The Politics of Dam Resurgence:

High Modernist Statebuilding and the Emerging Powers in Africa

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I confirm this thesis has not been submitted for any other degree, concurrent or past, at the University of Oxford or elsewhere.

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Thesis Abstract

Following a decade from the mid-1990s that saw a near cessation in dam building, the infrastructure has returned. This phenomenon is controversial because dams' social and environmental impacts, economic costs and development ineffectiveness have been well evidenced. This timely analysis of the dam resurgence asks why and how this trend is happening. It studies three individual dams in Rwanda and Tanzania with Indian, Brazilian and World Bank involvement respectively. Primarily qualitative analysis interrogates three conceptual levels of these projects: The international enabling companies and financiers; driving national governments; and each dam site's locale. Addressing a literature bias towards materialist explanations, theoretical analysis uses a lens of high modernist ideology. Research finds depoliticising and expert-centric applied high modernist ideas in the case study dams' justifications, decision-making and knowledge-production. This entailed a singular focus on electricity generation and short-sightedness to these dams' socio-environmental impacts. However, the thesis also demonstrates the presence of dam reforms and evidences their influence on each case's discourse and practice. Given reformist policies' foundation in oppositional principles, the thesis proposes an ideological bricolage with high modernism to describe the rationales and practices of its case studies of dam resurgence; a moulding of past high modernism with new reformist idea-practices. This significantly furthers the social science literature on the dam resurgence, describing and explaining the era's complexity, its limited but important change and array of, increasingly corporate, actors. Through the case study research, the thesis also furthers understanding of the emerging powers' presence and influence in Africa. Moreover, it contributes to analysis on the growing number of illiberal modernisation projects across the continent. The dam-building resurgence in Rwanda and Tanzania and its ideological bricolage both demonstrates and nuances this trend. Intersection with these themes ensures the thesis advances understanding of the ideology, politics and geography of development.

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List of Abbreviations

ABC	Brazil's Development Cooperation Agency
AfDB	African Development Bank
BHEL	Bharat Heavy Electricals Ltd. (India)
BNDES	Banco Nacional de Desenvolvimento Econômico e Social (Brazilian Development Bank)
BRICS	Brazil, Russia, India, China, South Africa group
BTC	Belgian Technical Cooperation
CCM	Chama Cha Mapinduzi (Tanzania Ruling Party)
CII	Confederation of Indian Industry
CNI	Confederacao Nacional Da Industria (Brazilian private-sector association)
CSR	Corporate Social Responsibility
DAC	Organisation of Economically Developed Countries (OECD)'s Development Assistance Committee
DfID	Department for International Development (UK)
DPA	Development Partnership Agency (India)
DVC	Damodar Valley Corporation
EDCL	Energy Development Corporation Ltd (Rwanda)
EDPRF	Ethiopian People's Revolutionary Democratic Front
ExIm Bank	Export-Import Bank
ESIA	Environmental and Social Impact Assessment
EIA	Environmental Impact Assessment
EU	European Union
EWSA	Energy and Water Supply Authority (Rwanda)
FICCI	Federation of Indian Chambers of Commerce & Industry
FIESP	Federação das Indústrias do Estado de São Paulo (Brazilian private-sector association)
FINAME	Agencia Especial De Financiamento Industrial (Brazilian Special Agency for Industrial Finance)
GDP	Gross Domestic Product
GIZ	Gesellschaft für Internationale Zusammenarbeit (German Cooperation Agency)
GoR	Government of Rwanda
HSAF	Hydropower Sustainability Assessment Framework (IHA produced)
ha	Hectares
IBAMA	Brazilian Institute of Environment and Renewable Natural Resources
ICOLD	International Consortium on Large Dams
IDEAS	Indian Development and Economic Assistance Scheme
IHA	International Hydropower Association
ITEC	Indian Technical Economic Cooperation
IPTL	Independent Power Tanzania Limited
IPP	Independent Power Producer
IUCN	International Union for the Conservation of Nature
JICA	Japanese International Cooperation Agency
KBO	Kagera Basin Organisation
Km	Kilometres
kWh	Kilowatt Hours (generally used as unit for generation over time)
LoCs	Lines of Credit

LRS	Livelihood Resettlement Scheme
m	metres
MEA	Ministry of External Affairs (India)
MEM	Ministry of Energy and Minerals
MERCOSUR	Southern Common Market
MINECOM	Ministry of Commerce (Rwanda)
MINECOFIN	Ministry of Economic Planning and Finance (Rwanda)
MININFRA	Ministry of Infrastructure (Rwanda)
MME	Ministry of Mines and Energy (Brazil)
MoU	Memorandum of Understanding
MoW	Ministry of Water (Tanzania)
MW	Megawatts (generally used as unit for Installed generation capacity)
NAM	Non-Aligned Movement
NBI	Nile Basin Initiative
NELSAP	Nile Equatorial Lakes Subsidiary Action Programme
NEMC	National Environmental Management Council (Tanzania)
NGO	Non-governmental Organisation
NORAD	Norwegian Agency for Development Cooperation
OECD	Organisation of Economically Developed Countries
ORF	Observer Research Foundation (India)
PAP	Project Affected People
PT	Workers Party (Partido dos Trabalhadores), Brazil
ORF	Observer Research Foundation
OUV	Outstanding Universal Value
TANESCO	Tanzania National Electricity Supply Company
TERI	The Energy and Resources Institute (India)
TSH	Tanzanian Shillings
TVA	Tennessee Valley Authority
RAP	Resettlement Action Programme
RBO/RBA	River Basin Organisation/ River Basin Authority
RDB	Rwandan Development Board
REG	Rwanda Energy Group
REMA	Rwanda Environmental Management Authority
RIS	Research and Information System for Developing Countries (India)
RNRA	Rwanda Natural Resources Authority
RPF	Rwanda Patriotic Front
RUBADA	Rufiji Basin Development Authority
SIDA	Swedish International Development Cooperation Agency
SMEC	Snowy Mountain Engineering Corporation
USAID	United States Agency for International Development
UN	United Nations
UNDP	United Nations Development Agency
UNESCO	United Nations Environmental Social and Cultural Organisation
UNSC	United Nations Security Council
WCD	World Commission on Dams
WHC	UNESCO World Heritage Committee
WTO	World Trade Organisation
WWF	World Wildlife Fund

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Introduction

The Allure of Dams

This thesis analyses large dams[1], vast hydraulic infrastructures whose size and transformative potential often capture the imagination of politicians and publics. A dam and its imagery frequently place them as the political flagships of development programmes, elevating some to the status of national icons. The ideology of high modernism, with its emphasis on the aesthetic of modernity, its rationale of social engineering and prescription of technologically-induced top-down development, is strongly intertwined with the visions justifying dam building. However, the infrastructure's monumentality matches significant and often understated impacts to what I term *socio-ecology*. Additionally, dams have a poor record of delivering promised benefits[2] and their construction costs are typically underestimated[3], causing some to label them white elephants[4]. Consequently, dams are political, producing trade-offs and a geography of winners and losers[5]: Generated electricity, irrigation and economic opportunity have often accrued to richer people and the urban metropoles where dams are designed. Meanwhile, losers are frequently poorer and socially marginalised groups living in the less developed, predominantly rural, and thus more dam-able, spaces. Researching dam building therefore generates insights into the trajectory, costs, politics and ideologies of 'Development'[6].

[1] Defined by the International Commission on Large Dams (ICOLD) >15 metres.
[2] World Commission on Dams 2001, 21.
[3] See Ansar et al. 2014.
[4] Asserted by Timberlake and Tinker 1988.
[5] Following Connolly's definition (that understands politics as a cluster of distinct ideas that are contestable and complex; Connolly 1993, 13) dams are political because: They are government policies; they have potentially significant, decades-long influences on livelihoods; their outcomes affect different interest groups; and they are the subject of debate and protest (Connolly 1993, 12–14). This later idea is also captured by Lasswell (Lasswell 1936) who described the political as who gets what, when, where and why.
[6] Referencing (Hart 2001) Big 'D' Development: Externally derived and implemented programmes of development.

This study asks why dams are built and how they are planned and constructed. It does so at a pertinent moment when, after a decade-long stagnation, dam building has returned. The 20th century saw a dam boom incorporating the Global North[7] and South[8]. However, dams' economic, social and environmental record, and protests against their impacts, led to a decrease in construction as the 20th century closed. This moment was representative of a wider period of discontent and political change which questioned the previously-dominant programmes of state-led, large-scale modernisation[9]. The stagnation of dam-building was particularly pronounced in Africa given many the countries that frequently depended on concessional finance and the retreat of dam-funding institutions. The World Bank's withdrawal from India's Narmada Dam[10], after a disapproving investigation by the Morse Committee[11], in 1993 symbolised this stagnation. The 1990s decrease culminated in the World Commission on Dams (WCD; 1998-2001)[12], a science-policy interface that investigated dams and their impacts. As Chapter 1 examines, its extensive review recommended a fundamentally more critical appraisal of dams and a set of policy reforms. Surprisingly however, the mid-2000s witnessed the start of a dam-building resurgence,[13] particularly in Africa[14]. China India, Brazil and other emerging powers have led the return of dam building through domestic and international construction. However, the return of dams also involves 'traditional' finance, including the World Bank, and Western engineering companies.

This phenomenon sparks questions about why and how this resurgence is happening and whether its rationales and practices represent a change from, or replication of, the past dam-building era. Are policy reforms stemming from the WCD and others influential? Dam resurgence

[7] Referring to the economically richer regions of Europe, America, Australia etcetera and therefore not entirely geographically coherent.
[8] Replacing the more problematic 'developing country' label with a more generalised geographical reference.
[9] Famously captured by 'Small Is Beautiful' (Schumacher 1993) and Ferguson's Zambian case study (Ferguson 1999; nuanced by Larmer 2006; Larmer 2007).
[10] Also, the Arun III Dam (Nepal).
[11] Khagram 2004.
[12] See Chapter 1.
[13] Cole, Elliott, and Strobl 2014; Zarfl et al. 2015.
[14] Darmawi et al. 2013; van der Wat 2013.

also poses questions about the emerging powers role: How important are they in driving this trend and in dictating project implementation practices? Moreover, given dams' association with grand modernising visions, does their return mark the reappearance and increased influence of high modernist ideology? This thesis analyses the dam resurgence in Africa, examining its actors, their motivations and policies. It focuses particularly on the drivers for dam building and the processes of knowledge production and decision making about designs, compensation, mitigation and construction practices. Research follows a theory building, qualitative case-study approach, analysing three dams across two countries: The Nyabarongo Dam in Rwanda (28 megawatts), involving Indian finance and companies, the proposed Stiegler's Gorge Dam in Tanzania (2100MW), involving Brazilian government support for the firm Odebrecht, and the Rusumo Falls Dam (80MW) on the two countries' border that is financed by the World Bank.

This thesis finds new complexity in the dam resurgence in Africa. A novel cast of actors propel the resurgence alongside traditional multilateral banks and Western states and engineering corporations. Prominent here are financing governments, and particularly engineering construction companies, from the emerging powers. Significantly, the host governments' dam building drive stems from ambitions to increase electricity generation, not to build the infrastructure itself. Moreover, sustainable development rhetoric justifies dams whilst planners emphasise mitigation, compensation, participation and benefit sharing measures. The research demonstrates that these reforms can matter, changing dams' social outcomes. However, new discourse masks the persistence of high modernism, with dam justifications following ideas about technologically-induced, linear development. Moreover, the case studies demonstrate implementation practices premised on experts' exclusive legitimacy. This research significantly advances the literature by analysing the ideology of the dam resurgence and by highlighting the changed state and corporate actors undertaking it. By developing a theory of ideological bricolage, the thesis enables specific description, and partial explanation, of the empirical observations of high modernism's continuity and dam reforms.

This chapter sets out the thesis' research design. Responding to calls to discuss the difficulties of research in authoritarian countries[15], an interweaving theme is the constraining research environment of Rwanda and Tanzania. Both countries demand strict central-government research clearances and permissions from local authorities when talking to citizens[16]. Moreover, both curtail access to information, freedom of speech and freedom of movement to field sites, all of which affects research strategies, ethics and the availability of data. As asserted below, this does not negate the validity of the thesis' research. Rather it is important to clearly discuss the constraints entailed by Rwanda and Tanzania's authoritarianism. The following section explains the thesis' questions and then turns to the study's relevance. Subsequent sections detail research design and the case study selection strategy. Research methods and analysis are then discussed. Lastly, the chapter presents an outline of the thesis' structure.

Research Questions

This thesis' central question is *why* and *how* the resurgence of dams has happened. This breaks down into a number of sub-questions:

1. Why have the case-study dams been resurrected?
    A. What are the rationales of national governments and their agencies?
    B. What are the rationales of international financiers and enabling dam-building organisations and companies?
2. How were the case studies designed and implemented?
    A. What is the step-by-step process of decision making, including:
        I. Design of the infrastructure
        II. Assessment of the need for the dam

[15] Ahram and Goode 2016; Art 2016.
[16] In Tanzania one needs explicit letters of permission from regional, district and sector administration levels. In Rwanda one must visit the relevant district government.

III. Assessment of the environmental and social impacts of the dam

IV. Design of the compensation process

V. Consideration of mitigating negative impacts and steps taken

VI. Consideration of benefit-sharing schemes with affected and local communities

B. How inclusive is the decision-making process?

I. Who made key decisions?

II. To what extent and how are local communities included in decision making?

III. To what extent did assessments capture the socio-ecological baseline and consider potential differentiated impacts on ecologies and livelihoods?

The thesis' research subject is therefore the complex policy making of a range of actors influencing the processes of dam building, from justifying rationales to knowledge production and decision making in implementation. Consequently, the research works at three geographical scales:

1. The international realm of dam-enablers: Financiers and engineering companies enabling and shaping projects, the latter often supported by domestic ExIm Banks. This level also consists of international river-basin organisations forging cross-border agreements to build dams.
2. National Governments: The politicians and civil servants in ministries and governmental agencies.
3. Each dam's locale: The communities and ecologies directly within and around the infrastructure's footprint.

Where the first two levels answer both the *why* and *how* questions, the third level is important only for analysing the second set of questions. As concluded in Chapter 8, this thesis finds that

Rwanda and Tanzania are the key drivers of the dam resurgence, with international actors then enabling each project's implementation. Additionally, whilst both national and international actors play key roles in determining knowledge production and planning practices, it is also necessary to research these questions from below. This ensures a deeper understanding of the socio-ecology around the dam, the livelihoods of affected people and river's biophysical services. Such research allows critical analysis of the knowledge production behind the planning of compensation, local-level benefit sharing, dam designs and the official impact assessments. Moreover, such bottom-up research examines the extent of participation in dam planning and implementation processes. Therefore, the purpose of the third local level is not to evaluate impacts and outcomes of dam projects, as such studies necessitate a longer time horizon and a larger fieldwork scope. Moreover, it does not intend to systematically understand what 'the community'[17] thinks about the dams, whether people in each locale have articulated alternative versions of modernity or made claims to implementing authorities[18]. Rather, this local geographic level of research assesses officials' claims about the *how* of the dam resurgence, triangulating analysis about the degree of reform in planning and implementation processes.

Empirical and Theoretical Relevance

This timely research is important because the politics and geography of the dam resurgence phenomenon remains under-studied. This is particularly true of recent dam building across Africa in comparison to Asia[19], where few studies examine the resurgence or contextualise dams within their nation state's politics[20]. Furthermore, as with the study of Africa's political

[17] Treated here as a subject, not unified object.
[18] A good example of this style of analysis being Larmer 2005.
[19] For instance studies of recent dam building in Asia: Kirchherr, Charles, and Walton 2017; Matthews 2012; Mirumachi and Chan 2014; Kiik 2016; Lord 2016; Tilt 2015.
[20] Much of the literature focuses either on impacts (Kirchherr, Disselhoff, and Charles 2016; Avery 2013), geopolitics (e.g. Wheeler et al. 2016; Cascão 2008; Cascão and Zeitoum 2010) or China's role (Hensengerth 2013b; K. McDonald, Bosshard, and Brewer 2009; Chen and Landry 2018; Felix et al. 2017). Exceptions study Sudan (Verhoeven 2015a; Cuesta-Fernández 2015; Kraak 2012; Abbink 2012; Menga 2015).

economy more widely, the role of ideology within the dam resurgence remains frequently overlooked[21]. This is particularly important when considering the incorporation of dam-reform policies, with studies focusing on their presence, not on their detailed, ground-level practice[22]. Moreover, few studies research a regime of dam-actors like that existing in the 20th century[23], which featured a common model that rationalised dams and particular building processes. Additionally, with its diverse case range, this thesis addresses a longstanding bias identified by Kirchherr et.al.[24] towards only researching the biggest dam infrastructure. This research therefore advances the social science literature on dam building in multiple ways.

Additionally, research contributes to pertinent literature on the growing engagement of governments, finance and companies of the (re)emerging powers in Africa. As examined in Chapters 1 and 2, the governments of China, India and Brazil are significant players in the dam resurgence, producing large-scale construction programmes at home[25] and financing projects abroad[26]. Moreover, emerging power engineering companies have become some of the world's top dam builders following the 1990s retreat of traditional finance sources[27]. However, the emerging powers' role in African dam building, especially beyond China, is under-examined. Indeed, research of Indian and Brazilian relations with the continent pales in comparison to the volume studying China-Africa: Whilst India-Africa research is growing[28] few studies detail Brazil's African role[29]. Furthermore, notwithstanding great attention on the emerging powers in Africa,

[21] An important exception is Verhoeven 2015a.
[22] For instance, Scheumann and Hensengerth 2014a; ; or the work of Skinner and Haas 2014; Dao 2010.
[23] Hoag 2013.
[24] Kirchherr, Pohlner, and Charles 2016: Primarily towards 'major' dams defined by ICOLD by dam walls of <150m.
[25] Tilt 2015; Burrier 2016.
[26] Siciliano and Urban 2018; Hensengerth 2014; Verhoeven 2011; K. McDonald, Bosshard, and Brewer 2009; Lord 2016.
[27] Chapter 1.
[28] Although greater than Brazil: E.g. Mawdsley and McCann 2011; Chaturvedi and Mulakala 2016; Cheru and Modi 2013; Cheru and Obi 2010b; Beri and Institute for Defence Studies and Analyses 2015; Taylor, van der Merwe, and Dodd 2016; Narlikar 2010b; Dubey and Biswas 2016.
[29] Few studies including Stolte 2015; Abdenur and Marcondes 2014; Alencastro 2018; Cabral et al. 2016.

until recently, much of the literature focused on macro-scale analysis[30] rather than intensive, empirical case studies of projects. This bias still exists for India and Brazil. This thesis further addresses this gap, linking strategies and trajectories of emerging power governments and companies with specific projects and practices.

Furthermore, this research contributes to a nascent literature analysing the rise of illiberal, modernising developmentalist states[31]. As Chapters 3 and 4 analyse, Rwanda and Tanzania have authoritarian regimes that adopt differing degrees of democracy, have produced grand visions for socio-economic transformation and intervene socially, politically and economically to implement these programmes. This echoes past high modernist statebuilding projects[32]. Rwanda and Tanzania are part of a global rise in hybrid/illiberal/democratic-authoritarian countries that are garnering increased academic attention: As Ahram and Goode assert, "authoritarianism is back, empirically and analytically"[33]. However, this empirically-significant trend, and its content, remain under-researched. Moreover, this return, along with the resurgence of dam building, raising wider questions about the state of development politics in Africa, particularly whether these trends signify a re-emergence of the style and ideology of development associated with the mid-20th century and analysed by James Scott's thesis on high modernism[34]. Therefore, this study addresses three timely and significant academic themes: The dam resurgence and this phenomenon's interplay with the emerging power's growing role in Africa and the apparent turn towards illiberal states focused on modernising development.

[30] E.g. Carmody 2013; Taylor 2014; Alden, Large, and Oliveira 2008; Bräutigam 2011.
[31] Jones, Verhoeven, and Soares de Oliveira 2013; Jones and Dye Forthcoming; Hagmann and Reyntjens 2016; van der Walle 2016.
[32] Jones, Verhoeven, and Soares de Oliveira 2013; Jones and Dye Forthcoming.
[33] Ahram and Goode 2016, 834.
[34] Scott 1998.

Research Design

This thesis involves an in-depth qualitative, case-study based research design. This was chosen because it is most suitable to the research's contingent theory-building aim but also because it enables intensive, complex, in-depth analysis of what Gerring calls 'the deep'[35]; that is, the thoughts, ideas, values, opinions and perceptions behind policy making. Such data cannot be easily quantified or placed in a statistically analysed large-scale comparative study. Furthermore, its gathering is time intensive, entailing detailed work on a small number of cases. Moreover, a case-based, inductive research design is most appropriate for this study of an emerging, under-researched phenomenon. Broadly, the thesis will situate itself within the state-society political-economy framework identified by Kohli[36] whose key areas include research on the selection and practices of development projects. Therefore, as opposed to parts of the political science discipline that tend towards theory testing, model building and quantification[37] this thesis will use grounded, relevant empirical data to heuristically build theory of mid-level generalisability[38].

This research design has limitations. Mahoney and Rueschemeyer[39], Tarrow[40] and perhaps most famously King, Keohane and Verba[41] assert the methodological weaknesses of small-n studies which they argue produce overly contingent theories. George and Bennett[42] counter these authors' argument claiming that it problematically assumes cases act like points in statistical large-N studies, existing as only a single measure of one variable. Alternatively, a key advantage of intensive case studies is their ability to capture the complex interaction of multiple variables. Therefore, whilst it is important to recognise the contingency of a qualitative case study's findings,

[35] Gerring 2007, 48–50.
[36] Kohli 2002.
[37] Laitin 2002; Geddes 2002.
[38] George and Bennett 2005, 76, 78.
[39] Mahoney and Rueschemeyer 2003.
[40] Tarrow 2010.
[41] King, Keohane, and Verba 1994.
[42] George and Bennett 2005, 17–19; 28–30.

acknowledging this far from negates the usefulness of qualitative, small-n approaches. In fact, as argued by Brady and Collier's edited volume[43], this approach has significant merits. For instance, in analysing the detailed, context-dependent and less-quantifiable dynamics of decision making, qualitative case studies can have greater causal leverage, enabling stronger theory building[44]. Therefore, this case-study research design follows Gerring's[45] assertion that "case studies are more useful when the purpose of the research is hypothesis generating rather than hypothesis testing".

Case Selection

The Case Studies

The Nyabarongo dam

Initiated by the Ministry of Infrastructure (Mininfra) and Energy Utility (changing from Electrogaz to RECO[46] to EWSA[47] to REG[48]), two Indian contractors, Angelique International and Baharat Heavy Electrical Limited (BHEL) built the Nyabarongo Dam, with Indian government finance provided through its Export-Import (ExIm) Bank. RSW (based in Canada, later merged into Aecom) supervised the project as Owner's Engineer, Snowy Mountain Corporation (an Australian engineering firm) provided detailed designs and CIMA (a Canadian engineering firm), the socio-ecological impact assessment. The dam was first envisioned in the 1980s but was officially resurrected in 2006 and completed in 2014, with a wall of 50 metres (m) and installed capacity of 28MW. It is significant for Rwanda, being the largest post-genocide infrastructure project, largest

[43] Brady and Collier 2010.
[44] George and Bennett 2005, 19.
[45] Gerring 2007, 66.
[46] Rwandan Energy Company.
[47] Energy, Water and Sanitation Authority.
[48] Rwanda Energy Group.

power plant and primary backup power station[49]. However, the dam site and reservoir directly affected over 4000 households and costs ran over budget from US$98million to $112million.

The Rusumo Falls Dam

The Rusumo Falls Dam is on the Kagera River, which forms the Rwanda-Tanzania border. Its primary planner and implementor is an international river-basin organisation called the Nile Equatorial Subsidiary Action Programme (NELSAP). The Rusumo Dam project was officially resurrected with a 2006 agreement between governments[50]. Canadian consultants Artelia conducted impact assessments between 2009-2013, finding that 685 households would be affected. The dam achieved final governmental sign-off in 2012. A World Bank funding agreement followed in 2013. Compensation was completed in 2015 and construction started in 2017. A 13.5m dam wall, sitting on top of the Rusumo Waterfall, will redirect water to 80MW-capacity turbines. The project still qualifies as a large dam because its reservoir will hold 1.322billion cubic metres[51].

The Stiegler's Gorge Dam

This dam's proposed generation capacity of 2,100MW and dam-wall of 126m would make it Africa's joint-largest hydropower plant. The Stiegler's Gorge Dam's history spans the 20th century, starting in German colonialism and nearing construction under independence leader President Nyerere. The Rufiji Basin Development Agency (Rubada) led its recent resurrection from 2006. They signed an agreement with Brazilian company Odebrecht in 2012 after substantive Tanzanian and Brazilian diplomatic efforts. However, implementation has been less successful, reflecting this dam's continued controversy[52] that particularly stems from its location in the Selous

[49] Dye 2016c.
[50] Including Burundi as the first plans included a reservoir extending to the country.
[51] ICOLD's definition sets a minimum of 3 million cubic metres.
[52] See author's report for WWF; Dye 2017.

Game Reserve, a UNESCO World Heritage Site, and upstream of the Ramsar-protected Mafia-Kilwa-Rufiji river-delta site[53].

The Case-Selection Strategy

This thesis analyses the broad phenomenon of the dam-building resurgence. Given its more descriptive orientation, and following Gerring's advice on such studies[54], a diverse case-selection strategy was chosen. As Gerring describes it[55], a diverse selection includes the typical differences in a phenomenon's significant variables, capturing this spread for theory building or testing aims. This case selection strategy also follows the research design of Scott[56] and others like Brownlee[57]. In both monographs, strong differences exist between selected case studies and Brownlee's cases do not all lead to the same outcome. However, both authors focus on their cases' analogous aspects, building theories that are beyond what a single case-study design can deliver[58]. Furthermore, for Brownlee including different outcomes means his research accounts for alternative explanations[59], increasing his study's explanatory strength. This diverse strategy fits this thesis' purpose: Whilst involving a comparative element, this research is designed to deepen academic knowledge about broader continental trends, not focus on inter-case differences. This is achieved through an analytical focus on the dams' analogous aspects, namely their justification, decision making and knowledge production processes.

Therefore, the cases selected here, with Gerring's[60] diversity and typicality in mind, capture the gamut of project sizes and actors in Africa's dam resurgence. Whilst all are technically large dams, the three cases include a mix of dam-wall heights, generation capacities and

[53] The international wetland-protection treaty.
[54] As oppose to a causal, specific hypothesis purpose (Gerring 2017, 56, 62–65). Gerring also asserts such studies can make causal claims (Gerring 2017, 58–62).
[55] Gerring 2007, 97–101.
[56] Scott 1998.
[57] Brownlee 2007, 3, 14.
[58] Following E. Huber's (2003) argument.
[59] Skocpol 2008; Waldner 1999.
[60] Gerring 2007, 97–101.

construction costs. Additionally, reflecting the contemporary trend, the three dams are primarily designed for hydropower, two have run-of-river schemes[61] and, as with the majority of resurgence-era dams in Africa[62], all cases have long histories of chequered implementation efforts. Each projects' governmental and enabling actors are also considered. The Rusumo case study includes a new breed of river-basin authority, Nelsap. As Chapter 6 analyses, it has an important role in forging international agreements to enable implementation of previously-stalled projects. Meanwhile, the Rufiji Basin Development Authority (Rubada) represents the continued role of 20th century river-basin agencies created in the style of the Tennessee Valley Authority[63]. Collectively, this allows the three cases to capture the dam resurgence's typical variations.

Additionally, echoing Brownlee's research design[64], including Tanzania and Rwanda allows the research to examine cases with different outcomes. Whilst both feature high modernist statebuilding missions that drive grand electricity-generation ambitions and thereby dams, Tanzania's political settlement has led to a less successful implementation. This is important in clarifying the boundaries and challenges to dam building in its resurgence. Moreover, it deepens the thesis' analysis of the relationship between authoritarianism and high modernist infrastructure[65]. Case selection also considered financiers. Significantly the World Bank is, almost by definition, in the mainstream of traditional Western development and has been a key enabler of dams historically. In the resurgence the Bank also plays an important role either through direct finance[66], or through guaranteeing private-sector investment[67]. Moreover, the Bank's safeguarding policies are frequently cited as best practice[68]. The Indian ExIm Bank is the main conduit through which the Indian government finances infrastructure internationally. It can also

[61] The less impactful run-of-river dam design becoming the increasing norm in the resurgence, although storage dams like Stiegler's Gorge Dam also continue.
[62] At least all those known by the author.
[63] See Chapter 1.
[64] Brownlee 2007.
[65] Chapters 3, 4 and 8.
[66] The World Bank 2009; Chen and Landry 2018; Chapter 6.
[67] Chapter 7; Gore 2017.
[68] Chapter 8.

be considered representative of other 'new donor' finance to an extent, as it has similar protocols to the Chinese ExIm Bank[69]. Its inclusion here also echoes the long-held role of ExIm banks in past and present dam eras[70]. For the proposed Stiegler's Gorge Dam, in the 2006-2016 period analysed in Chapter 7, a public-private partnership was planned to finance the dam, led by Brazilian company Odebrecht. Such financial arrangements are an increasing facilitating instrument of resurgence-era dams[71], stemming from the privatisation and liberalisation of power generation in many countries[72] and active support to mobilise private finance among Western donors and multilateral firms[73]. Therefore, typical example of the key variations in governmental enabling actors are captured in the case-selection strategy.

