 / +1	8 / +1			10 / +1		25 / +1		26 / +1
		7 / -1	23 / -1			21 / -1		6 / -1		5 / -1
		4 / n/a	4 / n/a			4 / n/a		4 / n/a		4 / n/a

Appendix 7

Glossary of Terms Used in this Study

Ambit Claims	The claims that a stakeholder would like to find fulfilled through that stakeholder association with a particular system.
Aspect	The term used to describe the main categories under which the criteria for the social sphere were grouped in application of the IMA.
Benchmark Situation	For the purposes of this study this term is defined as the state of the system, as is it found at the time of intervention, in meeting the technical limits assigned to it.
Criterion	A characterizing mark or trait of a management system used to guide the intervention process in the application of the IMA.
Frame	The term used to describe the main categories under which the criteria for the forest management sphere were grouped in application of the IMA.
Interventionist	An individual that aims to modify a particular system.
Mission Statement	A succinct expression of the common interest for an organization.
Negotiation Aim	For the purposes of this study defined as the goals that are deemed to be necessary for the system under study to achieve its Technical Limit in a sustainable manner. The Negotiation Aims are determined by the interventionist for each criterion after the Technical Limits and the Benchmark Situation have been established and recorded.
Process Level	The term used to describe the main categories under which the criteria for the economic sphere were grouped in application of the IMA.
Round Table	The focus of the deliberation and negotiation process in the IMA.

Stake	A claim on the organization which a stakeholder has. For example the stake for the employees may be job security, the stake for the stockholders may be financial returns and the stake for the local community may be economic and social stability.
Stakeholder	Any individual or group who can affect or is affected by the achievement of an organization's purpose.
Stakeholder Action Plan (SAP)	A plan of action determined by the stakeholders of an organization to achieve the goals set out through the roundtable process. For the purposes of this study a SAP would, under ideal circumstances, include the following features: a Mission Statement and a synopsis of the system as found at the time of intervention, the new strategies and their expected impact, and where resources permit, an estimate of the estimated costs that would be required to implement the SAPs.
Stakeholder Identity- Internal / External Adversarial / Supportive	Stakeholders can be classified as being either <i>internal</i> or <i>external</i> and as either <i>supportive</i> and <i>adversarial</i> stakeholders. Internal stakeholders are defined as those stakeholders who are under the control of the manager of the enterprise. They are considered to be less likely to be adversarial to management (Cleland, 1986). External Stakeholders are defined as those stakeholders not usually subject to the legal authority of the manager of the enterprise. They may be supportive or adversarial to the management and in the latter case provide a formidable challenge to the management (Cleland, 1986).
Stakeholder Map	A graphical representation of the stakeholders and their relationship to an organization.
Technical Limit	The theoretical potential that a resource utilization system has for maximizing the goal sets of the three spheres that comprise the conceptual model of sustainable development.