This thesis' case strategy also considered George and Bennett's assertion that research questions should drive cases[74]. Thus, selection included Indian and Brazilian activity in Africa and illiberal modernising governments. One limitation of this multi-actor case-selection strategy is that its complexity reduces the length of fieldwork around each dam site and knowledge depth, for instance details about the elite politics in Rwanda[75] and Tanzania[76]. This limitation was partially addressed by using relevant literature. For instance, a number of academics have analysed the Stiegler's Gorge project's history and likely impacts[77]. The limitation was also reduced by extensive engagement with pertinent academics researching the four countries and because of three months prior fieldwork in Rwanda during my Master's.

[69] E.g. in demands for domestic content.
[70] E.g. US ExIm Bank in Spain's dam boom (Swyngedouw 2007; Swyngedouw 2015).
[71] D. A. McDonald 2009; Hathaway and Pottinger 2009; Ahlers, Zwarteveen, and Bakker 2017: E.g. in Uganda's Bujagali (Gore 2017), D.R. Congo's Inga (Showers 2009) in Tanzania (Chapter 4) and Rwanda's micro-hydro sector (Chapter 3).
[72] For instance, through risk guarantees by USAID's Power Africa and DfID's Energy Africa.
[73] Gore 2017; The World Bank 2009; Chapter 1.
[74] George and Bennett 2005, 83.
[75] Behuria 2015; Jones 2014.
[76] Gray and Khan 2010.
[77] Havnevik 1993; Mwalyosi 1988; Hoag and Öhman 2008; Hoag 2013; Hoag 2005; Brown, Mwansasu, and Westerberg 2016; Hamerlynck et al. 2011; Duvail and Hamerlynck 2007; Duvail et al. 2014; Hamerlynck et al. 2010.

Research Methods

Justification

This thesis' research design focuses on the decisions, opinions, values, experiences and ideological assumptions of participants. Moreover, it aims to generate contingent, complex explanations through an inductive process. This makes qualitative methods most suitable. The fieldwork's authoritarian context reinforces the appropriateness of an inductive approach: Flexible and spontaneous approaches to research are often necessary under such conditions[78] because they allow practitioners to overcome barriers in data access[79]. The primary method used was the semi-structured interview. This style is appropriate for governmental settings, where respondents are more familiar with a formal questioning format[80]. Simultaneously, this interview style allows probing and a degree of interactive conversation that should allow issues raised or subverted by the respondent to be discussed[81]. In accordance with Rathburn's[82] assertion of the usefulness of recorded, citable sources, the research followed a notetaking technique that involved writing down as much as possible verbatim during the interview, with gaps filled in immediately after. Whilst the technique allowed recording of key phrases and the discussion's substance, it sometimes missed the exact wording of parts of sentences. It was still possible to paraphrase these sections and maintain the interviewee's meaning. Such sections are demarcated by brackets in the following chapters. Despite frequent reflection on this shortcoming, it was considered the best choice throughout the research. This is because the technique avoids using a recorder, a particular advantage in authoritarian contexts where interviewees might have felt

[78] Art 2016.
[79] Barros 2016.
[80] K. Willis 2006.
[81] Cloke 2004; Leech 2002.
[82] Rathburn 2010.

intimidated by them and their entailed data record[83]. This consideration was particularly important given the politically-sensitive nature of large infrastructure. Art[84] supports this recording practise, stating that researchers in authoritarian contexts need to build trust to discuss politically-sensitive subjects and so should present themselves as a confidante, not a formal interviewer.

Through an interpreter, less structured and more ethnographic interviews and participatory methods were used to research each dam's locale. These built an understanding of each dam sites' surrounding socio-ecology, the compensation process and involvement of local people in decision making in the valley. Such an interview style also allowed greater interactive conversation that aimed to ensure discussion of issues raised by the respondent, something particularly appropriate for contexts where the interviewer is liable to consciously and unconsciously rely on preconceived ideas[85]. To further break the hierarchical nature of data collection, fieldwork around Rusumo and Nyabarongo Dam sites used participatory methods. These proved particularly useful in understanding the valuation of farmland and details of livelihoods that interviewees could not always clearly express or thought were too obvious to state in interviews. In addition, participatory mapping was used around Nyabarongo to assess compensation, livelihood and landscape changes. Again, this hands power to the participant[86] and revealed previously unknown details. More participatory methods therefore enabled the capture of socio-ecological complexities. Additionally, quantitative methods feature in Chapters 3 and 4 to aid examination of each energy sector. This involved compiling data sets of electricity-generation construction and descriptive statistical analysis. Furthermore, research involved

[83] Rwanda for instance has no free press and Tanzania has suffered a number of large energy corruption scandals recently. Interviewing in Brazil occurred during the political crisis that resulted in Dilma's impeachment, and India's Africa engagement faces public scrutiny and corruption allegations (Dye 2016a).
[84] Art 2016.
[85] Hoggart, Lees, and Davies 2002; Leech 2002.
[86] Beazley and Ennew 2006.

analysis of documents about, national energy policies, dam-financing agreements, India/Brazil-Africa ties, the case-studies' histories and each dams' impact assessment.

Reflexivity and the Authoritarian Context

Given the authoritarian context and because of dams' political sensitivity, it was necessary to carefully frame research and interview questions during fieldwork to get research permissions and protect oneself, and one's interview subjects[87]. Ahram and Goode describe the importance of "posing political questions in apolitical ways[88], the need to make research sound almost boring, or at least non-threatening[89]. To do this requires a close reading of a country's politics before and during fieldwork[90], a point reinforced by Loyle with regards to Rwanda[91]. She describes the regime's red lines including research on ethnicity and critiques of Rwanda's statebuilding project. This thesis presented questions in terms of the energy sector and attempts to increase electricity generation, particularly hydropower. Whilst not entirely disingenuous, this presented the thesis' focus on a more successful area of Rwanda and Tanzanian policy, and on the positive contributions of India, Brazil and the World Bank. Additionally, Chatham House rules were used meaning that there is no direct quote attribution. Rather, interviews are referenced with an anonymising institutional affiliation. In some cases, interviewees specifically asked for whole interviews or particular comments to be off the record[92]. An even greater level of protection was afforded to interviewees in the dam site's locales[93]. In Nyabarongo Dam participants are anonymised to approximate village level and in Rusumo, to either side of the border. These approaches were chosen because of the ethical need to protect research subjects[94].

[87] The latter point made by Loyle 2016.
[88] Ahram and Goode 2016, 840.
[89] Also see Art 2016; Malekzadeh 2016.
[90] Art 2016.
[91] Loyle 2016.
[92] Referencing no direct attribution.
[93] Echoing calls from Loyle 2016; Shih 2015.
[94] Reny 2016; Ahram and Goode 2016.

Additionally, throughout the primary research, a reflexive analysis of positionality was important. This is because a power dynamic stemming from my status as a foreign, white British male shaped the research[95]. This approach rejects a positivist assumption of objective data collection and rather sees research as a subjective and interactive construction of knowledge that therefore requires an awareness of that creation[96]. Adopting such an approach involved critical personal appraisal, with regular reflections during and after fieldwork trips which considered my ability to convey questions and interpret answers. Such reflexivity is additionally important in authoritarian contexts, as one should review personal safety and the ethical implications for participants. Moreover, echoing calls for academics to be strategic[97] and creative[98] when faced with barriers, and given participants potential to avoid direct criticism of their government and rather reiterate regimes' positions[99], it was important to reconsider questions during fieldwork and devise strategies to overcome encountered obstacles. This included triangulation, which involved document analysis and through interviewing foreign consultants and donor officials that are more removed from Rwanda and Tanzania's political pressures[100]. Unlike those financed by the World Bank, key documents about Rwanda and Tanzania's energy sectors, and the case study dams, are not publicly available. These were accessed through building trust with interviewees.

Fieldtrips and Sampling Strategy

Figure 1 outlines this thesis' six fieldtrips during the thesis, but also the two fieldtrips made during Master's research. Appendix one lists all these interviews. Pertinent decision makers in relevant institutions were primarily found through internet searches. Snowballing was also a significant sampling strategy, with existing academic contacts, including from my supervisor and colleagues, used alongside those generated from interviewees. The latter technique elicited most

[95] Beazley and Ennew 2006; Momsen 2006.
[96] Cloke 2004.
[97] Art 2016.
[98] Loyle 2016.
[99] Ahram and Goode 2016.
[100] Advocated by Reny 2016; Shih 2015.

Location	Duration	Interviews Conducted	Time
(*During Masters*) Rwanda	One Month	Official Level: 7 Local-level: 2@Nyabarongo	April, 2013
(*During Masters*) Rwanda	Six Weeks	Official Level: 11 Local-level: 37@Nyabarongo	April-May, 2014
Rwanda	One Month	Official Level: 15 Local-level: 13@Rusumo	September-October 2015
Tanzania	Four Weeks	Official Level: 22	November-December 2015
India	Four Weeks	Official Level: 40	March-April 2016
Brazil	3 ½ Weeks	Official Level: 53	April-May 2016
Tanzania-Rwanda-Tanzania	Three Months	Official Level: 40 (Tz) 42 (Rw) Local-level: 37@Rusumo	July-September 2016
World Bank, United States	1 ½ Weeks	Official Level: 13	August 2017

Figure 1 List of fieldtrips

of the high-level interviews. Trips to Rwanda and Tanzania constituted the foundation of the research. Interviews in both countries included a wide range of policymakers connected to dams, including policy consultants, Western donor officials and private-sector or not-for-profit dam developers. Government officials related to dams were primarily located in the Energy Departments of Ministries and in the state-owned Energy Utilities. In addition, those approving Environmental Impact Assessments (EIAs) and designing water policy were interviewed, although the latter tended to focus on water allocation, agriculture and conservation, not large dams. Furthermore, in relation to the Stiegler's Gorge Dam, environmental NGOs and ecologists engaged in the UNESCO World Heritage Selous site were interviewed. Following the same technique, interviews in India and Brazil focused on actors engaged in policy making or analysis of the countries' respective Africa policies. In addition, the companies directly connected with the case studies, and with energy-infrastructure building in Africa more widely, were studied. Additionally, interviews were held with dam-related activists, researchers and academics. When interviewees were not available in person, a handful were conducted over Skype.

Research around the dam sites used a purposive targeting approach to attempt to capture the gamut of experiences among different social groups. Specifically, this strategy involved paying

attention to differences in power[101] and therefore approaching households based on their appearance of relative wealth, their geographical location (which can be a proxy for marginality and relative socio-economic power) and economic activities (from shop-keeping to fishing, brickmaking and farming). When approaching individuals, sampling considered gender, age and apparent poverty. Additionally, those directly affected by the project and those who had received compensation were deliberately sought, although research also included many indirectly affected to ensure a more holistic understanding of the valley's socio-ecology. As the Selous is a game reserve without human habitation, fieldwork involved a shorter trip to survey the gorge site and downstream area. I also spoke to guides, hotel managers and ecologists. This research in each dam's locale furthered critical appraisal of project planning.

Encountered Limitation

A major issue occurring during the fieldwork was the author's effective deportation from Rwanda in October 2015. This incident underlines the need for precaution in methodological design and the significant risks posed to researchers of authoritarian countries[102]. In my case, having attempted to follow the correct procedures of research clearance[103], this incident came as a surprise, not to mention personal ordeal. Fortunately, a successful appeal allowed a return in 2016 and appeared not to impede access to officials. However, it did reduce fieldwork time. Moreover, the event, or perhaps bureaucratic reasons, meant explicit permission for further access to Rusumo and Nyabarongo Dam sites was not granted[104]. Whilst unfortunate, pre-existing work had collected necessary core data on this dam and so this had a minimal impact.

[101] Power being classically defined by Dahl (1989) as the ability to make a person act against their interest. This has been refined by Lukes (2004), who describes another form of overt power being the controlling of an agenda and the more subtle and socially-located forms of power manipulating populations to obey certain rules and norms; the latter also analysed by Gramsci through the concept of 'hegemony' (Gramsci, Hoare, and Nowell-Smith 2007) and Foucault through 'governmentality' (Foucault 2010; Foucault and Gordon 1980).
[102] Not least demonstrated by the death of a Cambridge PhD student in Egypt (Goode and Ahram 2016).
[103] Gaining and research permit, submitting a research visa and registering with the local district authority.
[104] Echoing known difficulties in authoritarian-country research (Malekzadeh 2016; Loyle 2016).

Case Study Analysis

Influenced by Cloke et.al.[105], Rathburn[106] and Leech[107] analysis occurred during and after the fieldwork. It involved immersion in collected data, a process of continual re-reading that produced gradual refinement of themes and conclusions. Starting this during fieldwork also meant initial conclusions could be assessed during later research stages. Analysis broadly followed what Van Evera[108] calls the Delphi Method. He describes this involving "the investigator using (the subject's) … memories and judgements to infer hypotheses that could not be made from direct observation alone"[109]. This was particularly relevant for more ethnographic methods used in each dam-site's locale which aimed to capture participants' complex experiences.

Process tracing complemented this less structured method of analysis. Responding to King, Keohane and Verba's[110] critique of qualitative approaches, Brady and Collier[111], and others, formulated process tracing as a rigorous qualitative research technique grounded in social science theory. In their approach, process tracing is deployed alongside concepts like critical junctures to define causal mechanisms[112] or a causal pathway[113] which can then be verified by within-case tests to establish 'necessary' and 'sufficient' causes[114]. However, as with much of the literature on political science methods, such research typically focuses on causality, aiming to explain a specific event, outcome or decision. In contrast, this thesis follows Gerring[115] who, whilst recognising that the method can create usefully specific and plausible causal explanations, criticises an overly mechanistic interpretation of the technique that only allows for its narrow, prescriptive use.

[105] Cloke 2004.
[106] Rathburn 2010.
[107] Leech 2002.
[108] Van Evera 1997.
[109] Van Evera 1997, 70–71.
[110] King, Keohane, and Verba 1994.
[111] Brady and Collier 2010.
[112] Checkel 2006; Collier 2011.
[113] George and Bennett 2005.
[114] Goertz and Mahoney 2012; Checkel 2006; Collier 2011.
[115] Gerring 2010.

According to Gerring[116], an obsession with defining a first cause and on using precise within-case tests can lose clarity about researches' fundamentals. He argues these to be justifiable explanations and the relationships underpinning them. This is relevant to this study's more descriptive aims. Therefore, following George and Bennett[117], process tracing was used to construct a detailed narrative series of events and actors, with findings then interpreted through pre-existing theories. This helped map planning processes and the equifinality of ideological and materialist drivers in decision making[118].

The application of a more open-ended analytical technique is also justified by the authoritarian research context. Goode and Ahram[119], Art[120] and Barros[121] argue the application of recent formalised social-science methods, like precise process tracing, to authoritarian countries is problematic, primarily because of the trustworthiness and availability of data. As Ahram and Goode[122] argue, authoritarian countries create agnotological environments, ones that supress information because ignorance is part of such regimes' basis for power. This environment creates problems for applying clearly definable process-tracing tests, with Art asserting that researchers must "think more like detectives"[123], working around constraints and piecing together information to overcome knowledge gaps. A number of academics[124] suggest that rigor in this context stems from reflexivity. Given deliberate obfuscation, and fear of speaking critically[125], researchers must understand responses within each regimes' context. This again requires a close understanding of the political landscape of the country: such details can enable a scholar to both ask the right questions and analyse responses, reading between the lines where necessary. Loyle[126] specifically

[116] Gerring 2010.
[117] George and Bennett 2005, 225.
[118] Echoing Campbell 2002.
[119] Goode and Ahram 2016.
[120] Art 2016.
[121] Barros 2016.
[122] Ahram and Goode 2016.
[123] Art 2016, 975.
[124] Ahram and Goode 2016; Goode and Ahram 2016; Malekzadeh 2016.
[125] Captured by the Goode and Ahram's (2016) idea of preference falsification, meaning a desire to lie.
[126] Loyle 2016.

asserts the importance of this contextual understanding when researching Rwanda. Moreover, in refutation of recent calls to increase the transparency of data to ensure the possibility of external validation, to publish transcripts and attribute quotes, the argument here contends that personal vulnerability and the ethical need to protect research participants means that scholars of authoritarian countries must anonymise much of their data. Therefore, because of this thesis' research design and its take on methodological debates, and because of an authoritarian-country context, research followed a looser, inductive, qualitative, small-n analysis.

Theory Building

Theory building here follows a heuristic process outlined by Eckstein[127], where rich data from each case study is analysed through a theoretical lens to build broader generalisations. The aim is not to produce a universal theory, but one contingent on these cases and with broader explanatory potential for the dam resurgence phenomenon. This thesis primarily builds theories about *why the resurgence in dams is taking place* and *what its practices are*. A core aspect of this concerns the *degree of continuity and change in dam-building justifications and practice* and thereby the *role of high modernist and reformist idea-practices*. Additionally, secondary theory-building aims reflect on:

- The influence of high modernist ideology in development

- The extent to which Indian and Brazilian actors influence infrastructure building

- Trends in illiberal, modernising developmentalist states

[127] Eckstein 1975.

Analytical Frameworks

Political Ecology

Methods and analysis deployed here partly use a Marxist political ecology framework because of its relevance to deconstructing power relations and trade-offs in environmental intervention and given the frameworks ability to integrate elite-level policy-making with experiences in particular locales. Using Robbins'[128] mapping of political ecology, this thesis follows the environmental conflict research theme that examines human-induced environmental intervention and its resulting politics. This political ecology approach highlights the central role played by the environment in people's livelihoods and society. This influences the thesis' central stress on the interconnection of the social with environments, captured by the term *socio-ecologies*. The thesis particularly draws on scholars who have used political ecology to study dams, for instance in relation to China's African dams (Chapter 2). Another important example here is Hoag[129] who uses the term waterscape to invoke the centrality of rivers and water to biological systems, cultures and livelihoods, and thus the fundamentally political nature of dams. Methodologically, the political ecology approach aims to conduct research that is critical, self-reflexive and acknowledging of power inequalities in such socio-ecological interventions, particularly highlighting power inequalities between different geographies and between socio-economic groups (wealth, gender, geographic location, age etcetera). This influenced the research and above sampling strategy in each dams' locale. Relatedly, the thesis is also grounded in literature identifying "the tyranny of participation"[130], a term describing participatory approaches that see 'the community' as a singular object. Whilst common, such approaches problematically

[128] Robbins 2011.
[129] Hoag 2013, 4–8; Also Swyngedouw 2015.
[130] Hickey and Mohan 2004.

ignore power differentials that allow those with higher socio-economic status to gain most from development projects [131].

Political Economy of the Emerging Powers in Africa

This thesis also follows the constructivist political economy approach that broadly seeks to understand how various economic actors, influenced by political relations and ideologies, create international relations and national policy agendas[132]. In analysing the international enablers of dams, the thesis is more specifically situated in the political-economy framework studying Africa-emerging power relationships. Analysed in Chapter 2, this approach questions the stereotyping often found in popular and academic commentaries of the emerging powers in Africa, asserting that relations involve a multiplicity of actors and complex outcomes[133]. Equally important for the thesis' theoretical framework, is the work of scholars analysing dams as products of national political-economy dynamics, of the ideologies and strategies of political elites and their visions for development. Key examples of such an approach include Verhoeven[134] in Sudan and Kraak[135] or Fantini and Puddu[136] for Ethiopia. Both political economy frameworks stress the complexity of development, seek grounded empirical understandings and stress the importance of African actors' agency in shaping decision making and outcomes.

High Modernist Ideology

The key theory-building lens for this thesis' is the ideology of high modernism. An ideology is defined here as a "thought edifice"[137], a cluster of ideas and understandings that explain the world and legitimate a set of beliefs and corresponding political actions[138]. Thus, as Goodwin

[131] Hickey and Mohan 2004; Hickey and Mohan 2005; Mohan and Stokke 2000; Williams 2004.
[132] Hajer 1995.
[133] Key texts including Bräutigam 2011; Alden, Large, and Oliveira 2008; Power, Mohan, and Tan-Mullins 2012; Large and Patey 2011; Mawdsley 2012.
[134] Verhoeven 2015a.
[135] Kraak 2012.
[136] Fantini and Puddu 2016.
[137] Freeden 1994, 140.
[138] Goodwin 2014.

writes, ideologies have explicit practical application and seek to impose "the right way, or ideal way, of organising society"[139]. Following Freeden[140], this thesis understands ideologies as containing a hierarchy of core, secondary and more applied ideas within a conceptual cluster. As Goodwin[141] describes, ideologies should aspire to coherence and yet are broad conceptualisations that may include contradictions rather than being highly systematised, consistent and dogmatic. Moreover, they are not static but rather change with time and between different practising actors who add and remove ideas or assert their different hierarchical ordering[142]. Following Campbell[143], analysis of ideology focuses on identifying the presence of ideas and their associated practices. As Freeden asserts, "the evidence for our thinking lies in our actions and utterances. Our thought-practices (the building-blocks of ideology) intermesh with and inform material, observable practices and acts"[144]. Thus, evidence for ideational thinking lies in both discourse and practice; we should see "ideologies as located in concrete activities"[145] and not just speech and writing: "Sometimes it makes more sense to trace a movement from theory to practice; at other times the theory can be extracted from practice itself. We are always looking at a two-way street"[146].

This understanding of ideology means analysis should not only include discourse but also decision-making and knowledge-production practices. Ideology is therefore an important tool relevant to the thesis' questions of *why* and *how* the dam resurgence is happening. In this thesis, high modernism is firmly placed as an ideology rather than another type of political idea, a distinction arguably under-theorised by Scott. Deconstructed in Chapter 1, high modernism[147] is a set of ideas about development, modernity and the correct paths to progress that is "grand in its vision, hegemonic in its claims and resolutely statist with its faith in expert knowledge and

[139] Goodwin 2014, 29.
[140] Freeden 1994, 158; Freeden 2006.
[141] Goodwin 2014.
[142] Freeden 2006; Freeden 2000.
[143] Campbell 2002.
[144] Freeden 2003, 21.
[145] Freeden 2003, 23.
[146] Freeden 2003, 21.
[147] Coined by Scott 1998.

bureaucratic rationality"[148]. Therefore, whilst examining discourse and visions of the future, this is not strict discourse analysis where the research object becomes language itself[149]. Moreover, high modernism is not conceived as a paradigm, referring to a coherent set of underpinning policy questions and solutions that establish a way of thinking[150]. Rather, high modernism involves ontological ideas about the state of the world and epistemological ideas about how to transform it[151]. Consequently, it resembles what Mannheim[152] calls 'total ideology': an all-encompassing world view adopted by a social group. Manheim contrasts such total ideologies with 'particular' ideology, which refer to a specific set of ideas defined in opposition to total ideologies[153]. In this thesis dam reforms are argued to broadly constitute such a particular ideology.

High modernism is turned-to because of its crucial relevance to the thesis' questions and empirics. Throughout the 20th century, academics have found high modernist ideas in dams' justifications and practices, albeit to varying extents. Thus, the decision to analytically use the lens of high modernism is historically grounded, to some degree enabling assessment of persistence and change in the dam-building resurgence. Finding the ideology's continued presence in fieldwork further supported this position. However, high modernism is never asserted in this thesis as the sole explainer justifying dams and their practices. As Chapter 1 demonstrates, dams can act to increase a state or institution's power and wealth, support economic-growth strategies and underpin a ruling regime's political project. The concept of path dependence is also significant. It describes how "initial moves in one direction elicit further moves in that same direction"[154]. This thesis uses the concept to assert that history matters[155] and accounts for some

[148] Apter 2014, 42.
[149] A distinction made by Campbell 2002; Discourse analysis is most famously associated with Geertz 1973.
[150] P. A. Hall 1993; Campbell 2002.
[151] E.g. in Gilman 2003, 3.
[152] Mannheim and Wirth 2015.
[153] Mannheim and Wirth 2015.
[154] Kay 2005, 553: Who also critiques the absence of specifically-proposed mechanisms in singularly path-dependent analyses, and their frequent inability to explain change and normative dimensions.
[155] Ohemeng and Anebo 2012, 164; Peters, Pierre, and King 2005. The latter also assert path dependent factors coexist with other drivers.

of the continuities in the dam resurgence-era's discourse and practice. Specifically, it uses three path dependent mechanisms. The first two use an economic metaphor that significant sunk costs[156] make continuing along a policy path more likely, partly because of having committed such spending[157] but also because of potential increasing returns on that initial investment[158]. The third mechanism concerns the influence of historically-established interest groups (here civil servants and dam-building agencies) vested in governments' continuing a policy of dam building[159]

Dam building in the past is not argued to equate to high modernism. Rather, the ideology is understood to involve a specific set of discursive ideas and associated policies that are varyingly applied. This thesis sets out in Chapter 1 precise, constitutive idea-practices for high modernism, allowing close analysis of its presence and absence. This informs the thesis' findings about the ideology's contemporary uneven spread: In the cases here, high modernism is particularly present in energy-sector planning ministries, energy utilities and river-basin agencies. In contrast, international enablers appear driven by more materialist factors. The thesis also acknowledges that high modernist ideology is only one way to 'shuffle the deck of history'. For instance, Swyngedouw[160] similarly analyses dams' role in underpinning Spain's modernisation programme. However, he uses a materialist perspective to examine the social construction of the country's waterscape, influenced by socio-technical studies and political ecology. Whilst not rejecting the legitimacy of such approaches, this thesis uses the prism of high modernist ideology because of its presence in the research findings, because its historic association enables assessment of change and continuity, and because as an ideology, it supports analysis of the thesis' specific questions on discourse and policy practice.

[156] Whether in training and studies (learning dividends) or enabling infrastructure (Beyer and Wielgohs 2001).
[157] Arrow 2000.
[158] P. Pierson 2000. However, this thesis does not follow the New Institutional Economics analysis (e.g. North 1989) often underpinning these economic approaches that assume singularly rationale actors.
[159] Numerous analyses of dam building emphasise this historical importance, two recent examples being Swyngedouw 2015; Verhoeven 2015a.
[160] Swyngedouw 2015.

The materialist tradition rooted in positivist empiricism, debates the legitimacy of such idea-based theory building[161], claiming that research should only analyse observable discourse, actions and institutions[162]. Moreover, because of the difficulty of 'proving' the influence of ideas within decision making, critics assert that actors can lie and manipulate interviewers to hide true interests whether Machiavellian or pragmatic[163]. However, Campbell, Goodwin[164] and others[165] argue that such materialist interests are not mutually exclusive but rather coexist alongside and within ideological beliefs. Indeed, individuals tend to draw on multiple sources of ideas and influences rather than coherently adopting practices and a highly systematised world view. Consequently, studies often find it difficult to tease apart materialist and ideological rationales[166]. Taking the ontological position that ideas do influence policy making[167], this thesis attempts to move beyond debates pitting idealist against materialist perspectives. Rather, it proceeds on the grounds that it is more fruitful to ask how ideas and materialist strategies co-exist, interact[168] and change[169]. By taking ideology seriously, this thesis makes a significant contribution to the study of political science in Africa, which predominantly privileges materialist explanations[170].

Outline of the thesis

This thesis proceeds in Chapter 1 to analyse high modernism in-depth, explaining its core and applied ideas. This includes the high modernist idea-practices that frequently justified dams and rationalised decision-making and knowledge-production practices in the past era. Chapter 1 also examines notable high modernist statebuilding programmes in which dams played a central role. The chapter then turns to the impacts of large dams across the world in order to contrast

[161] Kingdon 2011; Schmoldt, Benthe, and Haberland 1975; Campbell 2002; Goodwin 2014, Chapter 2.
[162] Goodwin 2014, 5–6.
[163] Campbell 2002, 28.
[164] Campbell 2002; Goodwin 2014, Chapter 1.
[165] Bevir and Rhodes 2002.
[166] Campbell 2002, 28–29.
[167] Demarking this study from psychological exercise in finding 'what people really think'.
[168] Campbell 2002; Bevir and Rhodes 2002.
[169] Bevir 2011.
[170] Campbell 2002, 21; Freeden 2008; Burstein 1991.

their problematic economic, social and environment record with proponents' grand justifying claims and statebuilding visions. The last section of the chapter analyses the near-secession and resurgence of dams. It focuses particularly on attempts at reforming dam planning implementation and debates around whether such reforms are sufficient and if the infrastructure is necessary for development. Therefore, the chapter grounds the academic context for this research.

Chapters 2, 3 and 4 then set the broader context for the international and national actors in the three case-study dams. Chapter 2, divided into three sections, tackles the emerging powers India and Brazil in Africa. The first section analyses relevant academic work whilst sections two and three turn to India and Brazil, using a mix of literature and primary fieldwork to understand why governments and companies from each country are interested in Africa and what their growing ties involve. Using this broader political economy framework, the chapter also specifically asks why India and Brazil are respectively engaged in Rwanda and Tanzania and in dam building in Africa. This includes analysis of key actors (politicians, governmental institutions and companies) and their differing agency in African dam building. This chapter demonstrates that dam building is not either governments specific policy aim, but rather the result of broader political foreign-policy goals and the activity of infrastructure companies.

Chapter 3 analyses Rwanda's dam-building. It starts by assessing the lively debate on the country, arguing that opposing academic arguments share an understanding of the regime's central developmentally-ambitious statebuilding project. The chapter reflects on the importance of this project to the government and its high modernist content and practice. This is used to explain Rwanda's 'megawatt mission', a policy which singularly demands rapid electricity-generation construction, entailing implementation of all available domestic energy sources without holistic thinking about projects' efficacy, economic or environmental impact. Hydropower features strongly, but is thus merely chosen as an electricity source, not because of a desire to

build dams. Chapter 4 finds a similar trend in Tanzania. However, it starts by studying dams' prominent history in the country's high modernist statebuilding, as this generated path dependency. It then turns to the post 2005 drive for megawatt construction as part of a partially-renewed statebuilding programme heavily featuring dams. The chapter also analyses the way Tanzania's powerful but fragmented state hampered energy-implementation plans. This limitation, along with the public critique of dams by certain actors, is used to reflect on the boundaries of the dam building resurgence and the somewhat unresolved challenges raised with the 1990s stagnation of dam construction. Thus, Chapters 3 and 4 foreground the individual case studies with the broader justifications and practices of each country's return to dam construction. They explain the role of high modernist ideology in this energy-centric dam drive, but also co-existing materialist and path dependent factors.

Chapters 5, 6 and 7 detail the Nyabarongo, Rusumo and Stiegler's Gorge Project respectively. Each chapter examines the projects' histories and initial stagnation. They then analyse each dams' return to government plans and the crucial role of international enablers in supporting further planning. The specifics of each case study are discussed, including the timeline of the planning stages and decisions over dam design, compensation package, benefit sharing schemes and mitigation measures. Additionally, processes of knowledge production about each project's socio-ecological baseline, hydropower's efficacy and dam impacts are detailed. Official narratives overlooking or dismissing trade-offs are contrasted with local-level research. This produces fine-grained analysis of the changes and continuities in the justifications for each dam and their planning and construction practices, thereby showing a degree of high modernist persistence.

Chapter 8 then brings the thesis' main arguments together. On the one hand, case-study analysis suggests significant changes to the justification and planning of dams. Megawatt generation and not dam infrastructure is the goal for Rwanda and Tanzania's regimes. Moreover,

the three cases demonstrate stronger insistence on impact assessment, wider-ranging compensation practices and local-level benefit sharing. The Rusumo Falls case also involved remarkable design mitigation. Whilst such reformist idea-policies have some significance, the thesis also asserts the presence of high modernism, as the ideology rationalises Rwanda and Tanzania's pursuit of grand, (overly)ambitious megawatt building and justifies expert-centric decision making that overlooks impacts and treats hydraulic infrastructure as apolitical. Arguably the ideology also underpins the way dam-building actors adopt reformist ideas. Thus, Chapter 8 argues that the dam resurgence is marked by ideological bricolage[171]: High modernist thought-practices are morphed with reformist ideas[172] that have the opposite ontological and epistemological assumptions. This is best captured with the finding of exaggerated *pervasive appraisal optimism*[173], where the impacts of dams are increasingly acknowledged but disregarded because of a continued belief in science and expertise to solve depoliticised trade-offs between different groups. The thesis' conclusion then asserts the relevance of these findings to broader literatures on the nature of development today, the emerging powers in Africa and trend of illiberal modernising states.

[171] Chapter 8.
[172] Chapter 1.
[173] Constitute concept of high modernism outlined in Chapter 1.

Chapter 1

High Modernism, Statebuilding and the Politics of Dams

> "I would like to urge the Members of the National Assembly to visit the Dam site at Akosombo from time to time and to persuade their constituents and friends here and abroad to come and see the gigantic dream come true. It is indeed an inspiring experience to visit the dam site and imbibe the message of hope and growth it conveys for our Nation. Major projects such as the Volta are the new 'places of Pilgrimage' in this modern age of science and technology. They serve as monuments to the determination and dedication of a whole people to raise themselves to a fuller and richer life"
>
> (Nkrumah 1997 [1963], p. 23; quoted in Miescher[1])

> Whilst "the electricity provided material advantage to some … dams also displaced millions of people, decimated indigenous communities, drowned choice farmland and rainforest and devastated fisheries- … While the benefits of these projects boosted GNPs, the costs were mostly neglected and … the impacts remained invisible on national and international political agendas."
>
> (Usher, 1997a: 4).

Concentrating on the thesis' key questions, this chapter analyses the gamut of literature on 20th century dam building. It starts by focusing on high modernism, the ideology's core rationales and enabling conditions, and on the role of dams as statebuilding tools. This chapter proposes seven applied high modernist idea-practices[2] that involve particular planning and construction processes, whilst also appreciating personal and organisational incentives for constructors, politicians and consultants behind their adoption. Colonial states and independent nations play a pivotal role in this chapter's analysis but aren't the only actors: Financiers and river

[1] Miescher 2014b, 342.
[2] Freeden 2008.

basin institutions, here termed 'enablers', constitute a 'dam-building regime' underpinning progress and shaping the infrastructure's planning and construction. The latter half of the chapter, as a reference point for the thesis' case studies, evidences the benefits, and the often unequal and costly impacts, of dams. It then traces the near-secession of dam construction towards the 20th century's close, which in-turn spurred initiatives of dam reform, most notably the World Commission on Dams. The chapter ends with analysis of these reformist idea-practices, assessing the ongoing debate about their sufficiency, the developmental necessity of dams and the nascent literature on the dam resurgence in which this thesis is situated.

High Modernist Ideology

James Scott coined the term high modernism[3], using it as a tool to connect desperate experiences of modernity and development in the 20th century across myriad countries. Scott traces its growth from the 18th and 19th centuries, when writers such as Condorcet 'discovered society'[4] as another realm which science could improve, as was happening across industry[5], agriculture and forestry. High modernism is therefore rooted on this era's growing faith that a scientific process could generate best paths to progress. Scott[6] describes high modernism's chief proponents including visionaries from across the political spectrum, from Le Corbusier, Trotsky and Lenin to Lilienthal and McNamara. All dreamed of scientifically-derived development, the ordered perfecting of society from above. High modernism's set of ideas thus explain why some countries have become wealthier than others, thereby legitimating idea-practices of how to 'do Development'[7]. High modernism is particularly interesting as its main theorists[8], generally from the critical development studies perspective, use it to explain why and how projects of

[3] Scott 1998.
[4] Scott 2006, 4–6.
[5] For instance in early 20th century Taylorism; meaning methods of atomising and increasing productivity in industry (Scott 2006, 12).
[6] Scott 2006.
[7] In the sense of Hart 2001.
[8] Often using the term, not the ideas: Peet and Hartwick 2009; Sardar 2001; Scott 1998; Ferguson 1999.

development fail and have economically-ineffective and socially-unequal, or even destructive, outcomes. Whilst critiques of Scott analysed below[9] point to limitations in using this ideology to straightforwardly ascribe development failure, the simplifying, depoliticising logics of high modernism, and its association with white elephant infrastructure especially, make its presence significant and heuristically valuable for the purposes of this thesis.

Although calling it an ideology, Scott does not theorise high modernism as such. This thesis, using the Introduction's discussion of ideology, advances Scott's work, more rigorously analysing high modernism and bringing his work into conversation with contemporary critics[10] and past academics who propose some of its key constitutive ideas[11].

Core Ideas

High modernism has two underpinning core ideas. The first, like other modernisation conceptualisations, asserts a binary between the 'modern' and the 'pre-modern' or 'traditional'. Latour[12] argues that this binary temporally and geographically delineates Europe's enlightenment culture from pre-enlightenment or traditional societies. Modernity therefore referred to industrialised countries whose people believed in science and the triumph of secular life. In contrast, traditional societies are primordial, timeless without history or capacity for radical change[13]. Lerner, a key proponent of high modernist ideas, exemplifies such static high modernist thinking about the non-European world in his description of a traditional Lebanese woman's "information coming as it did in biblical times, from the primary network of (her) … daily round"[14].

[9] Bähre and Lecocq 2007; Schneider 2007.
[10] Dye 2016c; Bähre and Lecocq 2007; Loo 2016. See also Gilman 2003; Ferguson 1994; Ferguson 1999; Mitchell 2002; Apter 2014; Bloom, Miescher, and Manuh 2014; Latour 1993. Although these latter academics, often from critical African studies, don't use Scott's term they similarly analyse 'development as modernity' ideas and are crucial to this thesis' understanding of the ideology.
[11] Albeit that they did not use the term.
[12] Latour 1993.
[13] Gilman 2003.
[14] Lerner 1958, 177.

This binary also focused on behaviour-centric traits. For instance, Pye[15], another mid-20th century proponent, explains Burma's poverty through a deficiency in modern cultural values, stating "the Burmese is bought up to feel that nearly all activities should normally occur in a group setting"; or, "transitional peoples … are particularly prone to human but essentially self-defeating practices (especially) irrational compulsions and aggressions"[16]. Lerner, as suggested in Figure 2, similarly espouses essentialising descriptions: "Whereas the traditional man tended to reject innovation by saying 'it has never been thus', the contemporary Westerner is more likely to ask, 'does it work?' and try the new way without further ado"[17]. A number of socio-cultural dichotomies underpin such normative, behaviourist assertions. Pye[18] even states some of these opposites as "traditional and rational, rural and urban, agricultural and industrial, primitive and civilised, static and dynamic, sacred and secular, folk and urban … communal and associational". Thus, high modernism advances the enlightenment's understanding of its own historical delineation to create globally applicable binaries based as much on image, as reality.

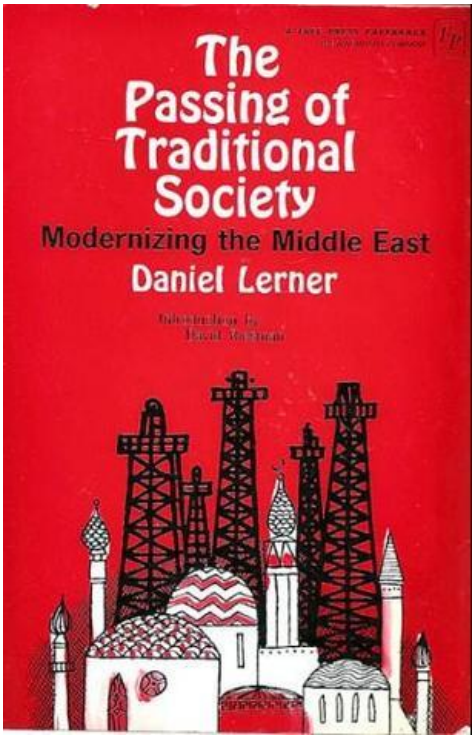


Figure 2 The front cover of Lerner (1958) quoted here. The cover supposedly juxtaposes 'Tradition' against the 'Modern'

The second core element is high modernism's "claim of to speak with the authority of scientific knowledge about the improvement of the human condition and to disallow other competing sources of judgement"[19]. Latour is again useful in analysing this epistemological

[15] Pye 1962, 10.
[16] Pye 1962, 287.
[17] Lerner 1958, 49.
[18] Pye 1962, 33.
[19] Scott 1998, 93.

binary[20]. Science could supposedly understand the 'natural' observable world through generation of universally applicable laws derived from experimentation. This scientific epistemology contrasts with "political intents and values that can only frustrate the solutions to social problems"[21]. This depoliticises the generation of knowledge, creating an unquestioning belief in the scientific epistemology as universally applicable and objective[22]. It also makes modern 'experts' *the* legitimate reservoirs of information, rejecting a broader definition of knowledge and technology[23]. Scott[24], critiquing the ideology, demonstrates the empowering of experts and their short-sighted decision making in the planning of new cities in India and Brazil, or Tanzania's villagisation policy. Necessarily then, high modernism "rejects the authority of history and customary practise"[25] and the alternative specific knowledges of place, everyday livelihoods, culture and environments, termed *metis* by Scott [26]. At its core then, high modernism uses dichotomies to depoliticise, essentialise and simplify a more complex world. Indeed, such simplification is key to high modernist practise as it creates the legibility that is necessary to transform society from above; the accessible data about where and what people do.

Stemming from these core ideas sit an adjunct set, which actors espousing high modernism varyingly adopt. One is 'modernisation as spectacle'[27], the importance of visually expressing the aesthetics of modernity, industrial technology and legible order. Scott[28] captures this with a forestry example: Early German attempts to transform environments to plantations removed the complex ecology underpinning the forest system, leaving environmentally-unsustainable rows of straight trees without undergrowth. Thus, high modernist "projects did not

[20] Famously using Latour's (1993) Hobbs against Boyle comparison.
[21] Scott 2006, 7.
[22] Mitchell 2002, 1–3: Scientific epistemology broadly referring to formalised knowledge grounded in positivist, supposedly independent and rational, experimentation and observation.
[23] Latour 1993; Mitchell 2002, 56.
[24] Scott 1998.
[25] Scott 2006, 8.
[26] Scott 1998.
[27] Bloom, Miescher, and Manuh 2014.
[28] Scott 1998, Chapter 1.

so much need to be efficient or modern, they had to look efficient and modern according to a legible structure"[29]. Visual legibility therefore performs high modernist development as well as enabling the gathering of statistics, planning of landscapes and re-ordering of livelihoods.

Another idea within the high modernist cluster is that of modernisation theory, which asserts the linearity, technologically induced and teleological nature of development. Drawing on the principle of the undeveloped as static and backward, modernisation theory asserts progress as a linear, staged, evolution: Externally induced change derived by expert knowledge will advance countries. Thus, technology, meaning infrastructure and devices conceived in the West, become the main agent of change[30]. Gilman[31] describes this universal prescription as "rooted in the contrast between 'traditional' and 'modern' societies, modernisation theory posited the existence of a common and essential pattern of development". Given euro-centric enlightenment origins, many high modernist ideologues have consequently seen Europe and North America as the exemplary models to follow. Rostow's economic growth model[32] is a well-known illustration of modernisation theory, involving a universal timeline of technologically-induced development: Traditional societies enter a take-off period, involving urbanisation and industrialisation, leading to mass consumption as the mature end point. This model is explicitly based on the West's experience and yet is argued to apply universally. However, recent work, not least Chapters 3 and 4, suggest that new ideas about what modernity looks like, and altered models of teleological, linear growth, are emerging from East Asian countries that have experienced rapid economic change[33].

Although originating in Europe and America, high modernist ideology spread globally in the 20th century, not least in Africa. This started with 'welfare' colonialism from 1945[34], and later

[29] Bähre and Lecocq 2007, 2.
[30] Gilman 2003, 39, 71; Mitchell 2002, 14–15; Scott 1998.
[31] Gilman 2003, 3.
[32] Rostow 1960.
[33] E.g. for the energy sector, Chapter 3.
[34] Scott 2006; Ferguson 1994.

"African intellectuals adopted (such) modernisation (policies) as a means of transforming material conditions … (and overcoming) historic iniquities"[35]. Therefore, elites in developing countries have frequently imbibed high modernist ideas, seeing the livelihoods, practices and knowledges of poorer and rural people through the ideology's lens as backward, traditional and irrational[36].

Enabling High Modernism

In Scott's theory[37], successful high modernist development requires an authoritarian, centralised state: "social engineering was inherently authoritarian"[38]. Only such states can effectively empower rational expert bureaucracies to design and implement development independently from other political influences. The top-down mode of implementation and principle of science deriving the correct paths to progress also necessitates "Olympian ruthlessness to the victims of their interventions"[39], a feat achievable in non-democracies. Additionally, Scott asserts that high modernism needs a prostrate civil society who can't mobilise politically to resist state actions[40]. This formula of authoritarianism and absent resistance creates the blank slate on which to re-write society along scientific lines[41]. Therefore, some of the clearest examples of high modernism come from communist authoritarian states: Leninist vanguard-style development adopts the idea of an enlightened elite deriving the paths to progress for the backward masses. Russian Leninism also placed great emphasis on technology to create industrial development, captured by phrases such as Lenin's "communism is Soviet power plus the electrification of the whole country"[42]. However, Communist states did not aspire to other high modernist ideas like Rostow's end-goal of a Western-style mass-consumption capitalist society.

[35] Bloom, Miescher, and Manuh 2014, 2.
[36] Peet and Hartwick 2009.
[37] Scott 1998, 5.
[38] Scott 2006, 7.
[39] Scott 2006, 7.
[40] Scott 1998.
[41] Bähre and Lecocq 2007; Scott 2006.
[42] Lenin and Katzer 1965, Volume 31:408–26.

Reinforcing this point Klingensmith, describing a prominent 1950s Indian dam-building engineer, states:

> "Both the Soviet Union and the United States are important to (Eng. Meghnad) Saha insofar as they are taken as representative of the triumph of science, technology and centralised government over politics, parochialism, obscurantism and backwardness, representative of the salvation of the nation through rationality coupled with strength. For Saha, the vast constitutional and political differences between (President Roosevelt's New Deal in the) United States and Lenin's Soviet Union do not merit comment"[43].

Therefore, like other ideologies[44], high modernism's specific idea-practices are only one element, being incorporated alongside different ideologies and therefore varying across different adopting actors. Consequently, examples of high modernism are found widely.

To explain this spread, it is necessary to look at the nature of political power and whether a central authority can sufficiently direct implementation whilst overriding opposition and alternative, local-level political power. Whilst authoritarian states tend to possess these elements, Scott argues that they can appear in democracies under certain conditions, for instance when states transform geographical peripheries and their subaltern people, or during revolution, war and economic depression when publics are more willing to sanction radical change [45]. Thus, the depression after 1929 enabled Roosevelt's radical New Deal that entailed projects like the Tennessee Valley Authority (TVA), created to transform 'backward Hillbillies' to modern citizens[46]. However, in such contexts, opposition and democratic processes tend to change high modernist development schemes over time. The TVA exemplifies this, as Arthur Morgan, its first chief, was thrown out due to hostility stoked by his frequent overriding of existing local political elites and

[43] Klingensmith 2007, 148.
[44] Freeden 2000.
[45] Scott 2006.
[46] Scott 2006.

democratic institutions such as farmers' unions[47]. Thus, liberal capitalist democracies can also express high modernism. Whilst this conclusion could demonstrate that high modernism is overstretched to the point of theoretical uselessness, the argument here maintains this finding is in fact consistent with the above definition of ideology: The specific high modernist bundle of ideas outlined here can be incorporated into other political ideologies from across the spectrum. It is then enabled and disabled by the nature of political power wielded by adopting governments. This argument rejects characterisation of high modernism as all-pervasive, whilst stressing the centrality of analysis on the state and political power.

Critiques of High Modernism

Despite later attempts to clarify the role of authoritarian power, academics continued to critique Scott's treatment of the state. For instance, in Bähre and Lecocq's special issue[48], Bähre[49], Schneider[50] and Geschiere[51] demonstrate that frequently, detailed contextual case studies indicate that Scott's thesis does not adequately account for research findings and their nuance, the reactiveness and complexity of states. Their central contention is that analysis of development needs to consider who is wielding power and appreciate the state's capability to implement; its capacity and coherence. Most convincing of the group, Schneider[52] attributes Tanzania's development failure under President Julius Nyerere (1964-1985) to its inflexible authoritarianism, not its high modernist plans, and analyses the state's shortcomings in planning capacity and implementation coherence. Other authors' levelling such critiques[53] problematically use less authoritarian countries with stronger civil societies that were never Scott's subject. Nevertheless,

[47] Scott 2006: Consequently, the TVA sort to win the support of local elites which partly involved lessening its degree of radical intervention, its re-writing of the status quo. Rather, to ensure its persistence, its projects did not undermine the power and activities of local elites (Klingensmith 2007).
[48] Bähre and Lecocq 2007; Also see Loo 2016.
[49] Bähre 2007.
[50] Schneider 2007.
[51] Geschiere 2007.
[52] Schneider 2007.
[53] Loo 2016; Bähre 2007.

these arguments firstly inform the thesis' careful theorisation of high modernism as an ideology that coexists with other ideas and strategies. Secondly, they influence this thesis' focus on the state with the premise that authoritarian regimes can learn, react and act pragmatically, undermining an ideology premised on relentless societal transformation from above. Thus, high modernism's 20th century peak was not only defined by unyielding states with singular, rigid ideological programmes[54].

Analysis here also intends to avoid a critique levelled at post-development, a distinct academic school that analyses development in a similarly critical way to Scott. Post-development theorists[55] see all development as essentialising, Western-centric and frequently harmful, and rather call for a grassroots alternative based on indigenous knowledge. However, as Scott himself acknowledged[56], it is important to recognise that in many ways high modernism, or the wider modernisation experience, has produced the standard of living advances experienced broadly across Western democracies; that gains have been made from order, infrastructure and services deployed from on high and that technology's introduction and rational scientific thinking can produce positive benefits. Thus, the thesis follows Kiely[57], Corbridge[58], and others in arguing that critiques of development cannot become panoptic and dismiss all attempts at modernising progress. Rather, study should pursue nuance and recognise development as a complex struggle with likely winners and losers.

High Modernism and its Entanglement with Dams

Dams embody many of the ideals of high modernism[59]. As Adams argues, the scale of externally-induced change personified in the large dam invokes the idea that "only a major

[54] E.g. Tischler (2013, 21) sees high modernism as a starting point.
[55] E.g. Crush 1995; Escobar 2012.
[56] Scott 2006.
[57] Kiely 1994.
[58] Corbridge 1998.
[59] Loo 2016, 36.

transformation in the environment, society and economy (is capable of improving) … the conditions on the ground. Only the boldest and most imaginative and modern development could counteract the poverty and backwardness of the farmers and the harshness of their environment" [60]. However, dam building is not synonymous with high modernism. Rather, the ideology entails specific justifications and rationalises a set of construction practices.

Dams Affinity with High Modernism

Dams can exemplify high modernist beliefs in the power of scientific technology and "man's superiority over nature"[61]. As McCully explains the "scale of large dams and their seeming ability to bring power and capricious natural forces under human control, gives them unique hold in the human imagination. Perhaps more than any other technology, massive dams symbolise[62] the progress of humanity from a life ruled by nature and superstition to one where nature is ruled by science"[63]. Myriad dam builders use such thinking in their justifications, imagining that control over water is superior to a free-flowing river, whether China's Three Gorges[64], Colonial Mozambique's Cahora Bassa[65] or Greece's Marathon Dam. Kaika describes the latter's justification referencing the ancient Marathon battle, where civilisation (the technological dam) fought barbarians (the wild river)[66]. Lilienthal, a key past-era dam building proponent (see *enablers* below), also alluded to the human-nature separation in what amounts to his dam-manifesto: "Waters once wasted and destructive, have been controlled and now work day and night, creating energy to lighten the burden of human drudgery"[67]. High modernist rationales about ordering supposedly irrational and wild physical and human geographies therefore justified numerous

[60] Adams 1992, 14.
[61] Everard 2013, 60.
[62] Thereby drawing on Geertz (1973) assertion that symbols can embody ideologies.
[63] McCully 2001, 237.
[64] Original justification cited 'irrational' flooding prevention and river economic control (Barber and Ryder 1993a).
[65] Isaacman and Isaacman 2013.
[66] Kaika 2006.
[67] Lilienthal 1944, 1.

dams across a variety of political-regime contexts[68]. Dams, as such large, complex and bold technologies, also appeal to high modernism's veneration of science and technology. Egypt's colonial-era Aswan Dam, as described by Mitchell[69], captures this in a near-metaphor. Its first purpose was electricity generation primarily for fertiliser production, but simultaneously, the dam curtailed the fertilising annual flood. This signifies dam-building's premise of technology[70] over ecological systems.

The symbolic materiality of a dam is consequently important. As Everard[71] summarises "(dam) construction, in the eyes of many became synonymous with development and economic progress. (Dams) … were viewed as symbols of modernisation and of humanity's ability to harness and control nature". Beyond physical transformation and symbolic biosphere control, a dam's presence has political importance. Looking at concrete infrastructures in Peru, Harvey[72] provides a theoretical way to assess this. Her thesis[73] argues that infrastructure has socio-political properties related to its materiality and that, particularly in remote, rural settings, the permanence of concrete and its ability to support larger structures suggests a state's presence and strength[74]. This materiality theory is relevant to dams[75], particularly given their frequent placement in remoter areas, their visual monumentality and entailed environmental transformation. Thus, many 20th century political regimes have used dams' symbolism, scale and technological sophistication for political imaginaries, as "icons of hope and prosperity"[76]. Kaika's Marathon Dam study usefully demonstrates this, with its marble cladding[77] designed to evoke the

[68] Those mentioned in the above paragraph include Maoist China, Portuguese Mozambique, Greece's Constitutional Monarchy and British Egypt.
[69] Mitchell 2002.
[70] Meaning technology exclusively derived from the West.
[71] Everard 2013, 12.
[72] Harvey 2010; Harvey and Knox 2008.
[73] Harvey 2010.
[74] Also, concrete buildings' potential size.
[75] For instance, a version is included in the 'hydrosocial cycle" (Linton and Budds 2014).
[76] Everard 2013, 60.
[77] Evoking Parthenon.

Parthenon and emphasise civilizational power, giving the dam 'temple of modernity' status[78]. Overall, dams' materiality and ability to change environments demonstrates their potential to embody programmes of high-modernist development.

High-Modernist Statebuilders

Thus, for statebuilders[79] dams can be a useful tool[80]. Practically, the infrastructure can extend state power. Dams, given their frequent location in remote areas and their accompanying access infrastructure (e.g. roads), can extend geographic control and provide opportunities to implement desired development policies. They can also underpin economic transformation through irrigation, water supply and electricity. Moreover, dams can make previously unknown and uncontrolled water resources legible and ordered, thereby giving the state greater ability to plan and control[81]. Wittfogel's[82], hydraulic civilisation theory advances this mechanism in an environmentally determinist way, proposing that controlling water in arid drylands produces despotic societies[83]. Dams are thus a statebuilding tool, producing the services for, and embodying the aesthetic of, development visions.

Large dam building programmes can also have coexisting materialist drivers. This is illustrated by Worster[84] and Reisner's[85] work on the Western USA. In this case, engineers and bureaucrats, rather than cowboys and farmers, were the frontiersmen of the Western United States during the late 19th and early 20th century. They expanded the presence of the US state through large dams like the Hoover and Grand Coulee which sculpted new landscapes, watering

[78] Kaika 2006: Referring to Nehru's infamous Bhakra Nangal Dam description.
[79] Defined as regimes who extended geographic and social control whilst advancing government-led developmental national transformation.
[80] Worster 1992.
[81] Ribeiro 1994; Worster 1992.
[82] Wittfogel 1981.
[83] Pritchard 2012.
[84] Worster 1992.
[85] Reisner 1993.

and electrifying areas that were previously arid and sparsely-populated and thereby underpinning cities like Las Vegas and the economy of California, with its globally-outstanding irrigated agricultural production. Worster and Reisner demonstrate the materialist interests behind this project, with water infrastructure able to secure votes and provide corrupt kickbacks[86]. Swyngedouw's[87] analysis of Spain's modernising dam building programme provides another example. General Franco (1936-1975) in particular, attempted to use hydraulic infrastructure to recast Spain's geography, binding the fragmented regions with hydro-electric infrastructure and canals that address water inequalities between arid and wet areas. Moreover, dams reinforced his political base, with water irrigating large landowners, electricity supplying industrialists and infrastructure construction earning support of the corps of engineers and construction companies[88].

High-Modernist Dam-Building Concepts in the 20th Century

Having established high-modernism's grand, dam-justifying logics, the chapter proceeds to propose specific idea-practices[89]. These concepts can act as tools to assess the ideology's presence in particular projects. In line with Freeden's understanding of clusters of competing ideas within ideologies, these concepts are not necessarily present in all dam projects, nor do the concepts capture all aspects of planning and impact. Usefully, this ideological framing helps explain how well-meaning development intentions result in practices entailing short-sightedness and a focus on ordered environments over infrastructure's impacts[90].

[86] Worster 1992, 261; Reisner 1993.
[87] Swyngedouw 2015.
[88] The majority of Spain's dam construction companies began under Franco (Swyngedouw 2015, 120). Also see Pritchard 2011 on hydraulic statebuilding in early 20th century France.
[89] As in Freeden 2008.
[90] Apter 2014; Bähre and Lecocq 2007.

Imbuing Dams with Development

Discussion above has demonstrated dams' ability to embody statebuilding visions of technologically-induced, linear socio-economic progress towards modern, end-point society.

Enabling Social Engineering

Similarly, discussion above describes the ability for dams to visually and physically extend geographic power, thereby enabling state-led socio-economic transformation. McCully[91] cites this as a common justifying element, using the example of Turkey where dams and their accompanying roads allow greater control of rebellious PKK[92] areas. As analysed in Chapter 5 and elsewhere[93], dam-induced resettlement also provides an opportunity for supposedly positive, externally induced development, as it offers the opportunity to remodel livelihood foundations[94]. Verhoeven's[95] analysis of the Merowe Dam provides an illustration of this, as it involved appropriating extra land for 'associated projects' that would develop the supposedly backward Nubian locale.



Figure 3 Indicative cover of hydro-engineering magazine

Emphasising Spectacle

High modernism's premise of large societal transformation, of fundamental rather than incremental change, has long created a bias for the big (Figure 3)[96]. As established, dams can symbolically perform development and the arrival of a modern

[91] McCully 2001.
[92] The Kurdish Opposition party (McCully 2001).
[93] E.g. With Cahora Bassa's securitised hamlets (Isaacman and Isaacman 2013) or Mtera's villagisation (Öhman 2007).
[94] E.g. Akosombo Dam: Model resettlement villages constructed around collectivised farms (Miescher 2014a).
[95] Verhoeven 2015a, 230–36.
[96] Adams 1990.

future, as captured by Prime Minister Nehru's (1947-1964) famous 'temples of modernity' speech[97]. Menga gives another example of this with the Rogun Dam. Its status as the World's tallest dam was a central part of the Tajik regime's narrative of progress[98]. Beyond ideology, larger projects can also be incentivised by greater self-enrichment possibilities through bigger contracts and corruption[99], speaking to the 'iron triangle' concept introduced below[100].

Technician's Realm

This refers to the institutional arrangement where technocratic experts, shielded from the political process, control decision-making over designs, compensation, mitigation measures and knowledge production. High modernism rationalises this top-down decision-making process, directing universalist development prescriptions[101], or as Klingensmith argues, "technocratic, scientific and apolitical approaches to progress"[102]: local concerns or alternative development assumptions are absent. This concept builds on Ellul's[103] work on '*technique'*, defined as practices that, through aiming to increase efficiency, render nature and society subservient to technology and the decisions of experts. Byrne et.al.[104] apply Ellul's work to energy-sector discourses and dam-building specifically, analysing the primacy given to engineers in dam-project decision making and the exclusion of situated, local knowledge and of livelihood concerns. Following this work, the political act of creating a technician's realm with its exclusive focus on implementation and a degree of short-sightedness to locales, means that the trade-offs entailed by dams are depoliticised: "Social consequences are relegated …. to the status of problems-to-be-solved" through rationally derived solutions[105].

[97] Satyajit Singh 2002.
[98] E.g. President rejected consultants smaller design (Menga 2015).
[99] Usher 1997a.
[100] Molle, Mollinga, and Wester 2009.
[101] Critiqued by Klingensmith 2003; Khagram 2004; Satyajit Singh 2002.
[102] Klingensmith 2003, 134.
[103] Ellul 1964.
[104] Byrne and Toly 2006; Agbemabiese and Byrne 2005.
[105] Byrne and Toly 2006, 21.

River-Basin Organisations such as the TVA and its facsimiles best exemplify the 'technicians' realm' concept, although as described above, the institution did have to adapt. Pritchard provides another illustration of this with French engineers in the Maghreb[106], as does Miescher with Ghana's Volta Men[107]. Additionally, Öhman describes a notable example of a Swedish engineer in Tanzania's Great Ruaha project assuming universal river-knowledge, and thus using Swedish flow-data, thereby overlooking Ruaha's significant seasonality[108]. Adams[109] echoes this critique: Water resource planners' frequent failure "can be attributed to a lack of understanding of existing environments and their uses and secondly to poor technological appraisal. To these might be added a third: A sublime confidence bordering on arrogance". In the 20th century engineers in empowered technician's realms were frequently celebrated. As Kaika writes regarding the Marathon Dam: "It was the scientist and the engineer who would become the modern Prometheus, the one man who would stand alone against nature"[110]. Thus, science, wielded by technicians, is presumed universally capable of calculating development through water manipulation[111].

Invisiblising

Indifference to specificity and place echoes the high modernist idea of disregard for supposed traditional, backward livelihoods and wasted and unproductive rivers. Adams[112] finds this occurring throughout 20th century Africa as planners frequently assume "floodplain resources are under-used and that natural environmental processes and patterns are well enough understood that dams can be built without adverse environmental impacts". For Adams, this simplistic and deductive thinking demonstrated "an ignorance bordering on disregard … for the

[106] Pritchard 2012.
[107] Miescher 2014b.
[108] Öhman 2007; van der Straeten 2017.
[109] Adams 1992, 106.
[110] Kaika 2006, 276.
[111] Tischler 2013, 24.
[112] Adams 1992, 151.

interests and needs of floodplain people"[113] and leads Everard to conclude, "the devil lies in what is overlooked"[114]. This thesis follows Öhman's[115] conceptualising such practices as invisiblising, the removal of people and the benefits of existing river systems from the planning process.

Pervasive Appraisal Optimism/The Rubber-stamp EIA

Such invisiblising produces an understanding of dams as essentially benign. A high modernist faith in Western technology's ability to generate positive progress reinforces this. Furthermore, a dam's engineering complexity makes them easier to portray in technical, de-politicised languages, with their only controversies pertaining to feasibility challenges rather than complex and power laden human geographies[116]. Consequently, a tendency to refute dams as damaging and in need of critical appraisal, dominates[117], relegating an environmental impact assessment (EIA) to "a formality, merely another regulatory hurdle which developers must jump through"[118]. Usher develops this argument conceptualising the culture of 'pervasive appraisal optimism' in environmental and social impact assessments (ESIA), "a cryptic way of saying that project assessments have tended to rubber stamp projects overstating benefits and ignoring their costs"[119]. She demonstrates the concept's prevalence in dam planning that understates costs and overstates benefits. Thus, a bias towards a technological future often appears to prevail without consideration of the existing system's benefits. Beyond the ideational, self-interest can reinforce this behaviour: Significant critique by consultants conducting assessments could prevent their engagement as the dam's owner's engineer or in future projects by the proposing organisation or government.

[113] Adams 1992, 130.
[114] Everard 2013, 60.
[115] Öhman 2007.
[116] E.g. Revealed by Baviskar 1995 or Öhman 2007.
[117] EIAs also side-lined for bureaucratic ease and expense.
[118] McCully 2001, 54.
[119] Usher 1997a, 61.

Enclave

Ferguson[120] advances this concept, applying Scott's[121] work to the logics of global capitalism. He examines the way capitalist resource extraction requires predictable and legible spaces to simplify complex socio-economic, political realities. Consequently, corporations construct enclaves in which they can operate. For Ferguson[122], the Angolan oil fields are the ultimate expression of this, financing the countries' authoritarian regime and continuing to operate through a decades-long civil war[123]. This concept also applies to high-modernist dam building more generally. Mohan[124] describes how elite-level brokering can create enclaves, where private constructors operate and make decisions in isolation from their locale, with goods and labour imported. Colonial Cahora Bassa[125] and Kariba[126] illustrate strong instances of this isolated construction practice with limited benefit sharing. In both cases, labour and managers came largely from oversees, or outside the project's region. Moreover, they did not involve substantial local procurement or policy ideas about benefiting each dams' locale.

These seven concepts lay out specific ways in which high modernist ideas translate into practices of justification and construction. However, discussion below, furthering the principle that high modernism is significant but not all-pervading, also asserts the potential of materialist motives for these concepts' adoption.

[120] Ferguson 2005.
[121] Scott 1998.
[122] Ferguson 2005.
[123] Soares de Oliveira 2015.
[124] Mohan 2013.
[125] Isaacman and Isaacman 2013.
[126] Tischler 2013.

The Dam Building Regime: Enablers

To realise dam dreams, particularly in developing countries without the necessary finance or expertise, governments required 'enablers'; international financiers, engineering and construction firms and politically empowered hydrocracies.

Hydrocracies

The chief institutional model tasked with implementing large dam-building programmes in the 20th century was the River Basin Organisation, (RBO)[127], many of which were established in line with the *technician's realm*. Molle et.al.[128] describe these institutions as hydrocracies (hydraulic-bureaucracies) and their basis in prescribing developmental solutions informed by universalistic assumptions of water knowledge. Adams[129] ascribes importance to these institutions' degree of political independence as this allows exclusively expert decision-making without significant recourse to social and physical geographies. The premier example, and frequent inspirational model, is the TVA. The US Federal government originally conceived this authority in the 1930s for a wider social engineering purpose involving benign bureaucrats industrialising and socially transforming the Tennessee River with a cascade of 16 dams[130]. Its leaders Arthur Morgan and David Lilienthal exemplify high modernist thinking[131]. The latter asserted that the TVA was participatory and democratic because it knew what 'the people' wanted. However, Scott reveals this claim as "participatory autocracy"[132], where local engagement primarily aims to persuade affected communities, a parallel to chapter's five and six sensitising programmes.

[127] Emphasised by Klingensmith 2003; Satyajit Singh 2002; Khagram 2004; Pritchard 2011.
[128] Molle, Mollinga, and Wester 2009.
[129] Adams 1992.
[130] Scott 2006; Satyajit Singh 2002.
[131] Klingensmith 2007.
[132] Scott 2006, 26–27.

Nethertheless, the TVA was highly praised and actively promoted by the US government "as it was widely regarded as a paradigm for world reconstruction"[133]. As Klingensmith writes "the 'TVA idea' was never very precise (and variously interpreted), but its crux was that the technical, apolitical, bureaucratised management of nature … would produce prosperity for all"[134]. The ideals and abstract model of the TVA, and arguably the similar (albeit less politically independent) Bureau of Reclamation, became the inspirational influence for dam building in the 20th century. Hoag[135] documents the export of the TVA's dam-development model, based on the assumption of its near universal relevance, to East and West Africa, notably including the Volta River Authority in charge of Ghana's Akosombo Dam[136]. The Damodar Valley Corporation (DVC) in India illustrates the most direct TVA influence, as Morgan, Lilienthal and the TVA's chief engineer[137], were involved in its creation and management[138]. These men justified their prominent roles despite lacking experience or knowledge of India, because of their "unquestioned assumption of the superiority, universality and internal coherence of Western technical means"[139]. Furthermore, copy-cat authorities include this thesis' Kagera Basin Organisation and the Rufiji Riven Basin Authority (see Chapters 6 and 7). The spread of such institutions and the ideas underpinning them, suggest a past dam-building regime involving a relatively small group of companies and consultants, or what McCully calls the "disciples of dams"[140], proselytising the same practices of hydro-development. As Khagram[141] argues "the continuing interaction among these big dam proponents generated an informal international 'big dam' regime by the 1950s, legitimising and neutralising the construction of these projects around the world … (The vision central to this regime equated development with) a large-scale top-down and technocratic pursuit of economic growth". Thus,

[133] Satyajit Singh 2002, 6.
[134] Klingensmith 2007.
[135] Hoag 2005; Hoag 2013.
[136] Miescher 2014b; Inaugurated in 1965.
[137] William Voorduin.
[138] Klingensmith 2003.
[139] Satyajit Singh 2002, 76; Klingensmith 2007.
[140] McCully 2001, XVI.
[141] Khagram 2004, 5.

these authors suggest that the 20th century was marked by a common set of thinking about why dams are necessary and how they should be built, that varyingly followed the seven high modernist concepts proposed above, particularly when transmitted through the river-basin hydrocracy model[142]. This is significant for the thesis as the following chapters find the existence of a comparable regime in the dam resurgence era.

International Finance, the Iron Triangle and Material Motives in the Dam Regime

Turning to financiers, the mid-twentieth century saw the rise of what Hart[143] calls big D Development, attempts to create economic and social progress through externally imposed programmes[144]. Central to this post-WWII era of development were multilateral development institutions, many of which became the latter-20th century's chief dam financiers. McCully[145] for instance, describes the United Nations Development Agency (UNDP) and World Bank as the largest 20th-century dam financiers. Additionally, Usher[146] demonstrates individual aid donors' role with examples of Sweden and Norway. Both had large dam industries founded to build hydraulic infrastructure particularly in northern regions where the indigenous Sapmi peoples live[147]. Usher then analyses each countries' strategic financing of dams as aid to sustain their domestic dam-industry in the post-war era[148]. National ExIm banks, have also played a significant

[142] This conceptualisation is influenced Althusser's about the way institutions can embody ideologies (Althusser 1984).
[143] Hart 2001.
[144] With origins in interventionist late-stage colonialism from the 1930s (Hoag 2013).
[145] McCully 2001.
[146] Usher 1997b.
[147] Öhman 2007; Seen elsewhere, e.g. The UK's dam-industry primarily operated in its colonies (Hoag 2013).
[148] Usher 1997c; Usher and Ryder 1997.

role[149], particularly in the Cold War logic of strategically supporting anti-communist countries: Dam financing was therefore seen as a tool to "cement alliances" with ruling elites[150].

These more materialist motivations are conceptualised here as the iron triangle, constituting financiers, politicians and companies[151]. For banks, lending grows their balance sheets whilst for financing governments, dam support constitutes a potential tool to forge geopolitical alliances and fund domestic industries. Additionally, engineering constructors want business and dam projects can potentially offer corrupt kickbacks to all parties. A number of studies demonstrates such iron triangle motivations, including in capitalist Nepal[152] and Argentina[153] where alliances exist between financiers, consultants, engineering firms and politicians. All can benefit from a dam project with the infrastructure fulfilling institutional mandates, growing personal and organisational wealth and serving political strategies. These iron-triangle drivers matter beyond justification for dams, as governments or companies seeking to lower construction costs may also adopt practices of *invisiblising* and *pervasive appraisal optimism* as money-saving shortcuts[154]. The chapter now turns to case studies from Africa to further analysis. Given this literature's volume, the most significant cases are singled out to demonstrate the presence and limits of high modernist ideology in the 1950s-1970s dam boom. This allows comparison with the thesis' cases from the dam resurgence era.

High Modernist Dam Building in Africa?

Africa's dam boom began under colonialism with more than 1000 large dams starting planning or construction between 1945-1950[155]. Barnett[156], for instance, studies the British Gezira

[149] E.g. Khagram (2004) cites activity of UK's Oversees Development Administration and US's ExIm bank.
[150] Hoag 2013, 176 (with regard to Africa) Swyngedouw 2007 (regarding the case study of Spain).
[151] Noting other conceptualisations such as the institutional triangle (Ribeiro 1994).
[152] E.g. Nepal's industry-consultants-politicians relationship (Lord 2016).
[153] Ribeiro 1994.
[154] Molle, Mollinga, and Wester 2009, 336.
[155] Hoag 2013, 13.
[156] Barnett 1977.

scheme[157]: an attempt to found a heartland Sudanese irrigation area using the Nile. Another key colonial example includes, Kariba Dam: Tischler[158] analyses its integral role in British plans for furthering the colonial Central African Federation, as its electricity was intended to underpin farming estates and nascent industry. Downstream, Portugal began the Cahora Bassa Dam, believing its symbolism demonstrated the colonialist's power and permanence. Independent governments also adopted high-modernist statebuilding visions. Akosombo Dam in initially democratic Ghana[159] was President Kwame Nkrumah's[160] pet project[161]. He asserted the centrality of this dam to Ghana's independence and sovereignty[162]: Its energy would found an aluminium industry[163], through which Ghana could compete internationally[164], electrify the country[165] and strengthen regional independence by providing energy for neighbouring countries[166]. As Miescher writes[167], "building the Akosombo Dam, Nkrumah sought to realize his dream of creating a modern and industrialized African nation that would join the industrialized world shaped by the parameters of science and technology". The chapter's opening quote by Nkrumah also underlines the Akosombo's political and symbolic importance.

Ghana is not alone, as Everard asserts that many post-independence countries saw dams as capable of proclaiming their status as "increasingly capable nations taking their place among the 'developed world' powers" [168]. Additionally, as discussed above, individual African dams in the 20th century demonstrate the *technician's realm* (Akosombo, Great Ruaha Dams), *invisiblising* (Great Ruaha Dam and Adam's West-African focused monograph), *pervasive appraisal optimism*

[157] Enabled by the Sennar Dam.
[158] Tischler 2013.
[159] Construction 1961-1965, 1-party state began 1964.
[160] Ghana's Independence leader: Prime Minister 1957-1960; President 1960-1966.
[161] Although British-colonials first conceived.
[162] Miescher and Tsikata 2009.
[163] Imagined essentially linearly, depicted in propaganda films like *A River Creates an Industry* (Miescher and Tsikata 2009, 22).
[164] Miescher 2014b.
[165] Miescher 2014a.
[166] Miescher 2014b.
[167] Miescher 2014b, 343.
[168] Everard 2013, 28; Also see Satyajit Singh (2002, 2) for India.

(Pangani Dam) and *enclave* (Kariba, Cahora Bassa Dams). Cahora Bassa, built during the 1964-1974 liberation war, is a particularly extreme case here. Illustrating a form of securitised social engineering, displaced peoples' houses were burnt to force them into 'strategic hamlets'[169] that controlled the number of hours they could spend outside farming. Kariba Dam is also notable for having displaced a minority tribe, the Tonga[170], worsening their living standards to this day[171]. Both dams have caused a marked change to the previously rich ecology and agriculture of the Zambezi River delta[172].

However, studies of 20th century dams in Africa frequently go beyond a simple high modernist account. A key element in Cahora Bassa's plan involved a security pact with apartheid South Africa, who in exchange for electricity, would militarily support Portuguese colonialism[173]. Furthermore, Mitchell[174] highlights the political work done by Egypt's successive dams which control electricity production and irrigation, thereby centralising power. Thus, empirically grounded studies frequently go beyond solely high modernist accounts, demonstrating the importance of acknowledging the complexity of each dams' context. For instance, in Tischler's analysis of Kariba Dam[175] high modernist statebuilding is the starting point for analysis, with contradictory attempts to appease emergent African Nationalists and white settlers complicating planning and implementation. Similarly, for Akosombo Dam President Nkrumah also inaugurated a substantive research programme whereby social scientists, ecologists and engineers were invited to research the impacts of the dam, its reservoir and displacement of people[176]. Whilst less critical about downstream effects, this differs from other projects' *invisiblising*. Furthermore, like

[169] As also practised in the Vietnam war.
[170] Tischler 2013.
[171] Scudder 2005.
[172] Isaacman and Isaacman 2013.
[173] Isaacman and Isaacman 2013.
[174] Mitchell 2002; also Ahlers, Zwarteveen, and Bakker 2017.
[175] Tischler 2013. Inaugurated 1959.
[176] Miescher 2014a; Miescher and Tsikata 2009.

many large national projects, praise for Akosombo extended beyond elites to Ghana's popular masses[177]. This contrasts with the implicit oppositional subaltern vs elite dynamic in Scott's thesis.

Although demonstrating the presence of applied high modernist ideas, these studies nuance the thesis' understanding of the past 20th century dam-building era. Indeed, dam projects were frequently forced to adapt to particular places' physical and human geography[178]. This links to Schneider's[179] assertion that the state is not monolithic, but complex and endogenous to experiences of high modernist development. Nevertheless, the lens of high modernism helps explain the following section's overview of typical global dam impacts where despite frequent developmentalist intentions, dams' record is of exaggerated benefits and overlooked financial, social and environmental costs. This section constitutes an important comparative backdrop to the thesis' case-study analysis of decision making and knowledge production.

Dams and their Impacts

Dams main benefits are hydro-electricity generation, irrigation and water supply[180]. In Africa, such services often underpin national economic activity, as demonstrated by the water and electricity from South Africa's Vaal Dam[181] or energy from Zimbabwe and Zambia's Kariba Dam[182]. Moreover, dams provide potential secondary benefits including reservoir-lake transport, flood prevention[183] and fisheries[184]. Simultaneously however, many synoptic studies[185] demonstrate the recurrent failure to deliver planned economic transformation and significant, initially-unforeseen and socially-unequal negative impacts[186]. Individual cases demonstrate this. Ghana[187] and

[177] Demonstrated by celebration and visits to the dam (Miescher 2014b).
[178] Geschiere 2007.
[179] Schneider 2007.
[180] E.g. dam-irrigation produces 12-16% of global food production (Bosshard 2006, 21).
[181] Scudder 2005.
[182] Tischler 2013.
[183] E.g. Both in Three gorges (Barber and Ryder 1993b).
[184] E.g. 20,000 fish in Lake Volta (Adams 1992).
[185] McCully 2001; Everard 2013; Adams 1990; Usher 1997a; Hoag 2013.
[186] E.g. Irrigation and electricity targets (Everard 2013, 73–75) or recent intervention Ansar et al. (2014).
[187] Miescher and Tsikata 2009.

Tanzania[188], for instance, have regular drought-induced power cuts. More extreme is Mozambique's Cahora Bassa Dam where the country bore social and environmental costs whilst revenue accrued to the dam's majority-Portuguese owners until 2007. Additionally, generated electricity went primarily to South Africa[189].

The academic literature[190] also pays great attention to negative socio-environmental impacts. Although critiqued by Kirchner et.al.[191], this attention is understandable given those affected typically have less power and given the policy literatures tendency towards *pervasive appraisal optimism,* the underestimation of impacts and overstating of benefits. One of the clearest impacts is displacement. Conservative WCD estimates place the total number of affected at 40 to 80million[192], with indigenous people, from the American Sioux[193] to Indian Adivasi (recognised tribal people)[194], disproportionately represented. Thayer Scudder's global database demonstrates that the vast majority of dam-displaced are unable to move beyond even the 'coping-with-displacement' phase because of a multitude of difficulties in regaining livelihoods and rebuilding underpinning social relations. As captured by McCully: "Dam 'oustees' … (have) been economically, culturally and emotionally (affected) … many once self-sufficient farming families have thus been reduced to eking out a living as migrant labourers or slum dwellers"[195].

Beyond displacement, dams have downstream impacts. Rivers transmit nutrients and water, which in-turn underpin socio-ecological systems of farming, fauna and flora[196]. This riverine role is particularly strong in basins with a marked seasonal pulse, often associated with the tropics[197]. Thus, rather than the destructive waste seen by high modernist planners, an alternative

[188] van der Straeten 2017.
[189] Isaacman and Isaacman 2013; Economic Consulting Associates.
[190] As in synoptic texts Adams 1990; Scudder 2005; McCully 2001; Everard 2013; Showers 2011.
[191] Kirchherr, Pohlner, and Charles 2016.
[192] Estimates by Scudder 2012.
[193] Scudder 2005.
[194] Baviskar 1995.
[195] McCully 2001, 66.
[196] Adams 1992.
[197] Everard 2013.

portrayal asserts seasonal flooding as an ecological and economic service. Building a dam can alter river flow, hold back sediment, generate erosion and change waters' pH[198]. Consequently, numerous cases demonstrate significant negative impacts downstream, from degraded grazing and farmland[199] to the loss of whole ecological systems. However, dam planners have often overlooked or downplayed these impacts because of discreet understandings of river systems as "flows of water to be exploited without wider consequences for ecosystems and the many people who benefit from them"[200]. Particularly notable examples include the North American Colorado river which no longer flows regularly to its delta, causing the loss of an ecologically-rich, Jaguar-containing rainforest. Further downstream hydrological effects stem from the quantity of water evaporated, particularly from dams in deserts[201].

Additionally, McCully[202] asserts that dams constitute underappreciated flood hazards given evidence of harmful unadvertised, sudden large water releases[203]. Furthermore, dam failures are an important threat, as illustrated by China's Henan province dam disaster which killed 230,000. However, these events tend not receive the attention of other modern-industrial failures like Chernobyl and Bohpal[204]. Dam reservoirs can also spread disease, as shown in Mitchell's study of Malaria in Egypt[205]. Collectively this evidence from the 20th century constitutes an empirical record demonstrating widespread and frequently underestimated, socially and geographically unequal, dam-induced impacts: Where dams are central to national plans, they have often damned remote and poorer populations. This history underlines the political nature of dams[206].

[198] Everard 2013.
[199] E.g. 1980s estimates of the Sud (Sudan) suggest it supported 0.8million cattle (Adams 1992).
[200] Everard 2013, 60.
[201] Estimated 5% of global river's volume evaporates in reservoirs (Lehner et al. 2011 citing Shiklomanov 2000). E.g. Lake Nasser evaporates ~10% of the Nile (McCully 2001, 40).
[202] McCully 2001.
[203] E.g. a 2001 flood killed 10,000s cattle below Kariba Dam (Scudder 2005, 217; 100).
[204] McCully 2001.
[205] Mitchell 2002. Another common reservoir-disease is Bilharzia, for instance found in 90% of Lake Volta's communities (McCully 2001).
[206] In-line with the Introduction Chapter's definition.

The chapter now analyses India and Brazil because of the thesis' case selection, but also as they further demonstrate this chapter's themes.

Dams and Activism: Examples from India and Brazil

India

India has a centuries-old pattern of statebuilding through hydrological intervention[207], where geographically-central areas exploit resource-rich peripheries. However, India's dam boom began after independence in 1947. The Nehru-Mahalanabis industrialisation plan[208] adopted a high modernist development vision premised on a technologically-enabled industrial revolution managed by an all-seeing and benign bureaucracy[209]. According to Roy, in this era, dams took on symbolic as well as practical importance: They were "portrayed as symbols of nationalism-huge wet cement flags … Every school child is taught that big dams will deliver the people of India from hunger and poverty"[210]. India constructed 1554 large dams between 1947-2000, making it one of the world's biggest dam-builders[211]. Overseeing this boom were the hydro-corps[212], an engineering vanguard influenced by the USA, most notably the aforementioned DVC that directly involved TVA officials[213]. The dam boom produced a domestic hydropower industry of construction companies and consultants, including firms owned by the state[214]. Thus, successive Indian governments and particularly the Ministry of Power, have been strong, arguably uncritical, advocates of dams[215].

[207] Dam-building dates from pre-colonial societies (Morrison 2010; Mosse and Sivan 2003), increasing under British colonialism (Satyajit Singh 2002).
[208] Influential in the 50s and 60s (Guha 2008).
[209] D'Souza 2002.
[210] Roy 2001, 32.
[211] Satyajit Singh 2002.
[212] Featuring well-known engineers like Sen and Komora Satyajit Singh 2002.
[213] Klingensmith 2007.
[214] E.g. turbine manufacturer BHEL and consultancy WAPCOS.
[215] Satyajit Singh 2002.

Echoing global patterns, the literature on India's dams records unfulfilled promises[216], socio-economic impacts[217] and ecological costs[218]. Baviskar highlights this inequality: "It is obvious that 'national interest' is merely the interest of the state, industry and rich peasantry"[219]. However, these experiences have not gone uncontested: India's history of mass independence movements and relative democracy, underpin one of the most globally prominent anti-dam movements. This ranges from Mawdsley's account of Hindu religious leaders criticising interventions on sacred rivers like the Ganges[220], to the 1980s-1990s mobilisation against the Sardar Sarovar Dam on the Narmada River. This latter dam diverts water to the richer state of Gujarat whilst only supplying the national electricity grid and affecting poorer rural communities and Adivasi[221]. They formed the Narmada Bachao Andolan protest organisation that mobilised tens of thousands of people, becoming a globally-significant actor in dams' stagnation (analysed below)[222].

Brazil

Similarly, the statebuilding agenda underpinning Brazil's dam building follows a pattern where the country's core geographic region seeks to exploit the resources of its periphery. Like India, Brazil in the second half of the 20th century was a major dam builder, initiating the world's second largest dam at Itaipu[223]. The Ministry of Energy and state-owned energy Utility Electrobras lead implementation efforts and continues to constitute a politically-empowered technocratic bureaucracy with a mandate for generating electricity[224]. However, drivers for Brazil's dam building go beyond the ideational as they are replete with high-level corruption between

[216] E.g. Singh (2002) cites irrigation report on missed benefits (p.101-109, 132) and reviews 500 dams, finding all over-budget (p. 116-132).
[217] >50million people directly affected (Roy 1999).
[218] E.g. River-basin fish species extinction, like Hilsa Fish (Everard 2013).
[219] Baviskar 1995, 32.
[220] Mawdsley 2005.
[221] Meaning indigenous groups. Estimated to affect 25million people (Roy 2001, 13).
[222] Khagram 2004; D'Souza 2002.
[223] Ribeiro 1994.
[224] Fearnside 1989; Burrier 2016.

engineering firms produced by the country's major dam building programmes and key politicians like the family of former President Jose Sarney and Energy Minister Edison Lobão (2011-2014)[225]. Fearnside demonstrates the numerous environmental and social costs of Brazil's dam programmes, ranging from displacement to species loss[226]. Moreover, Brazil demonstrates how dams are not carbon-neutral as reservoirs emit large quantities of methane from rotting flora. Thus, dams can emit an equivalent or greater amounts of greenhouse gas than fossil-fuel energy generation[227].

Brazil also illustrates the increasing influence of dam policy reforms that are detailed below and pressured by growing anti-dam campaigns enmeshed in wider environmental and indigenous rights movements[228]. This contributed to the establishment of an increasingly powerful environmental ministry and agency in 1989, IBAMA[229], and stronger mitigation measures that contrast with historic Brazilian dams like Tucuruí[230]. For instance, dam-building companies increasingly adopt social strategies, for instance spending 8% of the Madeira Hydro-project's budget on social projects[231], an interesting comparative case to Chapter 7. Concurrently though, this Madeira Dam demonstrates the limits of Brazil's reforms, as the Federal government forced through construction despite IBAMA's objection[232]. India and Brazil thus represent exemplary dam-building states. Both have histories of high modernist statebuilding programmes that treat dams as apolitical. Moreover, both have anti-dam campaigns that became globally-significant in the downturn of dam construction.

[225] Millikan 2011: Also Lavo Jato mega-scandal revealed Belo Monte and Jirau dams corruption (Poirier, Millikan, and Irigaray 2015).
[226] Loss of biodiverse rainforest and insufficient resettlement (Fearnside 2001) e.g. underestimate of Tucuruí dam's 1500 resettled (Fearnside 1999).
[227] Fearnside 2001, 383–85.
[228] Hecht and Cockburn 2010; Hochstetler and Keck 2007. E.g. Kayapo tribe (Schwartzman and Zimmerman 2005).
[229] Hochstetler and Keck 2007.
[230] E.g. Belo Monte size reduction and fish ladders in Madeira (Burrier 2016).
[231] Burrier 2016.
[232] Fearnside 2014.

Stagnation and the World Commission on Dams

Protests in developing countries combined with global organisations, particularly International Rivers, and increasingly successful movements in Europe[233] and America (see Figure 4)[234] to produce a powerful critique of dams. Along with a growing realisation of the infrastructure's frequently poor economic efficacy, these protests contributed to a decrease in construction from the late 1980s, which further stagnated in the mid-1990s (see Figures 5 to 8): Whereas the 1970s-1980s had seen 600-700 reservoirs constructed a year, this reduced to around 50 by the mid-2000s[235]. Leading financiers, including the World Bank, UNDP and euro-American national ExIm banks were key, as they dramatically scaled-back and even withdrew from funding dams[236]. Given Africa's previous reliance on such funding, this increased the strength of dam-building's stagnation on the continent. Hoping to provide some resolution to the dam debate, the UN-sponsored World Commission on Dams (WCD)[237] convened a wide-ranging panel of pro and anti-dam stakeholders in 1998 to review dams' record[238]. The eventual, relatively exhaustive,

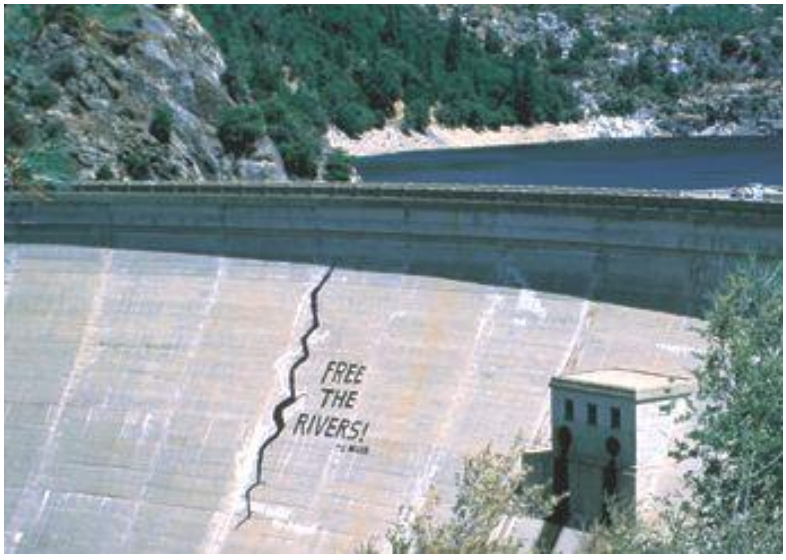


Figure 4 Case study from Lowry (2003). Protest at O'Shaughnessy Dam, Yosemite (Source: damvsman.wordpress.com)

[233] Usher 1997d; Lövgren 1997; Dalland 1997; Öhman 2007.
[234] Lowry 2003.
[235] Chao, Wu, and Li 2008.
[236] Accounts written at this time describe dam-building in retreat (McCully 2001, xvi).
[237] Goodland's (2010) reviews publications from 1989-1997 leading to WCD.
[238] Scudder (2005) describes experience on the WCD panel.

report called for a fundamental re-think on dam building[239]. Central to its argument were conclusions about dam planning involving insufficiently holistic appraisals, overstated benefits, ill-considered alternatives and undervalued river-systems. The WCD recommends states that projects should involve a high degree of participation, gain public consent and undergo stringent questioning that considers cumulative impacts of multiple dams alongside alternatives to achieving dams' developmental services. Given this level of critique, and the degree of dam-building stagnation, Usher, in 1997, stated that "one is hard pressed today to find anyone engaged in the development debate who would deny that large hydro-electric dams have at least the potential to cause massive social and ecological disruption"[240]. Meanwhile Khagram[241] concluded in 2004 that the big dam-building era had ended[242].

The Dam Building Resurgence

Old and New Enablers

As depicted by Figure 5 to 8, these claims proved premature. Economically growing economies in South America and Asia continued domestic dam building[243] and some of these

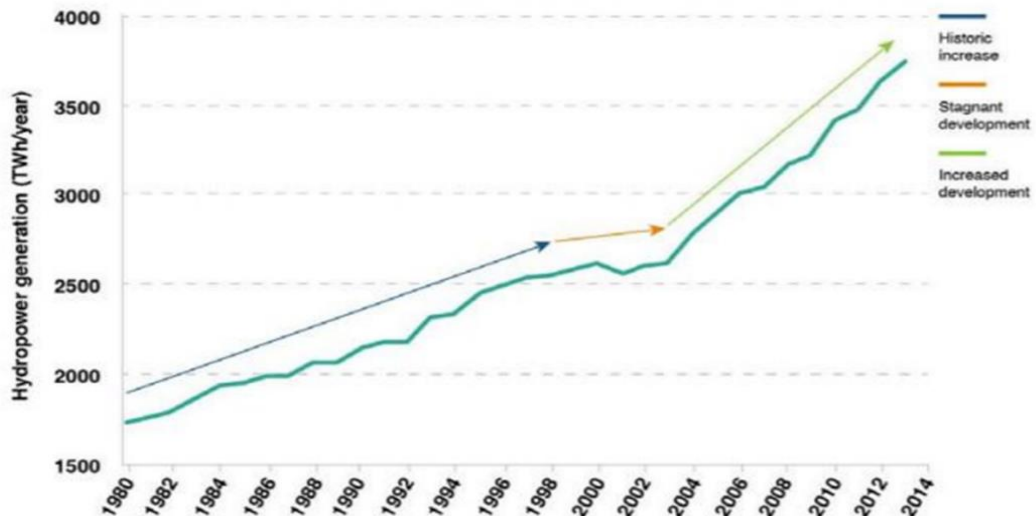


Figure 5 Global hydropower generation. (Source: IHA)

[239] World Commission on Dams 2001.
[240] Usher 1997a, 60.
[241] Khagram 2004.
[242] Khagram 2004.
[243] E.g. Around Mekong (Matthews 2012; Mirumachi and Chan 2014).

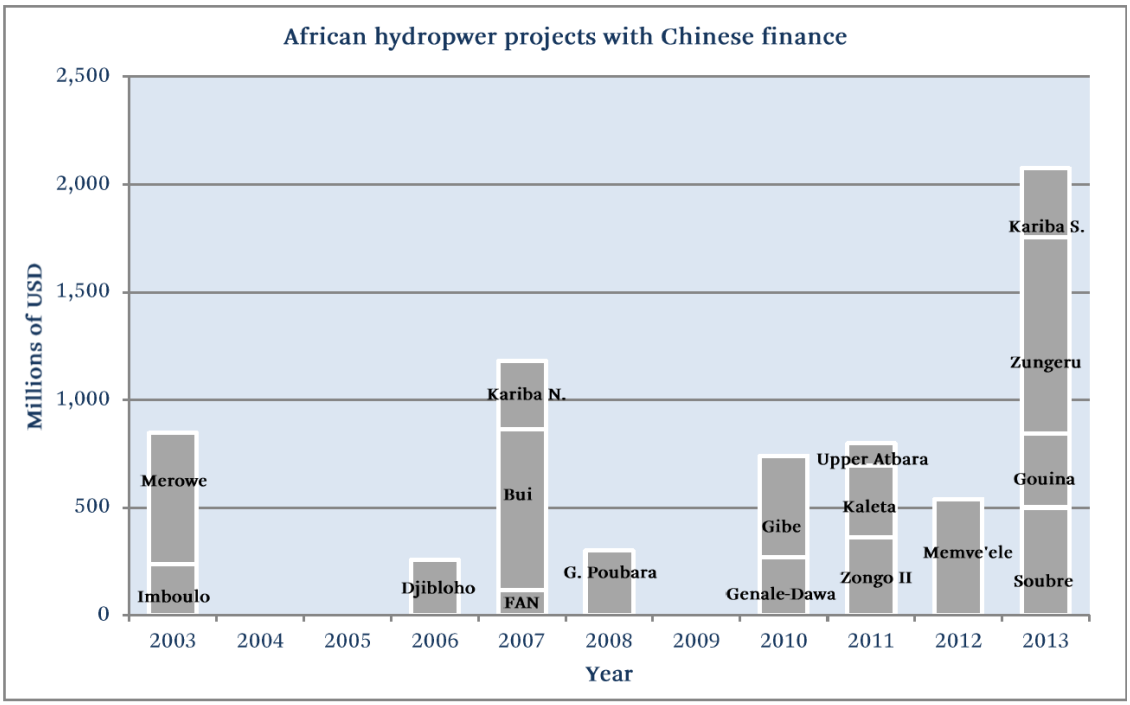


Figure 6 Demonstrating increases primarily in China's ExIm Bank's dam finance (Source: Hwang, Bräutigam, and Wang 2015, 8)

countries, namely India, Brazil and China, began to significantly expand infrastructure financing internationally[244]. In 2006, 35 dams of over 150 metres and 300 over 50 metres started construction[245]; in 2014, 3700 new dams were being built or being planned, translating into a projected global hydroelectricity-generation increase of 73%, from 980GW to 1700GW[246]. China has been the most significant enabler of this drive (see further discussion in Chapter 2). For instance, Figure 6 shows that Chinese government finance increased from two dams in 2003, to at least 17 dams and an accumulated spend of $13.3 billion by 2014[247]. Additionally, by 2014, many Chinese companies had become established engineering contractors leading projects, including Chapter 6's Rusumo Falls Dam. In 2014 Sinohydro was the largest contractor in African hydropower[248]. However, this well-known emerging power is not alone, with Chapter 2 demonstrating Saudi Arabia's Sudanese dam-engagement alongside that of India and Brazil. The

[244] Zarfl et al. 2015.
[245] Lempérière and ICOLD 2006.
[246] Zarfl et al. 2015.
[247] Hwang, Bräutigam, and Wang 2015, 12: Note that this differs International Rivers 2014) less reliable research citing China's engagement in 60 dams.
[248] Zarfl et al. 2015; Hwang, Bräutigam, and Wang 2015, 5.

resurgence era also involves new financial sources such as climate finance analysed below, and capital investment in privately-owned hydro-plants[249]. For instance Uganda's Bujagali is Africa's largest privately-financed dam[250].

Western donors increased aid spending on energy programmes threefold[251], including on hydropower[252]. Concessional loans for dams from European and American governments have also re-emerged. Examples here include Italian and European Infrastructure Bank lending for Ethiopia's

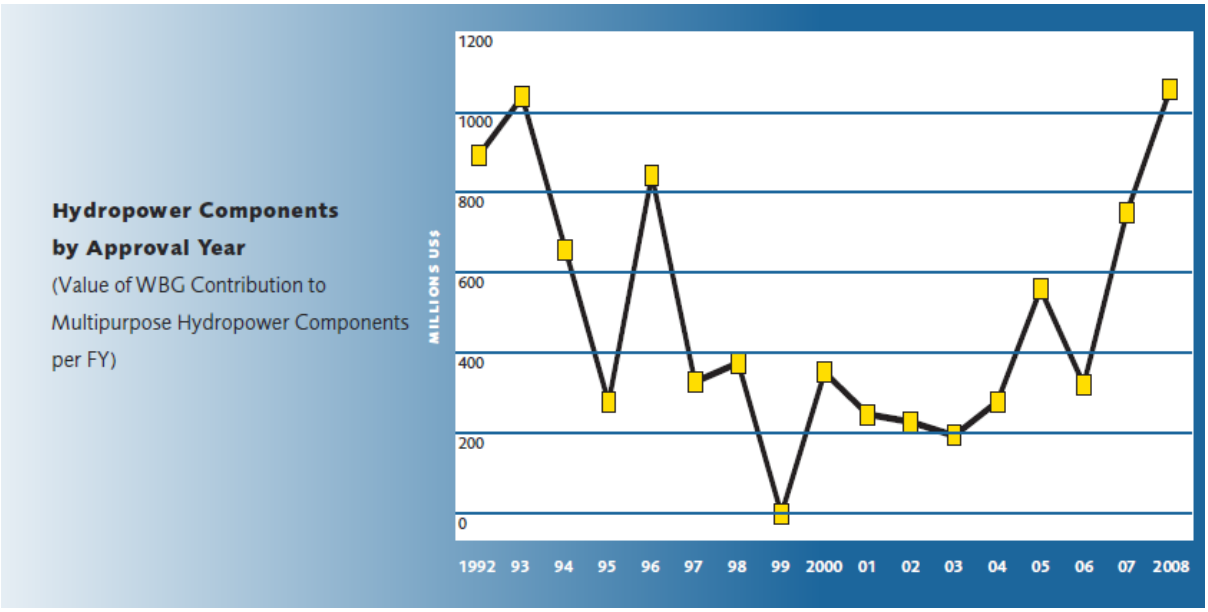
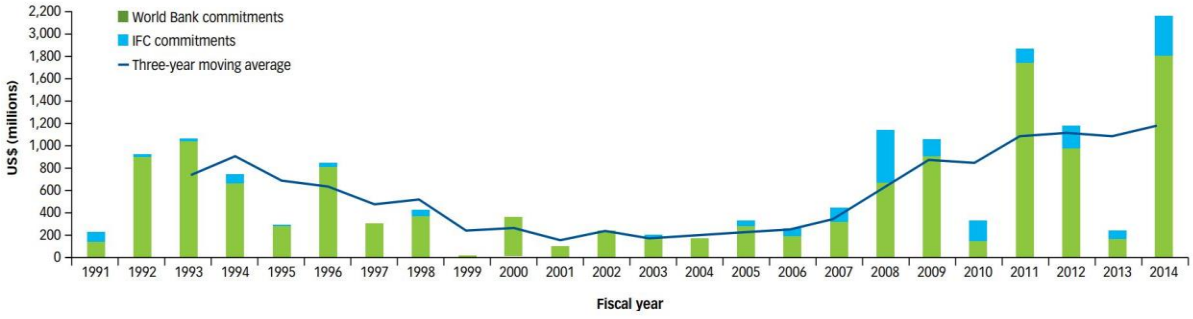


Figure 7 Showing World Bank Group approvals for hydropower (Source: World Bank, 2009)



Source: World Bank.

Note: Lending volumes represent funding for hydropower components in the year of approval. Volume of lending does not necessarily reflect the numbers of projects supported, since it is heavily influenced by the relative cost of projects and the proportion of total project financing that contributed by the World Bank Group.

Figure 8 Depicting the World Bank's lending for hydropower projects. (Source: Rex et.al. 2014)

[249] Ahlers, Zwarteveen, and Bakker 2017.
[250] National Association of Professional Environmentalists 2014; Gore 2009; Gore 2017.
[251] OECD 2018.
[252] E.g. under Power Africa (USA, Sweden et.al.) Energy Africa (DfID) initiatives.

controversial Koysha[253] and Gibe Dams[254]. Moreover, as Figures 7 and 8 show, the World Bank funded no projects in 1999, but, following policy statements from 2003 to 2013, listed in appendix 2, this increased to an approved $8.8 billion for dam-development and restoration between 2003 and 2014[255].

This includes a focus on dams over 10MW[256]: The categories' funding has increased from $250million a year between 2002 and 2004, to $1billion in 2008 alone[257]. Additionally, Western firms continue to play important roles in dam building. Typically they undertake complex design, impact assessment and compensation planning aspects, as illustrated in Chapters 5 and 6 and by dams ranging from China's Three Gorges[258] to Ghana's Bui[259], Sudan's Merowe[260] and Uganda's Bujagali[261].

The magnitude and geographical extent of this dam-building resurgence is thus significant, whilst its number of engaged actors has increased. However, the phenomenon's drivers and practices remain academically under-analysed. Moreover, lively debate on dams continues unresolved, with academics and policy practitioners contesting whether the infrastructure is efficacious for economic development. Furthermore, few studies focus on the role of statebuilding, the presence of high modernism and the adoption and extent of reformist dam-building practices. The next sections detail the nascent literature on these ongoing debates, laying the groundwork for the thesis' contribution.

[253] Verhoeven 2016.
[254] Fantini and Puddu 2016.
[255] The World Bank 2009.
[256] Although noting that between 2003-2014, half of the World Bank's dam projects involved less-impactful run-of-river designs and were under 30MW (Rex et al. 2014).
[257] Skinner and Haas 2014.
[258] Barber and Ryder 1993b.
[259] Hensengerth 2018.
[260] Hänsch 2012; Askouri 2007.
[261] KfW and the World Bank provided finance-risk guarantees for Bujagali Dam (Gore 2017).

The Debate: The World Commission on Dams Impact and the Sufficiency of Reform

Seventeen years on, the impact of the WCD remains unclear. Contemporaries hailed the achievement of securing agreement among a broad group of supporters and critics[262]. However, debate soon resumed. A range of actors, from the World Bank to the majority of big dam-building states, rejected full adoption of the WCD[263]. Goodland[264] alleges this stemmed from dislike of the critical direction of the WCD process and consequent fears it could stymie any future dam-infrastructure financing. Indeed, its recommendations ask officials to question and consider rejecting projects[265]. Key parts of the WCD's recommendations can be summarised as:

- Detailed, independently approved social and environmental impact assessments (ESIAs) that includes 'strategic' (i.e. cumulative river-basin) impact analysis alongside examination of upstream and downstream impacts
- A compensation process whose planning and execution is more inclusive of those affected and that, focusing on livelihoods rather than acquired land, aims to leave project affected people better-off[266].
- Explicitly including local development and benefit sharing schemes in project planning
- Amending dam designs in light of impact assessments to mitigate negative outcomes
- Invoking community participation
    - In the approval of dams (thereby acting to legitimate dam justifications)
    - In knowledge production and decision making, to improve development outcomes and officials' understandings of project impacts

[262] Moore, Dore, and Gyawali 2010.
[263] E.g. World Bank accepted the WCD's strategic priorities not recommendations (Bosshard 2006)
[264] Goodland 2010.
[265] Moore, Dore, and Gyawali 2010; Scheumann and Hensengerth 2014b.
[266] Echoing the work of Scudder 2012; Scudder 2005.

Arguably, reformist ideas constitute what Manheim calls a particular ideology[267], a discreet set of idea-practices defined by their opposition to total ideologies like high modernism. However, this label is cautiously adopted here as, in contrast with Manheim's conceptualisation, these ideas are not associated with one specifically defined group[268].

Influenced by a broader context where concern for the environment, sustainability[269] and community inclusion become increasingly mainstream[270], such reforms have been increasingly adopted. The World Bank, Germany and other development banks[271] increased the stringency of their safeguard policy in 2003 with reference to the WCD[272]. Additionally, in Brazil, WCD recommendations influenced a multi-stage planning-approval process that is more inclusive of civil society[273] and in 2006 China's ExIm Bank institutionalised social and environmental standards[274]. The International Hydropower Association (IHA), a dam-industry advocacy group, created the Hydropower Sustainability Assessment Framework (HSAF) that claims to operationalise the WCD's report[275]. The HSAF constitutes a method to assess dams along multiple social, economic and environmental lines, and has been widely adopted, including by China[276]. The HSAF's greater success as oppose to the WCD suggests governments prefer a technocratic focus on the *how* of dam construction, not the *why,* or acknowledgement of political trade-offs. Overall though, reports by the IHA[277], and Skinner and Haas[278], suggest increasing adoption of these reformist idea-practices.

[267] Mannheim and Wirth 2015.
[268] Here influenced by Goodwin 2014).
[269] E.g. the 1992 Rio Conference on Sustainability and Nobel prize winning economist Ostrom.
[270] Hickey and Mohan 2004.
[271] WCD officially referenced by Asian Development Bank and EU Clean Development Mechanism and Officially incorporated into Germany's Development Ministry policy guidelines (Scheumann and Hensengerth 2014b).
[272] Goodland 2010.
[273] da Costa 2014.
[274] Updated every few years (K. McDonald, Bosshard, and Brewer 2009; Qui, Mang, and Bosshard 2018).
[275] Skinner and Haas 2014; The World Bank 2009.
[276] Scheumann and Hensengerth 2014b.
[277] International Hydropower Association 2017: E.g. chapters on Chaglla Dam, Peru, and Canada describe co-ownership and designing of dams with indigenous political organisations.
[278] Skinner and Haas 2014. Also see da Costa 2014; Scheumann and Hensengerth 2014b.

Dam-advocating governments, financiers and companies use these reforms to assert that the infrastructure's past controversies have been addressed. Thus, Gore asserts: "Rather than deterring future investment in large dams, … the emergence of these global (reformist) norms and associated policies designed to alleviate past problems with construction may have, conversely, installed a new level of confidence in dam construction efforts"[279]. An emerging group of academics therefore debate such claims. For instance, Skinner and Haas, highlight the HSAF's absence of legally binding promises for affected people and assert that it falls short of the WCD vision. Similarly, Goodland writes: "Whereas (the) WCD proposes democratic measures such as meaningful participation HSAF promotes only transparency and disclosure"[280]. Additionally, Mirumachi and Chan[281] find that despite their increasing presence, EIAs tend to remain persistently anthropocentric, overlooking and mis-understanding the bio-physical systems that underpin ecologies and environmental livelihood services[282]. This suggests much continuity in dam projects' knowledge production[283] but more detail is required to understand practices of dam reforms 'at ground level', a gap this thesis addresses.

The Debate: Dams as Necessary?

Alongside this debate about reforms' sufficiency, another theme challenges dams as development solutions. Climate change is the most influential discourse here, underpinning new ethical arguments for the infrastructure that sanitise hydropower-dams as renewable because they are a less polluting and large-scale electricity source[284]. Thus, countries like Ethiopia draw on climate change justifications to legitimise their controversial dams[285]. Furthermore, climate change policy concern has brought new finance streams such as carbon credits and the Clean

[279] Gore 2017, 15.
[280] Goodland 2010, 390.
[281] Mirumachi and Chan 2014.
[282] Skinner and Haas 2014.
[283] Bosshard 2010; K. McDonald, Bosshard, and Brewer 2009.
[284] A. Huber and Joshi 2015.
[285] E.g. Gibe III (Kraak 2012).

Development Mechanism[286], thereby unlocking finance for hydropower, including Brazil's controversial Belo Monte hydro-project[287]. However, such discursive rationalising is somewhat problematic given recent research findings that future climate change could increase the variability of rainfall in Eastern and Southern Africa thereby undermining reliable hydropower production[288]. Dam building thereby increases the vulnerability of energy systems to an uncertain climate increase its variability[289]. Another, albeit Africa-specific, justification draws on emerging Afro-optimist narratives[290], particularly active during the commodity boom that ended in 2014[291]. They assert the continent's need for electricity based on recent economic growth[292]. Further analysed with regards to Rwanda and Tanzania in Chapters 3 and 4, Baptista and Plananska[293] argue that this rationale often asserts electricity's ability to linearly produce development: Thus "once the physical manifestation of negative 'high modernist' development thinking, large hydroelectric power dams have re-emerged as principal engines in national economic and social development strategies"[294].

Another new rationale for dam building draws on rhetorics of fear, constructing a Malthusian crisis of population growth, famine and water wars[295]. This is conceptualised by one group who use the water-energy-food nexus concept[296], and dams' production of electricity, irrigation and water supply, to assert, along positivist lines, that the infrastructure can solve such

[286] Hydropower is the 2nd most financed: 86% of which are large dams (Skinner and Haas 2014, 57), primarily in India and China (Ahlers et al. 2015).
[287] Moore, Dore, and Gyawali 2010.
[288] Cole, Elliott, and Strobl 2014.
[289] Conway et al. 2017; Conway et al. 2015.
[290] Replacing the older narrative that "Africa appeared to be too poor, too violent and too badly governed for international investors to risk their money and reputations" (Verhoeven 2016, 4).
[291] Taylor 2014.
[292] Kammen, Jacome, and Avila 2015.
[293] Baptista and Plananska 2017.
[294] Gore 2017, 13.
[295] E.g. Yergin; "Enormous" challenges from population and economic growth are "defining the future" (2012, Introduction).
[296] Only describing dams multi-purpose benefits (Ünver and Pluschke 2015) as opposed to those using the nexus concept more critically: E.g. Conway et al. (2015) on climate-change impacts for food and hydropower or Cuesta-Fernández (2015) on Ethiopia.

Malthusian crises and generate development[297]. Moreover, proponents like Berglöf and Devarajan and Bullock and Hülsmann[298] either omit dams' controversial history and politics or downplay these trade-offs and controversy as minor "within-country issues"[299]. This use of the term nexus negates the political ecology of water and the way resources in-fact embody societal power[300]. As Verhoeven argues, "much of the nexus thinking falls prey to a Rostow-like modernisation paradigm with the irresistible advance of good government steamrollering inefficiencies and irrational allocations"[301].

Grey and Sadoff[302] and Hall et.al.'s[303] water security argument further illustrates the new depoliticised language of scientifically-derived development that asserts dams' necessity[304]. They

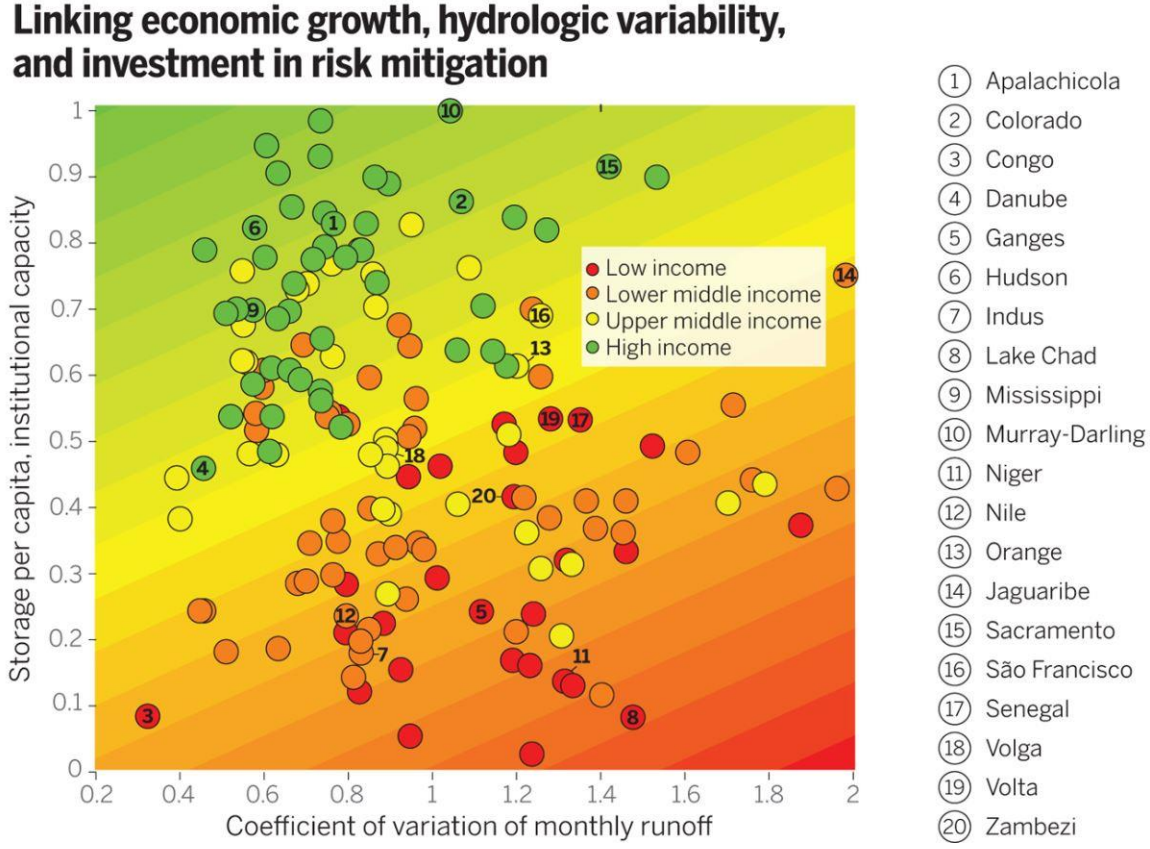


Figure 9 Source Hall et.al. 2014, 430

[297] Berglöf and Devarajan 2015, 23.
[298] Bullock and Hülsmann 2015.
[299] Berglöf and Devarajan 2015, 26.
[300] Verhoeven 2015b; Others assert need for critical nexus understanding (e.g. Eren 2018).
[301] Verhoeven 2015b, 370.
[302] Grey and Sadoff 2007: Both are former World Bank officials.
[303] J. W. Hall et al. 2014.
[304] Sadoff, Borgomeo, and De Waal (2017) for instance, largely overlook the socio-environmental services of free-flowing rivers.

proceed from the premise that variability in surface-runoff (i.e. in rivers), correlates with wealthier societies[305], and thereby creates economic growth or traps countries in poverty (see Figure 9). Aside from their findings seeming to lack correlation and in-fact suggesting that richer countries have more infrastructure, such an argument smacks of environmental determinism[306]. Moreover, as the authors partially admit[307], their proposed relationship between variability and income could merely prove the vulnerability of primarily agriculture-dependent economies. Furthermore, as the author has argued elsewhere[308], the water security thesis' involves seeing rivers along Scott's[309] lines: A good water secure state will make their rivers legible and controllable for 'productive' purposes, thereby assuming the beneficence of dam-infrastructure technology and overlooking the services of existing free-flowing river systems for ecologies and society[310]: With dam's historical problems dismissed as stemming from institutional practices, infrastructure is only seen as a solution rather than a potential negative. Despite this, water security has gained international policy-recognition[311] with little apparent critique.

For the re-entry of Western players, these new justifications rebranding old narratives of dams as developmentally necessary, and of past problems as solvable through reforms, are important. They allow the repainting of dams as green 'hydropower', or even 'multipurpose reservoirs' and 'water infrastructure'[312]. For instance, a World Bank report claims: "Now, lessons from the past, together with emerging global dynamics, are recasting the role of hydropower and stimulating a renaissance in investment and rehabilitation", and another document states: "In a world of growing demand for clean, reliable, and affordable energy, the role of hydropower and

[305] J. W. Hall et al. 2014; Grey and Sadoff 2007.
[306] Harking back to the 1930s geography of Mackinder and others who saw environments linearly causing behaviours and societal types: Essentially, this amounts to environmental racism.
[307] J. W. Hall et al. 2014, 429.
[308] Dye 2016b.
[309] Scott 1998.
[310] Tellingly, the TVA is praised for providing 'universal services' (Grey and Sadoff 2007, 533) ignoring the inequalities (see Scott 2006; Hoag 2006).
[311] Published in *Science* and discussed in international policy conferences like World Water Week 2015.
[312] E.g. The World Bank 2009; Berglöf and Devarajan 2015; Bullock and Hülsmann 2015.

multipurpose water infrastructure, which also offers important opportunities for poverty alleviation and sustainable development, is expanding"[313]. Here the word *dam,* along with the infrastructure's politics and controversial history, is erased. Thus, the upsurge "can partly be attributed to efforts by the International Hydropower Association and engineering companies to negotiate sustainable guidelines for the sector"[314].

In contrast, a recent intervention by Ansar et.al. debates dams' developmental efficacy by demonstrating the infrastructure's poor economic record, arguing that "delusion" continues in appraisals of dams as developmental solutions[315]: Ansar et.al.'s database indicates 96% of dams' face financial overruns, with half costing more than the benefits were worth. Similarly, construction time overran in 8 out of 10 dams by an average of 8.6 years. Academic debate therefore continues[316] about the efficacy and necessity of dams as developmental solutions and on the sufficiency of reforms in addressing past impacts. This thesis contributes to this work. On the one hand, it analyses the justifications for three case study dams, situating them in national drives for electricity generation and assessing the degree of short-sightedness in dam-rationalising 'megawatt missions'. Additionally, it studies the adoption of reformist idea-practices and the degree to which they meaningfully change dam-building policies, using the ideology of high modernism to explain the way such changes frequently appear more surface-level. Before presenting this case study evidence, the chapter analyses the nascent literature on the dam resurgence era.

Case Studies from the Resurgence: The Return of the Statebuilders?

Numerous countries appear to be (re)launching large interventionist development missions where dams play an underpinning role. Lord, for instance, describes Nepal as a persistent

[313] World Bank 2009, 1; World Bank 2009, ii.
[314] World Energy Council 2015, 6.
[315] Ansar et al. 2014, 44.
[316] E.g. Siciliano et al. 2018 asserted continued misunderstood, unequal impacts.

hydropower nation, where dams are seen as the panacea for "energy sovereignty, political stability, regional cooperation, poverty alleviation, social justice, and nationalistic progress"[317]. Ethiopia under EDPRF governance, and particularly Prime Minister Meles Zenawi (2003-2012), is another oft-quoted example of dam's return, with the infrastructure hoped to "catapult the country from an aid-dependent impoverished state, to a regional hegemon"[318]: Cheap hydropower will found domestic industrialisation whilst earning foreign currency and geopolitical power through international sales[319]. Sudan provides a further example. Verhoeven[320] describes specific ideologues in Sudan's Al-Ingez regime (1989-) who, in the 2000s, pursued a high-modernist statebuilding project centrally featuring a new dam-generated political geography: Particularly after the oil-rich South's secession, dams' irrigation and electricity is planned to create a new geographic core which will underpin regime prosperity and political stability. For the ideologues involved, "dams do not just produce electricity and facilitate energy through flood control, … they were "game changing" infrastructure- the kind of intervention that would turn around a country's economic fortunes with one master stroke"[321]. However, ideology is not the sole rationale in these cases. As Sudan also demonstrates, dams serve 'iron-triangle' purposes as they act to continue the country's economy of extraversion. They act as a tool to attract international finance, with construction contracts then used through corrupt patronage networks to enrich regime supporters[322].

Studies from the new era consequently suggest some instances where 20th-century high-modernist justifications of *imbuing dams with development* are replicated, a pattern that is also apparent in implementation practices. For instance, Sudan's Merowe Dam involved a piecemeal compensation scheme moving people to desert areas with limited or no irrigation[323]. Additionally,

[317] Lord 2016, 146.
[318] Verhoeven 2013b, 6.
[319] Cuesta-Fernández 2015; Kraak 2012.
[320] Verhoeven 2015a; Verhoeven 2013; Verhoeven 2016.
[321] Verhoeven 2011, 121–22.
[322] See above.
[323] Askouri 2007.

engagement with affected communities did not involve consultation or forewarning of impacts including filling the reservoir. This meant some villages had to flee rising water levels[324]. The fear and loss of possessions, crops and animals[325], and at times brutal use of the army in coercion or protest suppression[326], means Merowe has parallels to the colonial Cahora Bassa in Mozambique[327]. Elsewhere, dams in Ethiopia appear to give little consideration to downstream impacts or mitigation. The Gibe II[328] and Gibe III, for instance, divert the Omo River's flow from Kenya's Lake Turkana, the world's largest desert lake[329], thereby endangering ~180,000 people who depend on the river and lake's seasonal flow. Avery[330] predicts Gibe III will cause Lake Turkana to drop by two thirds, drawing comparisons with the heavily-drained Aral Sea, caused by Soviet Union dam and irrigation schemes.

In contrast, other studies suggest important change in the resurgence era. Protests continue to be an important feature in many countries[331]. Moreover, a number of studies document adoption of reformist idea-practices. Lord[332] gives one notable example with the Nepalese Chilime micro-hydro that involved strong local leadership in its planning and community shares in the dam, which generate a degree of benefit sharing. The Bui Dam in Ghana also shows an explicit intention to learn from Akosombo's problematic displacement experience: Officials made a more comprehensive plan before construction and the EIA included a civil society-led local community dialogue[333]. Similarly, Gore analyses how, whilst Bujagali Dam (250MW) in Uganda was chosen over a smaller and probably less impactful dam at Karuma Falls (100MW), it did involve a detailed ESIA and created an official link with non-governmental organisations to allow

[324] Hänsch 2012.
[325] Hänsch 2012.
[326] Askouri 2007.
[327] Isaacman and Isaacman (2013) detail accounts of violent army displacement.
[328] Fantini and Puddu 2016.
[329] Avery 2013.
[330] Avery 2013.
[331] E.g. Myanmar (Kirchherr, Charles, and Walton 2017; Kiik 2016).
[332] Lord 2016.
[333] Miescher and Tsikata 2009; Hensengerth 2014.

them to scrutinise and challenge the project[334]. This pattern of limited, change across a variety of regime types, thus suggests important differences from the 20th century. For instance, Tilt studies China's increased resettlement compensation and more stringent EIA policies. Similarly, Dao[335], comparing a 1970s dam with another built in the 2000s, finds that the newer project included planned compensation specifically mandated by the Prime Minister. Simultaneously however, compensation and the dam's wider decision making was non-participatory and top-down. This pattern is again revealed in Chen and Laundry's study[336] of Chinese and World Bank financed dams in Cameroon: Despite differences in compliance, on paper both projects involved significant impact assessments and mitigation policies. Foregrounding this thesis' conclusions then, this literature review suggests that the WCD was not the final chapter of the dam debate but rather an influential stage-post in a continuing trajectory of dam reforms. Analysis here suggests increased adoption of appraisals that acknowledge, rather than *invisiblise,* impacts and include stricter adherence to principles of livelihood restoration, not simple compensation. This thesis advances this literature, explicitly considering the drivers for these trends, their variations across different types of actors and the presence in knowledge production and decision making at the international, national and project level.

[334] Limited organisational capacity reduced these groups ability to challenge the government (Gore 2017).
[335] Dao 2010.
[336] Chen and Landry 2018.

Chapter 2

The Emerging Powers in Africa: India and Brazil's (Un)Intended Pursuit of Dams

Conducting fieldwork in Africa today, one is struck by the visible presence of the emerging powers. A curious observer at Mauritius' national botanical garden at Pamplemousses will see a stand of trees planted by visiting heads of state. Notably, since the late 2000s, plaques almost exclusively feature Asian powers such as India, China and Singapore. One has to walk a good distance into Mauritius's history to find the last European dignitary. Similar experiences of these growing ties can be found throughout the continent. For instance, if driving through Kigali, you will likely use Chinese-built roads, pass Rwanda's Turkish-built[1] architectural flagship, the Kigali Convention Centre, and see construction sites and vehicles plastered with the logos of Chinese contractors. Such experiences signify the sea-change underway in Africa's international relations: Countries from the Global South are advancing to parallel positions in the continent's economic, political and development-cooperation relations, to those from the Global North.

This chapter analyses these so-called emerging powers as a major player in the African dam resurgence. As Chapter 1 discusses, many of these countries build dams domestically and, supporting their dam-building industries, increasingly finance the infrastructure's construction internationally. It is therefore important to understand the emerging power's rise in Africa to analyse the continent's dam resurgence. Given the thesis' focus, analysis concentrates on India

[1] Noting that Chinese constructors started the German-Designed building.

and Brazil specifically. Using literature and primary empirical data, this chapter explains why India and Brazil have engaged with Africa and with Rwanda and Tanzania particularly. The chapter also asks how the Emerging Power-Africa engagement works, its actors and their actions. Through this analysis, the rationales and practices of India and Brazil's engagement with Africa, and specifically dam building, emerge.

The chapter uses the terms 'South' 'North' and 'West' whilst acknowledging the problematic practise of grouping such a diverse array of countries, experiences and politics together[2]. Moreover, it is important to recognise that such labels hide the past strengths of India and China, revealed by economic data that demonstrates that such areas had greater or equivalent economic wealth to Europe as recently as the 19th century[3]. Additionally, the terms 'rising', or 'emerging' power provoke questions about when one can judge such powers to have 'risen' or 'emerged' and suggests a problematic unidirectional trajectory. Despite this simplification, following Hurrell[4], these terms are regarded here as useful. This is because they capture the general experience of two broad groups of countries where, through processes like colonialism and industrialisation, power[5] became concentrated in the Global North (i.e. Western Europe, America and Russia), marking a pronounced divide with the Global South that persisted through much of the 20th century. From the 1990s, this geography of global power began to shift. Therefore, whilst acknowledging such difficulties, this chapter persists with the term 'emerging powers' (and perhaps more accurately the phrase (re)emerging) in order to capture the relative newness of the level of their current engagement and the significant change they have brought to Africa's international relations and development landscape.

The chapter starts by outlining the political-economy literature that seeks to nuance interpretation of the emerging powers in Africa, examining key themes which underpin analysis

[2] Alden, Morphet, and Vieira 2016.
[3] Maddison 2010.
[4] Hurrell 2014.
[5] Using the Introduction Chapter's definition.

of the thesis' cases. The first section includes a focus on China-Africa relations as a comparison to India and Brazil. The chapter's second and third sections deal with India and Brazil respectively. Using interviews, grey literature and statistics, analysis examines why both countries have pursued an expansionist Africa policy and the nature of their engagements. The argument highlights the key sectors involved in the Africa surge, the multiple actors shaping the policies and projects of Indian and Brazilian activities. In closing each section, the chapter explains specifically why and how Indian and Brazilian actors finance and build dams. Overall, the chapter demonstrates that Indian and Brazilian governments' support for dam building is not the product of a deliberate sectoral strategy, but rather stems from both states' broad interest in pushing engagement across a wide spectrum of economic sectors and development cooperation activity. Capable domestic construction companies actively drive these policies, and use the opportunity they provide, to advance business, including in dam construction. The chapter therefore provides an important part of this thesis' analysis of the *why* and *how* of the dam resurgence.

I: The (Re)Emerging Powers in Africa

What Has Changed?

South-South economic relations have taken off since the millennium. Trade between Southern countries stood at $147billion[6] in 1990, growing to $1 trillion by 2004[7], and a peak of $5.5 trillion[8] in 2014[9]. Trade between the so-called BRICs[10] and Africa grew at an even faster rate, increasing 10 times between 2000-2009[11], reaching approximately $377billion in 2016[12]. China has led this change. Its trade relationship rose from US$10.5billion in 2000 to $32bn in only the first half of 2007[13], moving to a peak of $215billion by 2014[14], although with the global commodity downturn, this fell to $128 in 2016[15]. The expansion of companies to Africa is one driver for such trade increases[16]. Recent research[17], for example, suggests that 10,000 Chinese state and private companies are present in Africa[18]. Analysis below suggests similar growth in corporate presence, albeit at a smaller scale, for India and Brazil. Turkey is also a notable new player, with a state-led drive to the continent supporting infrastructure companies[19] and the expansion of the government-backed Turkish Airlines[20].

Beyond trade, the emerging powers have increased investment in Africa, notably with governmental lines of credit (LoCs) that are stimulating an infrastructure boom. India's Export-Import (ExIm) Bank and Brazil's BNDES have joined established Western and multilateral

[6] All $ statistics are US Dollars.
[7] Aykut and Goldstein 2006, 11–12.
[8] UNCTAD 2017.
[9] 2015-2016 saw this category of trade fall.
[10] Noting that inclusion of Russia counters the chapter's South-South focus.
[11] Brazil, Russia, India, China.
[12] Swaran Singh 2017.
[13] Alden, Large, and Soares de Oliveira 2008, 11.
[14] Johns Hopkins China-Africa Research Initiative 2017.
[15] Johns Hopkins China-Africa Research Initiative 2018.
[16] Especially imports to Africa.
[17] Sun, Jayaram, and Kassiri 2017.
[18] Building on Gu et al. 2016; Gu 2009.
[19] E.g. Turkish company Hakan in Rwanda's energy sector (Chapter 3).
[20] Ozkan 2016.

Development Banks in extending finance to Africa, but it is China's ExIm Bank that leads the way[21]. China's lending for infrastructure alone rose from $0.5billion between 2001-2003[22], to a peak of $17billion in 2012, falling to $12billion in 2015[23]. Typically, power and transport were the largest sectoral recipients in 2015, with $4.5 and $4.6 billion respectively[24]. Railways are also a notable feature with one of the largest in Ethiopia, connecting the rapidly growing Addis to Djibouti's sea port[25]. The Arabian Gulf is also a growing economic player, for instance with investment in Sudan's dam and agricultural schemes[26], or through development finance from the Arab Bank for Economic Development[27].

The emerging powers also engage in development cooperation activities much of which fall under 'aid' definitions as set out by organisations like the OECD's Development Assistance Committee[28]. By 2010 this was estimated to have reached US$14billion, 10-12% of global aid[29]. Whilst concessional finance could count in this aid tally, it is contested by conditions mandating spending part of the loan in the donor country[30]. Many emerging powers also undertake more traditional aid activities[31]: As early as 2009, for example, African students had taken 29,465 scholarships in China, and Chinese-government grants built 107 schools and 54 hospitals[32]. Overall, this represents a significantly changed landscape in the volume of activities and in the actors engaging in trade, aid and investment in Africa. Dam building therefore sits in a broader context of growing relations and business and development cooperation activity. But how to understand this trends' motivations and practices? Whereas politicians, diplomats and companies

[21] Bräutigam 2011, 1.
[22] Foster et al. 2009, 21.
[23] Atkins et al. 2017.
[24] Atkins et al. 2017: Power, water and transport infrastructure dominate nearly every year.
[25] Terrefe Forthcoming.
[26] Verhoeven 2016.
[27] Foster et al. 2009.
[28] Mawdsley 2012: Recent steps broadening OECD aid definitions (e.g. including blended finance), increases this extent of overlap (Mawdsley 2017).
[29] Park 2011; Quoted in Mawdsley 2012, 85.
[30] A practise supposedly rejected by 'traditional' donors (Mawdsley 2012).
[31] Mawdsley 2012.
[32] Power, Mohan, and Tan-Mullins 2012.

from the emerging powers have tended to explain and justify their growing Africa ties through a narrative of South-South Cooperation, certain academics, Western media outlets and civil society actors in Africa[33], have proselytised the idea of rogue aid and neocolonial exploitation.

Interpreting the Rise

South-South Cooperation

Central to this rhetorical framework of South-South Cooperation is that trade and development activity represent equal, win-win relationships[34]. This concept was developed by the Third World Non-Aligned Movement (NAM) that brought together many developing-country leaders[35] to assert independence from the Cold War binary and establish a rhetorical tripartite divide by the mid-1960s[36]. The NAM era also fostered development collaboration branded as mutually-beneficial and win-win. China was not part of this grouping but espoused similar rhetoric and engaged in development cooperation projects, a prominent example of which is the 1970-1975 Tazara (Tanzania-Zambia) railway[37]. This principle of mutually-beneficial projects rationalises present-day practices like stipulations for spending 70-80% of concessional finance on donor-country's goods and services, ensuring both sides share benefits. Another underpinning principle is a strong Westphalian notion of state sovereignty[38], expressed in policies of non-interference and less-conditionality in trade and particularly aid relations: Rather than donor agencies driving development agendas, or insistence on certain social and environmental standards, as is typical under the traditional Donor Assistance Committee, South-South Cooperation is supposedly recipient defined. Thus, Tan-Mullins et.al.[39] analyse China's aid and concessional financing for presidential palaces (e.g. Zimbabwe) and national stadia (e.g. Angola). Similarly, India has built

[33] Obiorah 2007.
[34] Tan-Mullins, Mohan, and Power 2010.
[35] E.g. Nehru, Nkrumah and Nasser.
[36] Narlikar 2010b.
[37] Monson 2011.
[38] Hurrell 2014.
[39] Tan-Mullins, Mohan, and Power 2010.

Ghana's Presidential Office[40]. This lower-conditions approach is also important for infrastructure construction in Africa as it produces an easy supply of less bureaucratic finance to realise often long-dreamed, and socially and environmentally sensitive, projects. High rhetoric is, therefore, a central feature of many South-South relationships[41], but also rationalises specific practices.

'Rogue Aid'

In contrast, a number of European and American journalists, and some academics, painted the emerging powers' increasing African engagement, and particularly that of China, as a neocolonial force. Articles[42] like "Rogue Aid" [43] and "The Return of African Empire"[44] illustrate this narrative. In them, "Africa becomes a uniform space for encroachment and exploitation"[45]. Rogue aid narratives often assert the dangers of a limited-conditions approach to development finance with emerging powers seen as selfish, maximising their own benefit by building poor-quality projects, employing their own labour force (allegedly using prison labour[46], a claim that has nowhere been substantiated) and not caring about the socio-environmental consequences. McDonald et.al.[47] and Bosshard[48] illustrate this, correctly identifying Chinese finance and companies' prominent role in dam resurgence but in an un-nuanced analysis of China's disregard for environmental and social costs.

Such 'rogue aid' narratives are subject to substantial academic critique. Power et.al.[49] refute such one-sided analyses of agency, asserting that "Africa is presented as hapless and helpless, which not only serves to present China in a poor light but also … abdicates responsibility

[40] Cheru and Obi 2010a.
[41] Alden, Morphet, and Vieira 2016.
[42] Taken from Power, Mohan, and Tan-Mullins 2012.
[43] Naim 2009.
[44] Menon 2012.
[45] Power, Mohan, and Tan-Mullins 2012, 6.
[46] Bräutigam 2011, Prologue.
[47] K. McDonald, Bosshard, and Brewer 2009.
[48] Bosshard 2009.
[49] Power, Mohan, and Tan-Mullins 2012, 5.

of African Leaders". As Soares de Oliveira[50] demonstrates with Angola and West Africa's oil politics, by engineering these deals, national elites can increase their own power[51]. Additionally, both narratives rely on portraying the West as a moral actor only interested in the betterment of the continent, its development and 'good governance'. As Mawdsley[52] writes, "there is a distinct stink of hypocrisy when China's support for odious regimes is criticised", with her research[53] among many[54] finding substantive similarity between the so-called traditional and emerging power actors. This is evidenced by the emerging powers' investment and trade typically replicating the West's geographic concentration[55] and is also demonstrated in the dam building and wider infrastructure sector. Whilst recognising the leading role of emerging powers and 'Southern' companies, more 'traditional' players also play central roles: The World Bank is a key financier of energy systems, from transmission lines to power plants and generally less-controversial dams along with western donors such as Germany's GIZ and the US-led Power Africa scheme. Additionally, as Chapters 5, 6 and 7 establish, Western firms continue to design, assess, monitor and install electro-mechanical parts in dams.

Consequently, this chapter argues for a nuanced analysis that is sceptical of the extent to which the emerging powers are different and warns against presumptions of automatic conflict or of the abandonment of the liberal multilateral architecture. Moreover, the argument here attempts to avoid essentializing 'emerging' against 'old' powers as "patterns of binary are extremely unhelpful-analytically, politically (and) normatively"[56]. Rather, following the example of Hurrell and Narlikar in relation to India and Brazil[57], this chapter now examines themes from the

[50] Soares de Oliveira 2008; Soares de Oliveira 2015.
[51] E.g. Using the Queensway Group in Angola.
[52] Mawdsley 2012, 116.
[53] Mawdsley 2017.
[54] E.g. With regards to western-origin mining investment in Zimbabwe and military supplies (Carmody 2011a; Roessler and Verhoeven 2016).
Soares de Oliveira 2008).
[55] Taylor 2014. E.g. China's economic activity concentrated in Sudan, Angola, Nigeria, Zambia and South Africa (Bräutigam 2011).
[56] Hurrell 2013, 219.
[57] Hurrell and Narlikar 2006.

literature on the emerging powers that emphasises their important history, motivations, institutional dynamics and similarity or convergence with Western actors.

Emerging Analytical Themes

Continuity and Convergence Between Actors in Africa

Building on evidence above refuting the label of rogue aid, researchers, such as Carmody[58], have stressed the way the emerging powers' interests in Africa mirror those of the so-called traditional countries. Namely all are part of a scramble for resources, fuelled by a (now passed[59]) commodity boom and strong global economic growth[60]. As Klare and Volman write, "an examination of China's efforts to acquire … oil assets in Africa would reveal a pattern indistinguishable from those of Britain, France and the US … all these countries… are active participants in an oil rush in Africa"[61]. Infrastructure and engineering companies from the 'North' and 'South' have followed this commodity-fuelled wave of investment, economic growth and African government ambition. Thus, the dam resurgence is not merely the product of actors from the Global South.

Further complicating assertions of difference, Mawdsley[62] suggests that traditional donors have become more 'Southern' over the last decade. Having turned toward privatisation, market-friendly policies, good governance[63] and poverty targets[64] from the 1980s and 1990s, Western aid agencies have somewhat returned to infrastructure finance and promotion of commercial investment and trade[65], not least in programmes like Power Africa and Energy Africa[66]

[58] Carmody 2011a.
[59] As of 2014.
[60] Taylor 2014.
[61] Klare and Volman 2006, 304.
[62] Mawdsley 2017.
[63] Jenkins 2008; Burnell 2008; Simon 2008.
[64] E.g. the Millennium Development Goals.
[65] Mawdsley 2015.
[66] Chapter 1.

that finance dams and electricity infrastructure. Similarly, on the emerging powers side, the adoption of mandatory environmental and social impact assessments since 2010 also demonstrate varying degrees of convergence. For instance, dam financing by the Chinese ExIm Bank now includes a compulsory EIA[67], as does the Brazilian BNDES. Furthermore, the Indian ExIm Bank introduced new regulations in 2016[68] and research below demonstrates ambitions within government[69] and policy thinkers[70] to create a joined-up, India-led development agenda linking technical training, services and loans to achieve sector-specific development goals in areas like agriculture; a practice echoing (not replicating) Western aid-agency models embodied by the Paris Declaration[71]. Moreover, it is increasingly common for emerging-power companies to adopt at least the veneer of corporate social responsibility policies and sustainability principles, as demonstrated by Angelique (Chapter 5) and Odebrecht (Chapter 7). Consequently, although important differences persist between western donors and the emerging powers, making conflation problematic, characterising emerging power finance and corporates as singularly exploitative, or even a uniform group, is misguided. The Rusumo Dam (Chapter 6) reinforces this argument as it has a Chinese contractor but demonstrates the important difference made by the World Bank's safeguarding protocols.

Researching the Multiplicity of Actors and Their Differing Agency

Another strong literature theme stresses the multiplicity of actors in Emerging Power-Africa ties. For instance, with regards to China, the central government orchestrates a "Going Out" policy with diplomatic engagement, high-level visits, embassy openings and negotiated trade deals[72]. Additionally, with supporting government finance, China directs its state-owned

[67] Hensengerth 2013a; Qui, Mang, and Bosshard 2018.
[68] Dye 2016a; Centred on a more comprehensive Detailed Project Report.
[69] Interviews, Official, MEA, 2016.
[70] Modi 2013; Beri 2016.
[71] This declaration pushed 'aid effectiveness', meaning joined-up, sectoral approaches agreed between recipient governments and donors.
[72] Bräutigam 2011; Taylor, Kopinski, and Andrzej 2013.

companies in engineering, oil and mining to extend operations to Africa, aiming to build globally competitive transnationals. Whilst government managed[73], these companies are also engaged as contractors independently of Chinese state finance[74]. This prominence of the state contrasts with this chapter's analysis of Indian and Brazilian engagements. Chinese citizens also migrate to Africa in their millions[75]. Complexity even appears within apparently singular companies. Sinohydro, for instance, was reported by World Bank officials to operate essentially as a franchise with newer engineering outfits working under its umbrella without necessarily having the same experience or quality standards[76]. Analysis of the emerging powers must therefore differentiate between them and their constituent actors, practices and motives.

Alongside delineation of emerging power actors, the literature stresses the multiplicity and agency of people in Africa[77], not least government elites who negotiate investment and trade deals. A focus on such elites for instance, demonstrates the increased political space governments in Africa now have. Whereas before, finance and aid predominantly originated in traditional donors and multilateral institutions like the IMF and World Bank, with the emerging powers' rise African nations can diversify their international partners. This is important given the policy conditionality frequently associated with finance and aid from traditional actors[78]. Thus Taylor[79] argues, "the emergence of new or non-traditional actors in Africa has opened up varying degrees of (political) space for African elites". This is significant for the dam building resurgence, as it has increased the investment volume as well as creating more options for the financing of such 'hard', socially and environmentally-impactful infrastructure. As Chapter 1 evidences, India, Brazil and China embrace such infrastructure projects domestically and so accept (and arguably underplay) the social and environmental trade-offs entailed. Many African governments welcome this

[73] Senior managers are important party officials.
[74] Gu et al. 2016.
[75] Mohan et al. 2014.
[76] Interview, Senior Official, World Bank, 2017.
[77] Manji and Marks 2007.
[78] Power, Mohan, and Tan-Mullins 2012; Mohan and Power 2008.
[79] Taylor 2014, 10.

diversity and its entailed ability to circumnavigate what is frequently seen as "excessively bureaucratic"[80] Western finance[81].

African elite agency is also important in examining the success and workings of development projects, for instance academics find this factor determining implementation action on a dam in Nigeria[82] and the functioning of Chinese agricultural demonstration centres[83]. Hensengerth[84] and others[85] also argue that states in Africa are frequently the key determinant of environmental and social outcomes as they control what regulations should apply and have the ability to enforce particular standards. Thus, a number of academics[86] find that national elites shape the variation in practices and outcomes in Africa and South-East Asia. In addition, it is important to see communities in Africa as active shapers. Mohan and Lampert[87], for instance, examine a number of protests against Chinese firms and trading activities. A notable example here followed a mining accident in a Chinese-owned Zambian mine that killed 49 people[88]. Agency in Africa is thus crucial to understanding the nature and outcomes of emerging power projects.

Understanding Impact: The Asian Drivers Framework

The Open University's Asian Drivers Framework provides one way of disaggregating the complexity of impacts from these Emerging Powers. As Figure 10 shows, it categorises impacts along two axes, direct/indirect and competitive/complementary and aims to be a broadly applicable framework to a variety of themes (economic, social, environmental) and scales (national, organisational, individual). Usefully, it highlights the potential simultaneity of positive

[80] Mawdsley 2012, 204.
[81] Woods 2008.
[82] Felix et al. 2017.
[83] Xu et al. 2016.
[84] Hensengerth 2013a.
[85] Tan-Mullins, Urban, and Mang 2017; Yankson et al. 2017.
[86] Tan-Mullins, Urban, and Mang 2017; Yankson et al. 2017; Urban and Siciliano 2018, 169.
[87] Mohan and Lampert 2013.
[88] Carmody and Taylor 2010.

Channels	Impact	Direct	Indirect
Trade	Complementary	Asian Driver fabrics used in Lesotho's clothing exports	
	Competitive		Asian Driver competition in US squeezes out Lesotho clothing exports
FDI	Complementary	Asian Driver investment in Lesotho's clothing sector	
	Competitive		US foreign investors relocate clothing factories from Lesotho to China
Finance	Complementary	Asian Driver aid for budgetary support	
	Competitive		Asian Driver led realignment of currencies forces up the value of the Rand, and undermines profitability of Lesotho's clothing exports
Global Governance	Complementary	Budgetary support to government augments state power	
	Competitive		Asian driver input into WTO removes AGOA preferences
Migration	Complementary	Chinese migrants facilitate imports of cheap consumer goods	
	Competitive		Chinese migrants squeeze out local traders
Environment	Complementary	Indian solar technologies enhance energy efficiency in rural areas	
	Competitive		Asian Driver carbon emissions lead to global warming and reduce rainfall in Sub-Sahara Africa

Figure 10 The Asian Drivers Framework (Source: Kaplinsky and Messner 2008)

and negative impacts. For instance, cheap imports can undercut industries in Africa. Alden illustrates this with the textile industry. In South Africa international competition with industrialising Asian companies caused 800 firms to close, ending 60,000 jobs[89]. Similarly, in Nigeria, 80% of its textile industry shut under Chinese competition, removing 250,000 jobs[90]. On the other hand, these cheap Asian imports can reduce the cost of goods in a country and thus potentially increase standards of living.

Another instance of simultaneity comes from the effects of the global commodity boom. Fuelled by the emerging powers' growth, oil and metal prices doubled between 2003 and 2008[91].

[89] Alden 2007, 49.
[90] Alden 2007, 49.
[91] Erdem and Ünalmış 2016; Taylor 2014.

As a consequence, Africa in the 2000s recorded average annual GDP growth at 5.4%, underpinned by commodity-export increases at 18.5% per annum[92]. This produced an 'Africa Rising'[93] narrative. However, this economic growth was concentrated. Large,[94] for instance, asserts that in 2007, 85% of Africa's export trade to China (then Africa's second largest partner) originated in five oil and mineral commodity producers; Angola, Republic of Congo, Nigeria, Sudan and Zambia. Furthermore, Taylor[95] argues that this period in fact deepened the continent's dependence on exports, as demonstrated by the percentage of primary goods in Africa's exports increasing from 72% in 1995 to 81% in 2009[96]. Studies, such as Soares de Oliveira's[97] account of Angola and its elite billionaires including the previously-ruling Dos Santos family, further illustrate the frequent social narrowness of wealth capture[98]. Therefore, whilst enriching some, arguably, the Emerging Power-fuelled global commodity boom merely diversified dependency[99].

The commodity boom is, however, important for the dam resurgence because of its role in underpinning increased infrastructure finance. The so-called Angolan model illustrates this, involving extending loans, typically ExIm Bank credit, for promised resources such as oil, gold or copper[100]. India has such agreements with Sudan[101] and Brazil has an oil-backed line of credit with Angola[102]. The Asian Drivers approach highlights the benefits and costs this entails. Increased finance and lower-cost construction companies can help overcome infrastructure deficits, including in electricity generation[103]. However, as discussed above, emerging-power

[92] Taylor 2014, 14; Alden, Morphet, and Vieira 2016.
[93] E.g. The Economist 2011; The Economist 2013, and World Bank (Delfin and Page 2008).
[94] Large 2007.
[95] Carmody and Taylor 2010.
[96] Taylor 2014.
[97] Soares de Oliveira 2015.
[98] Burgis 2015.
[99] Taylor 2014, 16.
[100] Power, Mohan, and Tan-Mullins 2012: E.g. Zimbabwe, Sudan, Nigeria and Zambia (Bräutigam 2011).
[101] Patey 2011.
[102] Seifert 2016.
[103] The World Bank 2017a; Banks 2013; Arezki and Sy 2016; Mafusire et al. 2010.

infrastructure projects stimulate concerns about socio-environmental standards[104]. Felix et.al.[105] and Yankson et.al.[106] have applied this Asian Drivers approach to the political ecology of dams in Africa. Thereby, they analyse the intertwining of the political in environmental relations, dam building's simultaneous, power-laden processes and distribution of benefits and costs. The Bui Dam is well-analysed through this lens[107]. The Ghanaian government controlled the assessment of environmental and social impacts and the approval and enforcement of any mitigation or safeguarding practices[108]. However, as Power et.al.[109] conclude, such nationally-set regulations are prone to weakness because "these large elite-brokered turnkey projects are likely to encourage flouting of due process in favour of the Chinese (or whoever the investor)" given the government's desire to complete construction, and secure project finance, and given their frequently limited accountability to local populations.

Mohan[110] demonstrates similar complexity in Bui's local impact. The majority of workers were Ghanaian[111] and some local procurement occurred. However, simultaneously, the practice of *enclave* persisted. Chinese workers grew their own vegetables, senior engineers were mostly Chinese, and many goods, from oil to cigarettes, were Chinese imports, partly stemming from stipulations dictating spending the majority of Bui's loan in China. Chen and Landry's[112] study of two Cameroonian dams, highlights a further potential impact of Emerging-Power infrastructure contractors. The dams had World Bank and Chinese ExIm funding respectively, but both involved Chinese contractors and the same Finnish EIA-consultancy[113]. Chen and Landry's research reveals the Bank's more stringent enforcement of standards, but also highlights Chinese contractors'

[104] Bosshard 2009; K. McDonald, Bosshard, and Brewer 2009.
[105] Felix et al. 2017.
[106] Yankson et al. 2017: Also Tan-Mullins, Urban, and Mang 2018.
[107] Yankson et al. 2017; Hensengerth 2018; Kirchherr, Disselhoff, and Charles 2016; Power, Mohan, and Tan-Mullins 2012; Hensengerth 2013b.
[108] Chinese ExIm Bank did not mandate compulsory EIA's at the time.
[109] Power, Mohan, and Tan-Mullins 2012, 171.
[110] Mohan 2013.
[111] 91% of workers Ghanaian (Yankson et al. 2017).
[112] Chen and Landry 2018.
[113] Chen and Landry 2018, 9.

limited capability and experience of high socio-environmental standards. Again, this suggests potential complexities with the emerging powers enabling projects and sometimes adopting locally-beneficial practices, whilst simultaneously causing environmental and social costs[114]. This thesis follows this Asian-Drivers political ecology approach, using case studies to form conclusions discussed in Chapter 8.

Overall then, Africa has undergone a dramatic shift in expanding its economic and political relations. New actors, finance, corporations and countries appear firmly embedded in the political economy of the continent. Whilst recognising this shift, this opening section has sought to nuance analysis, arguing that degrees of replication exist in Africa's international relations, although these differ between actors. Moreover, it stresses important histories, multiple agencies and simultaneous impacts of emerging power-Africa relations. The chapter now takes this complex framework to the examination of drivers for India and Brazil's Africa engagement and their practices in dam finance and construction.

[114] Power, Mohan, and Tan-Mullins 2012, 210.

II: India in Africa
Dam Financing and the Private Sector's Prominence

In the 21st century, India became a growing presence in development projects, commodity extraction and infrastructure building. In this context, India-Africa trade, as depicted in Figure 11, surged from $914million[115] in 1991 to $39billion by 2009[116] and $71billion in 2014-2015[117], an acceleration of 400% between 2007 and 2012[118]. Energy imports fuelled this trade boom including in coal, uranium and oil, the latter reaching $25billion with West Africa the source for 18% of India's oil[119]. Additionally, Carmody describes Indian companies leading greenfield Foreign Direct Investment on the continent[120] and strategic African commodities constituting a significant import source for India, reaching 16% of copper, 79% of phosphates and 80% of rough diamond imports

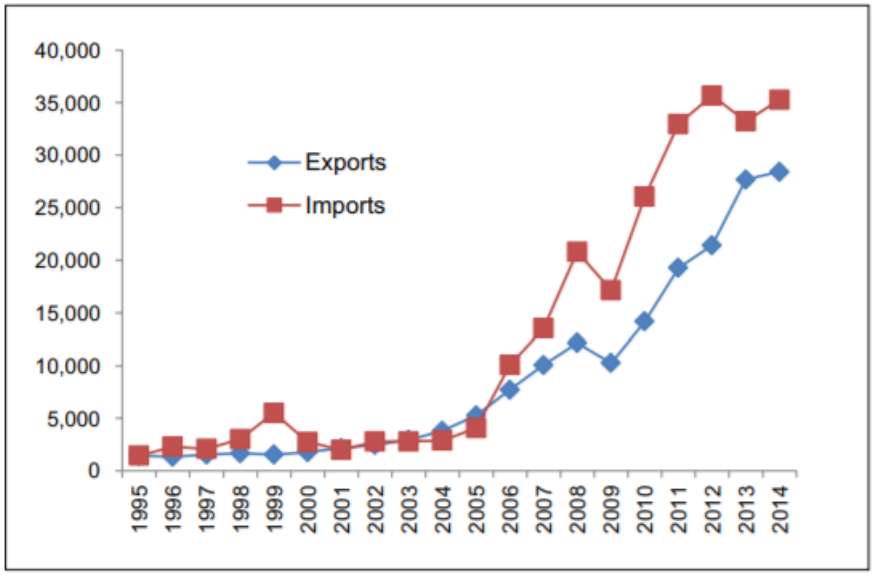


Figure 1: Bilateral trade between India and sub-Saharan Africa (in US$ million)

Source: UNCOMTRADE Database[5]

Figure 11 Source: Chakrabarty 2015, 19

[115] Excluding Oil.
[116] Cheru and Obi 2011, 13; 15.
[117] Bhatia 2015.
[118] Carmody 2013, 74.
[119] Chakrabarty 2015, 20..
[120] Carmody 2011a.

by 2012[121] (the latter being India's largest export). This section examines this rapid transformation. It lays out the chronology of ties, starting with India's Africa history and moving through the three key phases of accelerated relations starting in the 1990s. Given the thesis' case-study of the Nyabarongo Dam, the 2005-2014 period is especially focused on. Throughout this section key actors and their rationales are detailed. The chapter then turns to explain India's dam building in Africa, examining the process of government finance involved in hydro-projects. The section concludes with in-depth analysis of India-Rwanda relations and the histories of the two companies involved in Nyabarongo Dam, Angelique International and Bharat Heavy Electricals (BHEL). It thereby foregrounds the actors and decision-making process behind Chapter 5's case-study dam.

The History of India-Africa Relations

Whilst trade across the Indian Ocean has historically connected India and Africa, the 21st century's enhanced relations have roots in Prime Minister Jawaharlal Nehru's first independent government in 1947[122]. As a pioneer of the Non-Aligned Movement, Prime Minister Nehru and his government sought independence from the Cold War powers, making a "new identity for India and creating a middle space"[123] that could preserve the country's recent independence. A crucial part of Nehru's NAM vision was rooted in "morality and ethics"[124], captured in the principles of South-South Cooperation discussed above, but also emphasising the rhetoric of equality between nations and the championing of poorer-countries' rights[125]. African leaders also pioneered the NAM[126], attending its inauguration at the 1955 Bandung conference[127]. India consequently sought South-South Cooperation initiatives with fellow developing countries and created a dedicated

[121] Carmody 2013, 74.
[122] Interview, Senior Researcher, Observer Research Foundation (ORF), 2016.
[123] Interview, Senior Researcher, ORF, 2016.
[124] Interview, Senior Researcher, ORF, 2016.
[125] Viswanathan 2015.
[126] Mawdsley 2011; Cheru and Obi 2011: E.g. Ghana's Kwame Nkrumah.
[127] Mawdsley 2011.

organisation, the Indian Technical Economic Cooperation (ITEC), in 1964[128]. ITEC' activities included scholarships for Indian universities and provision of technical training[129].

This history is important, partly because interviewees[130] and commentators[131] use it to rhetorically frame India-Africa engagements today by suggesting such ties created goodwill which has inevitably brought the continent and country together. Some even reference Gandhi's Indian-rights campaign in South Africa as a source for present-day positive relations, a problematic reading given that campaign's racism against 'black Africans'[132]. Although such arguments are problematically teleological, Nehru's South-South Cooperation principles continue to influence the rhetoric and policy of the Ministry of External Affairs (MEA) and other civil servants. For instance, senior officials at the Indian ExIm Bank stated that their concessional loans were "credit, not aid" and that the "government does try to not dictate" how these loans should be used. Others echoed this assertion of India's LoCs as "demand driven"[133]. Similarly, a former Ambassador stated that he was "aware that we (India) were there as partners (not as hierarchical donors) and that India asserts no conditionalities, which was very appreciated" by African governments[134]. Whilst providing a rhetorical framework to describe Africa ties, this does appear to reinforce certain policy positions such as limited conditionality. Narlikar[135] also demonstrates persistence of NAM-era rhetoric and policy in India's continuing support for developing-country coalitions. For instance India has a leading role in the United Nations' G77 (group of developing countries)[136]. Moreover, India's diplomats frequently act belligerently in international negotiations in order to

[128] Saran 2012.
[129] Price 2011.
[130] Interviews; Former Senior MEA Official; Senior Researcher, ORF, 2016.
[131] Dubey 2016; Viswanathan 2015; Beri 2016.
[132] Anderson 2013.
[133] Interviews; Senior Official, Business Federation; Senior Civil Servant, Researcher, ORF; 2016.
[134] Interview, Former Senior Official, MEA, 2016.
[135] Narlikar 2013; Narlikar 2010b.
[136] Narlikar 2007.

win concessions for, or block changes against broader developing country (i.e. not necessarily Indian) interests[137].

Additionally, history does play an arguably greater role in shaping India-Africa ties than with other emerging powers because of the legacy of the large Indian diaspora produced by British colonialism in places like Mauritius, East Africa and South Africa[138]. Their presence creates trade and political ties today, although also stoking populist anti-Indian sentiment at times under Presidents like Idi Amin (1971–1979) in Uganda or Julius Nyerere (1964-1985) in Tanzania. India therefore has a long-established presence in African countries and governments which informs policies and rhetorical framings today. However, past ties did not involve substantive infrastructure investments on the continent and so to understand its dam-building, we turn to recent events.

Phase 1: The 1990s Start of "the quantum leap"[139]

Despite historical precedent, today's booming India-Africa ties began in India's economic liberalisation in the 1990s. This decade cemented a decisive domestic policy shift away from an interventionist, regulated 'Licence Raj', to a more market-based economy[140]. This apparent reinvention of India[141] reduced controls on international trade and, crucially, currency movement, making it far easier for Indian companies to internationalise. Many firms took advantage of this opportunity to search for new, profitable markets or expanded international activities, including in Africa[142]. This 1990s shift was part of a broader trend which, in turn, had its roots in government interventions that consolidated large corporations from the 1970s but gradually liberalised the economy in the 1980s[143]. These reforms followed an increasing consensus in Indian politics for a

[137] Hurrell and Narlikar 2006.
[138] Dubey 2016.
[139] Viswanathan 2015, 13.
[140] Price 2011; Corbridge and Harriss 2000; D'Costa 2010.
[141] Corbridge and Harriss 2000.
[142] Interview, Senior Civil Servant, 2016; Adisu, Sharkey, and Okoroafo 2013.
[143] D'Costa 2010.

market-economy development path[144] and desire for India's greater global presence[145]. Moreover, from the mid-1980s, India's economic growth took-off, increasing corporate and governmental wealth[146].

Introducing a key theme of this analysis, the 1990s demonstrate the prominence of India's private sector in driving India-Africa relations, as companies seized the opportunity generated by decreasing government regulation. As one insider stated, they "led the whole process into Africa, … the government came in later"[147]. Many firms from what Taylor calls India's rentier class of large, family-owned conglomerates[148] established or expanded operations in Africa from the 1990s, for example ArcelorMittal in mining, Reliance in oil, or Tata whose activities date from 1977 and include hotels, mining and energy[149]. India's business federations further demonstrate this point. The country has two major groupings, the Federation of Indian Chambers of Commerce and Industry (FICCI), tending to represent established family firms and the Confederation of Indian Industry (CII), representing newer market entrants[150]. According to Sinha[151], both played a crucial role in India's internationalisation to Africa and elsewhere, with conferences and delegations spreading awareness and building key business contacts. A former senior diplomat[152] recalled the impact of business federations in the 1990s, as they supported embassy trade fairs and increased private sector investment. Moreover, both FICCI and CII led lobbying efforts to increase government support for internationalising to Africa. One representative recalled, "we started the dialogue for this Africa Fund" that would support such "platforms of business promotion"[153]. This

[144] Bajpai 2011; Vanaik 2011.
[145] Adeney and Wyatt 2010, 216.
[146] D'Costa 2010; Corbridge and Harriss 2000.
[147] Interview, Senior Official, Business Federation, 2016.
[148] Taylor 2016.
[149] Taylor, van der Merwe, and Dodd 2016, 2; Interview, Senior Civil Servant, 2016.
[150] Sinha 2011.
[151] Sinha 2011.
[152] Interview, 2016.
[153] Interview, Senior Official, Business Federation, 2016.

became the Focus Africa programme, launched in 2002 and marked the start of greater government engagement in India-Africa ties.

Phase 2: The ExIm Bank/ IDEAS Loans 2003-2008

A step change in India's engagement with Africa came with the introduction of subsidised Lines of Credit (LoCs) in 2003 through the Indian Development and Economic Assistance Scheme (IDEAS). Although the State Bank of India issued LoCs from 1966[154], later replaced by the more effective[155] ExIm Bank from 1982[156], these had bureaucratic and legal limitations, particularly in how concessional loans were. The IDEAS scheme overcame this by replicating the World Bank's subsidising rates. IDEAS became the "principal tool of India's development cooperation programme"[157]. LoCs are particularly significant for India-Africa relations as, whilst a global programme, the continent has received the majority, some 60% between 2003-2015 according to officials[158] and commentators[159]; although this percentage[160] lessened from 2015 due to Prime Minister Narendra Modi's foreign policy reorientation[161]. The ExIm-LoCs' process is analysed below, but crucial here is the scale of activity they enabled. Once instituted in 2004, significant lending took-off: Price[162] records extension of $5billion in ExIm-IDEAS LoCs by 2008, including a $1billion oil-backed credit line to West African producers that imitated China's 'Angola' model in its commodities for infrastructure mechanism[163]. The government also boosted technical cooperation, including the ITEC programme[164] and in the breadth and volume of scholarships[165].

[154] Saxena 2016.
[155] E.g. in its use of US dollars not Indian rupees.
[156] Founded 1981.
[157] Singhal and Qadri 2014, 5.
[158] Interview, Senior Official, ExIm Bank, 2016.
[159] Singhal and Qadri 2014; Carmody 2011b.
[160] Not financial volume.
[161] Which involve an increased focus on neighbouring countries and East Asia (Interviews; Senior Researcher, ORF; Senior Official, ExIm Bank; 2016).
[162] Price 2011, 8.
[163] Cheru and Obi 2011; Carmody 2011b.
[164] Carmody 2011b.
[165] Interview, Senior Researcher, 2016.

The MEA's database (viewed as part of this research) stated that grant spending grew from $4-10million in 1997/1998, to $71.62million in 2003/2004 and $125.81million in2006/2007.

A number of political rationales justify this increased government engagement. One argument posits the simple persistence of Nehruvian principles of South-South Cooperation[166] and whilst acknowledging its degree of ideational influence, interviews with current and former senior diplomats indicated self-interest also figures strongly[167]. India seeks global reform in the WTO and UN, the pinnacle ambition being to secure a permanent UN Security Council seat. Such reform requires support from developing countries[168]. Therefore, increasing diplomatic ties and goodwill through development cooperation in Africa is strategic, particularly as the continent traditionally block-votes as 54 countries. Thus, India-Africa relations are "not just about economics but political relations" too[169]. However, economic rationales also factor: "India has pushed its Africa connection, not just to score diplomatic points but also to achieve a foothold in an energy and mineral-rich region"[170]. As attested by the statistics listed above, India imports a number of strategic resources from Africa and with the supposed 'scramble' for further extraction underway, the government was keen to support its companies in acquiring commodity assets, particularly fossil fuels. The government became increasingly aware in the 1990s of India's growing energy needs and limited domestic resources, especially in oil where imports account for 70% of consumption[171]. A key concern was to diversify supplies from the Middle East and especially from Saudi Arabia. Moreover, with African wells typically producing high quality (low sulphate) crude[172], and the continent representing an important source for new oil and gas findings, India's Energy Coordination Committee (formed in 2005) identified Africa's value[173]. Consequently, a senior

[166] Vanaik 2011.
[167] Interview, Former Senior Official, MEA, 2016.
[168] Interview, Senior Foreign-Affairs Researcher, 2016; Narlikar 2007; Cheru and Obi 2011.
[169] Interview, Senior Foreign-Affairs Researcher, 2016.
[170] Saxena 2016, 66.
[171] Joao 2015.
[172] Adisu, Sharkey, and Okoroafo 2013.
[173] Beri 2016, 108.

diplomat stated that Africa's "importance in oil supply" has fuelled "a great deal of interest" in increasing ties with the continent. The state-owned oil company (ONGC), and its overseas subsidiary OVL, are key agents, for instance forging a deal for 18 oil blocks in Nigeria in exchange for $6billion investment in infrastructure projects[174]. OVL also took over Canadian firm Talisman's stake in Sudan oil fields and in return, the Indian government has lent Sudan $567million in ExIm Bank loans and supported the peace process with troops[175].

The new policy of subsidised ExIm loans, alongside strategic interest in energy and subsequent oil-backed credit deals, therefore positively changed the conditions for large Indian infrastructure engagement in Africa. The IDEAS loans are especially important as concessional finance is often necessary for infrastructure projects in Africa and other developing regions given such projects' long build-time, prolonged benefit-payback and the low investment grade of many governments. Nethertheless, this research found no deliberate sectoral or geographic planning comparable to that for oil. Rather, the Indian government has tended to play a more enabling role for private sector engagement. For example, the Focus Africa programme, supported the CII-ExIm Bank's annual Conclave, active from 2005 and regularly attended by senior politicians and businesses from Africa. It has also enabled FICCI-organised trade delegations, sectoral conferences (e.g. in Agriculture) and the India-Africa Business Partnership Summit. The high-level and consistent nature of these meetings has significantly boosted Indian businesses engagement with governments from Africa. For instance, FICCI invited Rwanda's President Paul Kagame to its summit in 2009. Interviewees also illustrated such event's significance. An infrastructure-firm representative reported signing MoUs at such trade conferences[176] and a business federation official described delegation visits that enabled a large pharmaceutical firm to secure required

[174] Vines 2010; Verma 2017, Chapter 6.
[175] Patey 2011; Patey 2014, 151.
[176] Interview, Senior Official, BHEL, 2016.

national licences[177]. Thus, whilst enabled by government, profit-seeking, companies are crucial in driving economic and political relations with African countries.

Phase 3: Enhanced Government Engagement and the India-Africa Forums from 2008

However, over time governmental attempts to lead engagement increased. Some interviewees described early unsuccessful attempts in the mid-2000s by prominent diplomats such as Sujata Mehta to agree clear outcomes and priorities for India-Africa relations[178]. These initiatives eventually led to the India-Africa Forum Summit, a regular high-level, government to government conference. The first meeting, held in Delhi in 2008, set out a broad framework for cooperation stressing activities including infrastructure and energy alongside technical education and social sectors like health[179]. The Indian Prime Minister promised $5billion in line-of-credit deals[180] and the Forum launched a series of flagship development projects. The largest of these was the E-Network, a $1billion programme connecting Indian and African institutions digitally to facilitate technical assistance in health and education[181]. It was reputedly the brainchild of the former Indian President Dr Abdul Kalan[182], a point that questions how recipient-led India-Africa cooperation is. The Forum also granted a no-tariff agreement to Africa's poorest 34 states and expanded the ITEC programme which included doubling scholarships and increasing technical training to 5000 places by 2009/2010[183]. Additionally, the Forum launched a 'V-VIP' network of secure phone lines between African heads of States and India[184].

[177] Interview, Senior Official, Business Federation, 2016.
[178] Interview, Journalist, 2016.
[179] Viswanathan 2015.
[180] Viswanathan 2015.
[181] Cheru and Obi 2011; Carmody 2011b.
[182] Saran 2012.
[183] Viswanathan 2015.
[184] Cheru and Obi 2011; Carmody 2013; Carmody 2011b.

The second Forum followed in 2011, similarly scaling-up LoC promises and development programmes. The 2015 Forum however, marked a decisive shift to demonstrate the seriousness with which India takes its African relationship. This event abandoned the African Union's Banjul formula that limited attendance to just 15 rotating African governments and laid on a grand diplomatic display for heads of state from almost all African countries, lavishing gifts and red-carpet treatment. From 2008 therefore, the Indian government had a greater role in shaping Africa ties, increasing development programmes and diplomatic spectacle. As with the above, real-politick interests in India's diplomatic concerns and commercial interests rationalise this upscaled involvement, but an additional motive was reportedly the long-standing rivalry with China that included the Sino-Indian 1962 Himalayan border war. Given this history and both countries' recent economic rise, commentators described the impressive 2007 China-Africa Forum[185] and the country's diplomatic and economic rise on the continent as a "sore point"[186]. Senior diplomats corroborated this, with one stating that "(increased) development cooperation" stemmed from a "sense that (India was) losing ground to China"[187].

However, despite growing government initiative, institutional constraints, particularly in the MEA, hampered governmental leadership. The MEA is responsible for handling development cooperation, from the approval of LoCs, to the ITEC schemes. Recognising an increasing workload, the MEA created a subsidiary Development Partnership Agency (DPA) in 2012. Whilst a step forward in increasing capacity, this new agency represents a compromise: According to Taylor[188] and others, its effectiveness suffers from a lack of independence and limited staffing that includes only 20 ranking diplomats for Africa relations. This situation arises because foreign policy spending is particularly controversial in the Lok Saba (Indian parliament), leaving the Ministry poorly staffed compared to competitors. India, in 2011, had 750 diplomats compared to China's 6000 and only

[185] Alden, Large, and Soares de Oliveira 2008.
[186] Interview, Journalist, 2016.
[187] Interview, Former Senior Official, MEA, 2016.
[188] Taylor 2016.

29[189] embassies in Africa[190]. Commentators therefore argue India is overstretched in its international relations[191] and often unable to adequately follow-up on initiatives[192]. This critique is also reflected by insiders, as one senior diplomat argued, "if there has been a shortcoming (it is that) ... high level exchanges are not done as much … compared to China or maybe Brazil. (There have been) more visits from Africa to India than the other way around". Although analysis below suggests recent change, these constraints help explain the state's confined role in India's African relations, particularly between the 2005-2014 period focused on here.

Overall, this analysis suggests that the Indian state did not have a grand plan for Africa and played a limited role in directing African relations' content[193]. The Indian state initiated and increased development cooperation and infrastructure investment but did not stipulate a sectoral or geographic focus in economic and infrastructure ties, at least beyond oil and key mineral imports. This is partly because of the influence of South-South, horizontal-cooperation principles, but also stems from the state's limited foreign-policy capacity and greater interest in broader diplomatic, global governance goals. Therefore, as demonstrated in the following analysis of dam building and ExIm loans, the Indian government acts primarily to enable the private sector who then become key agents shaping India-Africa's implementation alongside governments in Africa.

[189] Out of 54 countries.
[190] Taylor 2016.
[191] Price 2011; Vines 2010.
[192] Interview, Researcher, ORF, 2016.
[193] Interview, Senior Researcher, ORF, 2016.

Dam Finance and the Workings of ExIm Bank Credit

ExIm Bank LoCs, the Energy Sector and Dams

Countries in Africa received 133 of 187 IDEAS-ExIm Bank loans or US$6.28billion of US$10.21billion between 2003-2014. The content of these loans shifted over time, moving from primarily bankrolling trade between 2004-2008 to supporting infrastructure projects[194], underlining the schemes' importance to this sector. Between 2005 and 2014 power projects received the most finance[195], reputedly 28.5% of loans[196], followed by railways and agriculture. Hydropower features prominently. The MEA's database records seven hydropower projects in Africa, including Nyabarongo Dam. Figure 12 below detailed these dams, highlighting the prominent role of companies BHEL and Angelique International. Other Indian-financed and built international dams include as the Thahtay Chaung Dam (113MW) in Myanmar and the Nam Chien Dam in Vietnam (200 MW, also involving BHEL). The prominence of dam-building in ExIm/IDEAS finance and India-Africa ties could suggest a dam-building strategy. There is precedent for this

COUNTRY	PROJECT (COMPLETION)	(EXIM LOAN/TOTAL CONTRACT) SIZE	COMPANY
DEMOCRATIC REPUBLIC OF CONGO	Kakobola Hydroelectric Project (2015)	($42 million) 10.5 MW (3 x 3.5 MW)	Angelique International
	Katende Hydroelectric Project (2015)	(US$82 million /$168m) 64MW	Consortium of BHEL and Angelique International
BURUNDI	Kabu 16 Hydroelectric Project (2014)	($80m) 20 MW (2 x 10 MW)	Consortium of BHEL and Angelique International
RWANDA	Nyabarongo Hydropower Project (2014)	($80m / $98m) 287.5 MW	Consortium of BHEL and Angelique International
ZAMBIA	Itezhi-Tezh	($50m) 120 MW	(In joint venture) TATA Africa[41]
CENTRAL AFRICAN REPUBLIC		2 Hydropower Projects: On Hold ($39.69m)	

Figure 12 Listing India's dam building in Africa

[194] Saxena 2016; Singhal and Qadri 2014; Interview, Officials, ExIm Bank, 2016).
[195] Saxena 2016; energy and transport accounting for 50% of loans.
[196] Interview, Official, MEA, 2016.

with India's Himalayan neighbours Nepal and Bhutan[197]. Keen to access both countries' large hydropower potential[198], India has initiated agreements whereby it pays for dam construction in exchange for the majority of the produced power[199]. Another dam that is part of a wider foreign policy strategy[200], is the symbolically-named Afghan-India Friendship Dam (a project also including Angelique as a sub-contractor). Despite this precedent for strategic thinking, the following analysis finds this is not the case in African-bound ExIm loans.

The Decision-Making Process for Concessional Indian Finance

The IDEAS-credit process is supposed to start when recipient governments formally make a loan request to an Indian embassy. However, research revealed that Indian companies tend to reach agreements with the recipient government first[201]. A former senior officer in one Indian infrastructure company described the process starting with their efforts to find out "what is their (the African government's) requirements (and then based on that) … we offered them what we could give. (You couldn't) take in all sectors … (so just engage in their) first or second priorities". To secure this negotiation stage a visit to India or to a company's past infrastructure projects might occur. For instance, a BHEL official[202] described obtaining a power project after a high-level Sudanese visit to its turbine factories. Thus, the "private sector can lobby African governments to push forward a project (and get) ExIm Bank loans"[203]. Subsequently, a project starts its official passage through the organs of Indian government.

[197] Recognised as a deliberate strategy by government interviewees (e.g. Former Senior Official, MEA, 2016) and researchers (Interviews; Senior Researchers, ORF; The Energy and Resources Institute (TERI); 2016: Wirsing and Jasparro 2007; Shah and Giordano 2013; Bisht 2012).
[198] Thakkar 2009; Lord 2016; Interviews, officials, TERI, 2016.
[199] In Bhutan: Chukha (336MW), Tala (1020MW) and Kurichu (6MW) Hydropower Projects. In Nepal includes $1billion ExIm LoC (The Economic Times 2015).
[200] India rivals Pakistan for influence in Afghanistan.
[201] Interview, Former Senior Official, MEA, 2016.
[202] Interview, Senior Official, BHEL, 2016.
[203] Interview, Senior Official, Business Federation, 2016.

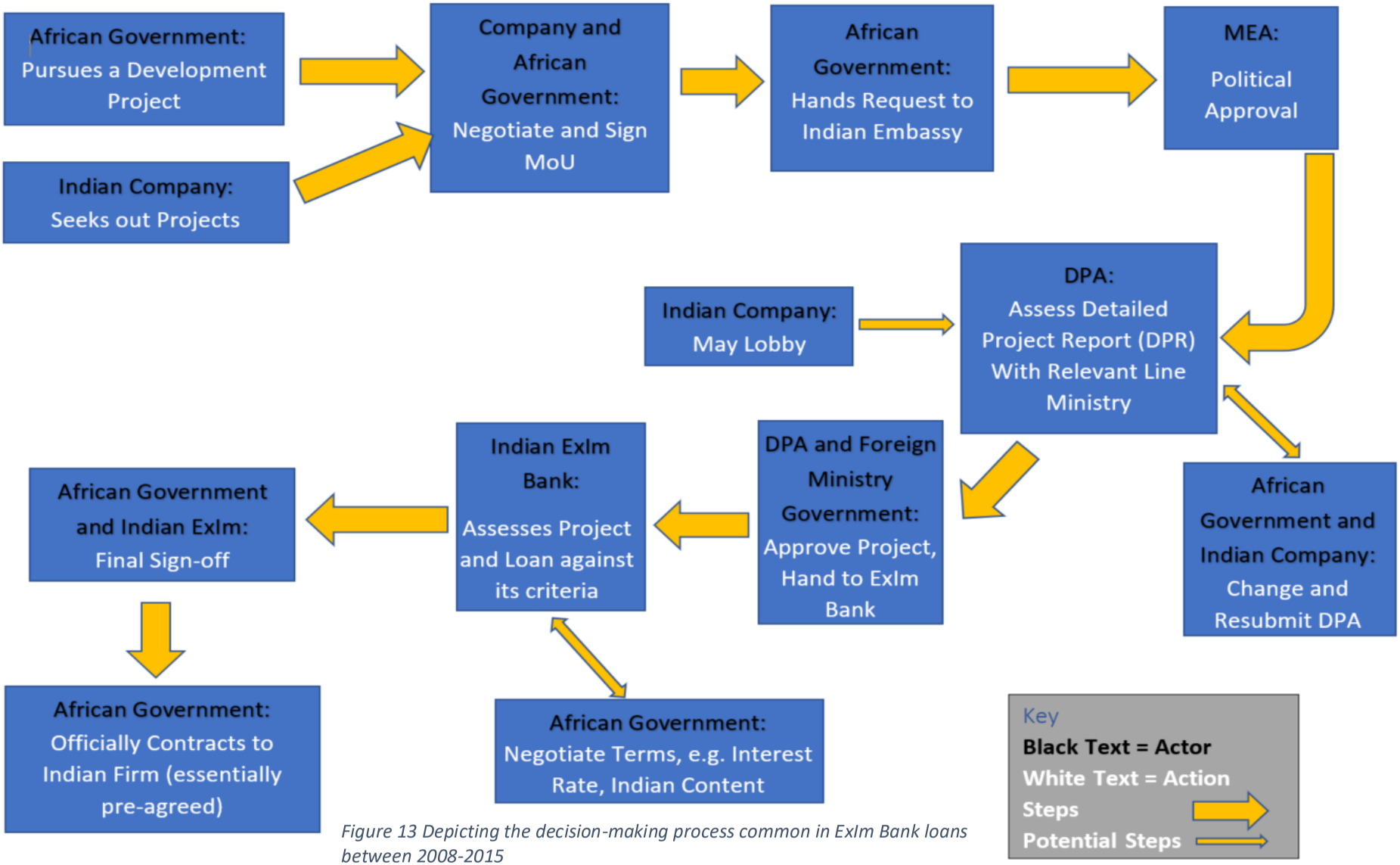


Figure 13 Depicting the decision-making process common in ExIm Bank loans between 2008-2015

As explained in Figure 13, the political desk in the MEA leads the first stage. Their decision making is partly based on the project and partly on the requesting country[204]. Alternatively, a high-level government-to-government meeting, such as the India-Africa Forum, might generate specific credit agreements. The next stage involves the approval of a Detailed Project Report whose purpose is to demonstrate technical feasibility and the proposed contractor's capability. This excludes explicit consideration of developmental, environmental and social impact. For this stage, the MEA (and since 2012 its DPA) convene with the Ministry of Finance, ExIm Bank, and a relevant line Ministry (e.g. Power Ministry for hydropower). A project then requires sign-off from the Ministry of Finance[205] and negotiation with the ExIm Bank itself, who decide terms such as a sovereign guarantee on repayment, the details of the monitoring process and potential provision of training. Additionally, in line with the rhetoric of South-South Cooperation, officials assert that this "development cooperation is not charity or a hand out"[206], which rationalises the typical stipulation that 70% of the loan's value should be spent on Indian exports[207].

Once signed off, the money is distributed in stages for infrastructure projects, based on evidence of progress. A limited monitoring process relies on the engaged Indian company filing quarterly reports to the ExIm Bank with visits by Bank and embassy staff rare. The key focus here is on the project's timely completion. Therefore, as with the approval process, the impact and developmental outcomes of projects are not the primary foci. According to some researchers this was a deliberate way of reducing costs and respecting sovereignty as this practice places "management costs … (impact assessments and monitoring on) the partner country"[208]. Given the

[204] Interview, Official, MEA, 2016.
[205] Saxena 2016.
[206] Interview, Former Senior Official, MEA, 2016.
[207] FIDC and RIS 2015; Saxena 2016.
[208] Interview, Senior Researcher, Research and Information System for Developing Countries (RIS), 2016.

small capacity of ministries and limited ExIm reach, site visits are rare; although given the Nyabarongo's prominence[209], an interviewed senior Bank official remembered visiting this dam[210].

South-South Cooperation principles rationalise this ExIm loan process, with African governments primarily choosing projects without strong direction from India[211], or stipulation about construction-standards and monitoring[212]. Rather the Indian state's focus is project completion, not longer-term outcomes. Whilst analysis here stresses a critical interpretation of this, that cooperation is not always entirely recipient defined[213], the decision-making process does maintain a technical emphasis and an openness to recipients' suggestions. India's early agnostic approach to loan content does appear to be changing, stemming from allegations of corruption, poor standards and delayed infrastructure projects, often connected to the inexperienced insurgent companies discussed below[214]. A recent, emerging consensus in the ExIm Bank and MEA[215] calls for more rigorous project reports, greater monitoring and tendering to Indian companies with a proven record. Moreover, reversing the previous diplomatic status-quo, Prime Minister Modi[216] and India's President and Vice-President[217] have increased visits throughout the continent and announced the opening of 18 new embassies, including to Rwanda[218].

However, as such ideas and actions are only emerging now, it is apparent that India's concessional finance for infrastructure projects was not, by design or policy practice, particularly strategically planned, despite announcements in the 2008-2015 Forums and especially during the

[209] E.g. Featuring on the cover key points of the 2015 ExIm Bank Annual Report.
[210] Interview, Senior Official, ExIm Bank, 2016.
[211] "Freedom to host governments to choose projects" (Interview, Senior Official, MEA, 2016).
[212] Interview, Former Senior Official, MEA, 2016.
[213] One former ministry official (Interview, 2016) gave another example stating: "(At the end of the day) the decision was the host governments … (and) no way could we impose … but in the end, we are suggesting solutions (for them to consider)".
[214] Particularly made around the time of the India-Africa Forum, 2015 (Interviews; Journalist, senior research (ORF), academics; 2016; Dye 2016a).
[215] Interviews; Senior Official, ExIm Bank; official, MEA; 2016.
[216] DeFreese 2016.
[217] Chaudhury 2018; Shekhar 2018.
[218] Chaudhury 2018.

2005-2014 period. Notably, the MEA's database does not catalogue projects by country or sector and one official acknowledged that there is "no deliberate (geographical or sectoral) policy or allocation"[219] of LoCs. This point is reinforced by few loan rejections: The Ministry of Foreign Affairs "doesn't refuse (LoCs) frequently", even when project reports are inadequate as "our endeavour is to accept and if problems, work with (the partner government to sort them out)"[220]. One ExIm official even labelled the approval stages as "tick boxes". Thus, this research finds that the process does not involve critical appraisal or questions about what India should be building, or whether projects will achieve the aims of solidarity and development rhetorically invoked at India-Africa governmental meetings.

The Private Sector's lead in Lines of Credit: "If Columbus discovered America, it is not his fault"[221]

This left Indian companies and African governments as the primary agents forging concessional credit agreements' content. A group of entrepreneurial infrastructure firms, previously unheard-of in India, further demonstrate this role. Angelique International, Overseas Infrastructure Alliance, Lucky Exports and Jaguar Overseas, collectively secured 19% of all ExIm finance from 2003-2014[222], despite having little to no international or Africa experience, or any well-established Indian operations. This appears to stem from companies actively seizing the opportunity offered by Lines of Credit, as captured by the above sub-heading's quote. Another company official described: "(We) entered Africa when people did not even think about it as a big opportunity…we revealed the potential of Africa 10 years before anyone else did"[223]. Their strategy involved presenting themselves to governments and negotiating project MoUs knowing that ExIm credit could then secure finance. Besides their aggressive pursuit of projects, another

[219] Interview, Senior Official, ExIm Bank, 2016.
[220] Interview, Senior Official, MEA, 2016.
[221] Interview, Senior Official, Angelique, 2016.
[222] Iyer 2015.
[223] Interview, Senior Official, Angelique, 2016.

commonality is that these four firms "evolved as general platform companies rather than having specific core competencies"[224]. This meant they were flexible in bending to the priorities of African governments, but simultaneously inexperienced at handling large development projects. Furthermore, all four are small and privately owned, avoiding timely shareholder transparency requirements, and enabling quick decision making[225]. Private ownership can also increase the ease of corruption, an accusation often levelled at this group of firms after they became a significant news story just before the 2015 India-Africa Forum[226]. Indeed, some interviewees asserted that "(these) companies ... are enriching their own pockets"[227]; "corruption (is) enmeshed"[228], "unsavoury practices were gaming the system"[229]. Indeed, arrests were made in 2015, including of individuals associated with Angelique[230]. Nethertheless, the four companies, one starting from just three employees in the mid-2000s[231], have risen to compete with established infrastructure firms such as BHEL and Shapoorji Pallonji.

The example of Angelique International and BHEL

Angelique International best exemplifies this phenomenon and is additionally analysed given the company's role in furthering India-Rwanda relations through the Nyabarongo Dam. Angelique has claimed the largest share of ExIm LoCs of any company, securing 17% of the total value of LoCs with 69 projects[232]. This represents a remarkable rise for the family firm. Angelique International started life in the 1990s following India's liberalising and internationalising economy. It engaged in ExIm-Bank LoCs before the IDEAS scheme and reputedly learnt to appreciate the "niche where other companies don't want to go"[233], for instance, supplying goods to post-war,

[224] Interview, Senior Researcher, RIS, 2016.
[225] Interviews; Senior Official, Angelique; Journalists; 2016.
[226] Iyer 2015.
[227] Interview, Senior Foreign-Affairs Researcher, 2016.
[228] Interview, Senior Foreign-Affairs Researcher, 2016.
[229] Interview, Senior Official, ExIm Bank, 2016.
[230] The Economic Times 2015.
[231] Interview, Former Chairman, 2016.
[232] Iyer 2015.
[233] Interview, Senior Official, Angelique, 2016.

UN-controlled Kurdistan. Angelique increasingly turned to infrastructure projects, including acting as a contractor for a Myanmar dam and the aforementioned Afghan-Friendship Dam. Unsurprisingly then, the company recognised the significance of the IDEAS LoCs scheme. They used an agent to "facilitate meetings" with governments in Africa to identify potential projects, then sent 'business people' to negotiate with the additional offer that "if it is not funded, we can go to government of India (for an ExIm loan)". In line with the other quickly rising firms, Angelique's officials recognised advantage in their versatility; in "not (being) a single product company". Angelique was therefore able to grow so quickly because its jack-of-all trades model allowed it to pitch for a wide range of infrastructure projects. This aggressive drive led to Angelique soliciting for Nyabarongo Dam. Significantly, this project is the company's first experience as a primary contractor for a major infrastructure project, not to mention first time leading civil works on a large dam. Thus, Angelique was learning the skills of project management on the job, with limited previous technical engineering knowledge or experience of mitigating socio-environmental impacts.

In contrast, BHEL, the other company in Nyabarongo Dam, arrived passively on the project. "India's heavy engineering giant"[234] was created post-independence as a parastatal conglomerate to increase India's industrial capacity and ensure domestic manufacture of power generation, transmission and distribution products. Whilst its core focus continues to be domestic, BHEL's small international operations[235] have led to its first experiences of project management in electricity-plant construction. It has built thermal electricity-generation plants in Sudan[236], Niger[237], Ethiopia[238] and two in Libya[239], often with ExIm Bank loan support. However, rather than being an active facilitator, BHEL's involvement in Nyabarongo Dam was arguably inevitable given

[234] FIDC and RIS 2015, 75.
[235] Typically contributing under 10% of the company's revenue.
[236] $350 million; 4x125MW(FIDC and RIS 2015).
[237] Plant rehabilitation(FIDC and RIS 2015).
[238] 2x 12MW Biogas Plant (FIDC and RIS 2015).
[239] Tripoli West (2x130Mw plant extension); 4x150 Al Gabi (FIDC and RIS 2015).

the company's essential monopoly on producing electro-mechanical parts[240] and the Indian content requirements in ExIm loans. Because of its relative reputation and marginally-greater management experience, Rwanda's civil servants then demanded BHEL's placement as Nyabarongo's overall project manager.

Thus, this analysis demonstrates that India did not actively choose hydropower. Rather the ambition of Rwanda, Angelique's entrepreneurship and the Indian state's broad desire for closer Africa relations jointly-spurred finance and construction. This case therefore speaks to the importance of recognising the agency of African governments, the multiplicity of actors involved in any project and the lack of central planning and coordination in India-Africa relations.

In Focus: India-Rwanda Relations

India-Rwanda relations further demonstrate these themes. Rwanda opened a chargé d'affaires office in India in 1998, upgrading to full ambassador level in 2005. Only in 2018 is India set to reciprocate, with its Ugandan embassy previously covering Rwanda. Piecemeal ties markedly changed with the Nyabarongo Dam. Subsequently India has given grants for training, a demonstration centre and solar panel project[241], as well as a second Line of Credit, worth $100m, for an irrigation project. Partly because of the initiative to station a representative from the Rwandan Development Board in Mumbai, a beeswax manufacturer has invested in Rwanda, the Mahatma Gandhi University has opened a campus and a healthcare company started a medical training scheme with a view to opening a future hospital[242]. Angelique and Overseas Infrastructure Alliance also operate as contractors in the country, winning Rwandan-government transmission-line construction tenders. Moreover, an Indian investor set up Novel energy which engages in small energy projects including a micro-hydro plant[243].

[240] Supplying all of India's large dam projects (Interview, Senior Official, BHEL 2016).
[241] MEA database, Accessed April 2016.
[242] Interview, Rwandan Government Official, 2016.
[243] Interview, Novel Energy, 2016.

At a higher level, President Kagame visited India on the invitation of FICCI in 2009 and attended business summits in 2014 and 2015. The Prime Minister of Rwanda attended the 2008 and 2011 India-Africa Forums, with Kagame attending the grander 2015 meeting. Additionally, Rwandan Ministers of Finance, Agriculture and Infrastructure made official visits from 2006, the year when Nyabarongo Dam discussions started[244]. These often took in trade fair events such as the CII-ExIm Bank Conclave. Following this lead, Indian ministers visited Rwanda including the Ministers for External Affairs and for Agriculture. More recently in February 2017, India's Vice President led a delegation to Kigali that agreed MoUs on a planned Nyabarongo II Dam. These relations illustrate wider patterns in India-Africa relations. They show the importance of Indian companies in initiating ties and forging closer proximity. Additionally, business federations feature heavily. Moreover, the stronger agency of Rwanda's politicians and its state agencies contrasts with a relatively passive, albeit importantly enabling, Indian state.

Conclusion

India's engagement in hydropower and Rwanda is not therefore the product of grand thinking, either from corporations or the government. Increased activity by firms and the state was supported by the post-1990s economic liberalisation and context of increased economic growth[245]. As highlighted throughout this section, the agency of companies and their business federations were paramount in India's 'going out', establishing commercial operations and international government links. However, the constrained Indian state did play a crucial role in enabling both companies and concessional infrastructure finance. Its engagement with Rwanda and dams stemmed from foreign policy motivations to enhance cooperation with Africa. For the government, the key value of these relations is not their content, but their ability to enhance diplomatic ties, potentially enabling India's global governance agenda at the UN, WTO and

[244] Chapter 5.
[245] D'Costa 2010.

elsewhere. Narlikar[246] argues this approach is 'softer' than China's, amounting to a 'Delhi consensus' where much activity originates beyond the state in the private sector and diaspora. This leads to a more horizontal integration into African economies, utilising local firms, labour and supply chains rather than relying solely on imports. Beyond certain key sectors such as oil or diamonds, Delhi's foreign policy position tends to be focused on increasing diplomatic and economic relations in Africa, asserted through the discourse of South-South Cooperation with its emphasis on horizontal, mutually-beneficial relations.

Thus, neither dams, nor specific countries, are the focus. Projects need only meet technical standards and tick required boxes of Indian content and sovereign guarantees. Indian involvement in the Nyabarongo Dam stemmed primarily from the actions of Angelique, acting in a broader context of advancing India-Africa relations. Therefore, the Indian government primarily cares about a project's existence, not its geography, impact, or implementation practices. This not only affects the financing of dams. The process for loan approval in particular does not mandate impact assessments or force standards upon projects, leaving this to African governments. Significantly, this helped the rise of inexperienced companies with little track record of socio-environmental mitigation or even engineering and project-management skills. Indeed, even if the approval process included such elements, the likelihood of India critically appraising dam infrastructure is arguably remote. This is because, as Chapter 1 analysed, India has its own large dam building programme whose planners in the Ministries of Power and Water Resources appear to preference irrigation and electricity over impacts on livelihoods, culture and ecologies in the country's periphery[247]. The same line Ministry appraises the social, environmental and developmental impacts for IDEAS-ExIm dams. Whilst this context appears to be shifting under

[246] Narlikar 2010b; Narlikar 2013.
[247] Baviskar 1995; Roy 1999.

Modi, Chapter 5 analyses how this played out in Nyabarongo Dam, and whether Narlikar's predicted positives of a more horizontal 'Delhi Consensus' were realised.

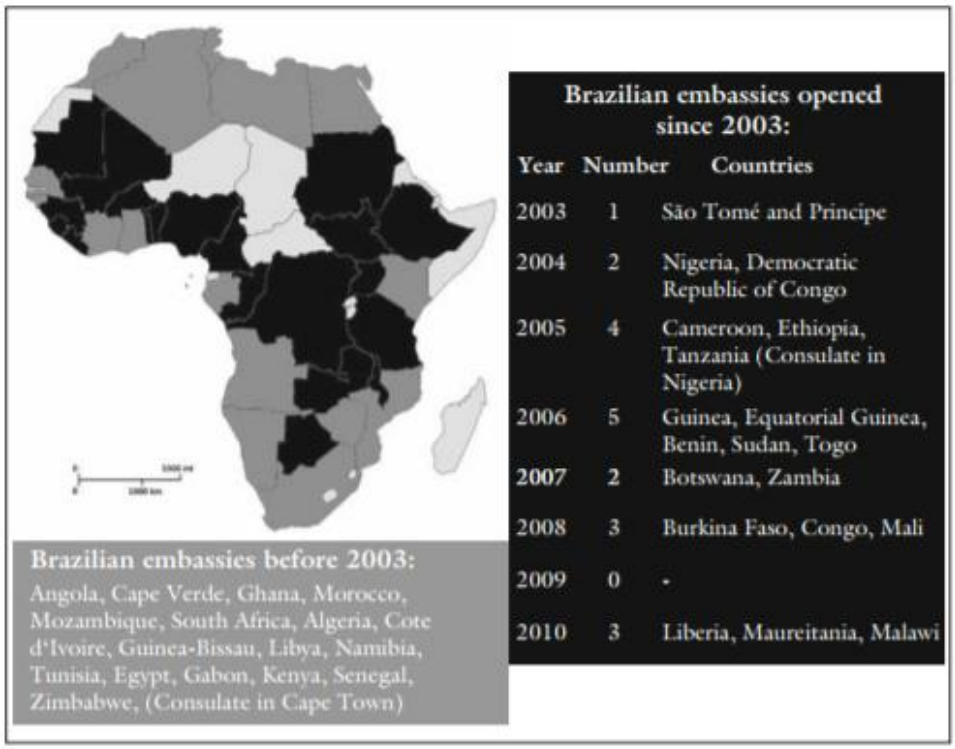
III: Brazil in Africa
The Iron-Triangle Behind Dam Building

The 2003 Transformation

In contrast to India's decades-long trajectory and relatively institutionalised foreign policy position towards Africa, incoming President Lula da Silva of Brazil's Workers Party (PT) generated a significant step-change in diplomatic, economic and development cooperation activity in Africa, albeit one that began to decline after his 2010 departure. Given the thesis' case-study of the Stiegler's Gorge Dam, this section especially focuses on the years 2006- 2013, the boom in Brazil-Africa relations and in construction-companies' activity, particularly that of Odebrecht.

Diplomatic Offensive

Lula's inauguration almost immediately marked a step-change as he took the unprecedented step[248] of holding his first post-inauguration diplomatic meeting with assembled



Brazilian embassies opened since 2003:

Year	Number	Countries
2003	1	São Tomé and Principe
2004	2	Nigeria, Democratic Republic of Congo
2005	4	Cameroon, Ethiopia, Tanzania (Consulate in Nigeria)
2006	5	Guinea, Equatorial Guinea, Benin, Sudan, Togo
2007	2	Botswana, Zambia
2008	3	Burkina Faso, Congo, Mali
2009	0	-
2010	3	Liberia, Maureitania, Malawi

Figure 14 Source: Stolte, 2015, p.94

[248] Unprecedented for a Brazilian President.

Country	Number of Visits	Year of Visit
South Africa	5	2003, 2006, 2007, 2010
Mozambique	3	2003, 2008
Angola	2	2003, 2007
Cape Verde	2	2004, 2010
Ghana	2	2005, 2008
Libya	2	2003, 2009
Nigeria	2	2005, 2006
São Tomé and Principe	2	2003, 2004
Algeria	1	2006
Benin	1	2006
Botswana	1	2006
Burkina Faso	1	2007
Cameroon	1	2005
Democratic Republic of Congo	1	2007
Egypt	1	2003
Gabon	1	2004
Guinea-Bissau	1	2005
Equatorial-Guinea	1	2010
Namibia	1	2003
Kenya	1	2010
Senegal	1	2005
Tanzania	1	2010
Zambia	1	2010

Figure 15 Brazilian presidential visits to Africa, 2003-2010 (Source: Stolte, 2015, p.95)

African ambassadors[249]. Brazil's aggressive acceleration is noticeable in the number of embassies opened in Africa, moving from 17 in 2005 to 37 in 2010 (see Figure 14), thereby overtaking the UK's total on the continent[250]. Moreover, during Lula's 2003-2010 Presidency, 520 official government-to-government agreements were signed[251] and Lula himself visited 29 countries on 12 trips[252] (see Figure 15), whilst Foreign Minister Celso Amorim, visited 33 countries[253]. New, high-level conferences furthered these significant diplomatic efforts. Lula instigated the Latin America-Africa Summit and its inaugural 2006 meeting involved 66 heads of state[254], with senior ministerial events following in 2009, 2013[255] and 2016. An ECOWAS-Brazil Summit was also held and relations with South Africa strengthened through the inauguration of the India-Brazil-South Africa group, now largely subsumed under the BRICS[256]. Within Brazil's Foreign Ministry, known

[249] Reported by official present at the meeting (Interview, Senior Official, Itamaraty, 2016).
[250] Stolte 2012; Carmody 2013; Alves 2013.
[251] Itamaraty Official Africa-Department Statistics.
[252] Stolte 2012, 1.
[253] Itamaraty Official Africa-Department Statistics .
[254] Stolte 2015.
[255] Stolte 2015.
[256] Marcondes and Mawdsley 2017.

as Itamaraty, job incentives boosted the number of diplomats working in Africa[257]. In sum, this represented a significant diplomatic offensive, a far-reaching extension of high-level political relations, capacity and representation. Africa became a cornerstone of Brazil's foreign policy.

Economic Links

Such political ties echoed increased economic activity. Large Brazilian corporations, generally in extraction or construction, began or expanded operations in Africa, particularly between 2007-2015. Notable examples include Petrobras, previously reputed to be the largest company headquartered in the Southern hemisphere. Its investments in Africa doubled between 2007 and 2012, with major operations in Angola, Algeria and Libya and exploration investment elsewhere, including Tanzania[258]. Another prominent firm is Vale, formerly regarded as the world's second largest mining-commodity firm[259] with operations including Liberia, Zambia, Mozambique and Guinea-Bissau. Equally important are construction firms, the most significant of which are listed in Figure 16. 19.8% of contracts in Brazil's construction industry originated overseas, with

TABLE 6.1 Selected Bra :prises in Africa by name, industry and destination country

Adeco Agropecuária	Sugar and ethanol	Mozambique
Andrade Gutierrez	Construction	Algeria, Angola, Cameroon, Equatorial Guinea, Libya, Mauritania and Republic of the Congo
Aquamec Equipamentos Ltd	Water treatment	Angola
Camargo Corrêa	Construction	Angola, Morocco, Mozambique and South Africa
Vale	Mining and metals	Angola, Guinea, Mozambique and South Africa
Marcopolo S.A.	Bus manufacture	Egypt (joint venture with a national enterprise, GB Auto S.A.E.) and South Africa
Medabil	Construction materials	Angola
Odebrecht	Diversified, but mainly construction	Angola, Botswana, Djibouti, Gabon, Liberia, Libya, Mozambique, Republic of the Congo and South Africa
Symnetics Management	Consultancy	Angola
Volkswagen Caminhões	Minibus manufacture	South Africa
Weg S.A.	Electromechanical	Algeria, Angola, Botswana, Cameroon, Côte d'Ivoire, Democratic Republic of the Congo, Ghana, Guinea, Kenya, Mauritania, Morocco, Mozambique, Namibia, Niger, Nigeria, South Africa, Togo, Tunisia, Zambia and Zimbabwe

Source: Barbosa et al. (2009)

Figure 16 Source: Carmody 2013, 120

[257] The Africa Department was joined with the Middle East (Stolte 2015).
[258] Stolte 2012, 5. Although Petrobras has scaled back operations significantly, selling concession including in Tanzania.
[259] Carmody 2013, 124.

Africa the second highest source and hydropower, the third largest activity[260]. Brazilian state finance was a key enabler for these companies, especially for the construction firm Odebrecht, at the time the largest in Latin America[261]. From 2003-2007 state-owned Banco de Brazil advanced lending but was limited by the government's official budget[262]. With political pressure overturning initial caution[263], from 2007 BNDES (the Brazilian Development Bank) largely took over this role[264], using its London office to add finance independently of the government budget and Brazil's social security fund[265]. BNDES lending for exports to Africa markedly increased from US$149million in 2007, to $778million in 2008, then settling to a somewhat lower rate[266] but amounting to an accumulated $2billion invested by 2012[267]. Odebrecht was by far its largest recipient, receiving US$7.9 of $12.6billion domestic and international infrastructure loans[268]. A rarity among these extractive-focused activities is Marcopolo, a bus firm now starting to manufacture parts in Zambia.

Evidently then, Brazil-Africa economic relations have experienced a step-change: Trade rose from $4.2billion in 2000 to a peak of $27.6billion in 2011, a six-fold increase between 2005 and 2015[269]. However, this activity is concentrated in extraction and construction. Oil dominates trade[270] along with commodities, together making 90% of Brazil's imports from Africa. Moreover, geographically 60% of Brazil's Africa trade involves just four countries[271]. With state support, Brazilian businesses have therefore rapidly increased trade and investment in Africa, albeit to a lower level than that achieved by India or China.

[260] Measured by project contracts.
[261] Alencastro 2018.
[262] Interview, Journalist, 2016.
[263] Interviews; Brazilian Academics and Journalists; 2016.
[264] Interviews; Journalist; Senior Officials, BNDES; 2016.
[265] BNDES' lending primarily uses this fund (Interview, Senior Official, BNDES, 2016).
[266] Stolte 2012, 7 (e.g. $446million in 2011).
[267] Carmody 2013.
[268] Alencastro 2018.
[269] Stolte 2015.
[270] de Freitas Barbosa, Narciso, and Biancalana 2009.
[271] Alves 2013.

Growing Development Cooperation

The final area of significant enhanced activity between 2003 and 2010 is development cooperation. Statements in this field include debt relief for African countries of between $897.7million[272] and $1billion[273], increasing scholarships for Africans to 4500[274] and efforts to lead international peacebuilding in Guinea-Bissau[275]. The budget for Brazil's Development Cooperation Agency, ABC, situated under Itamaraty increased significantly under Lula with total development cooperation spending[276] moving from $120million in 2006 to $1.2billion in 2010[277], with projects generated around the continent (see Figure 17). Carmody[278] argues that this made Brazil the largest South-South donor in 2010, notable for Africa as it received 60% of the ABC's budget[279]. Much of Brazil's development activity exports successful domestic programmes. For instance in agriculture, a key area of Brazil-Africa relations, the country's policies moved it from a net food

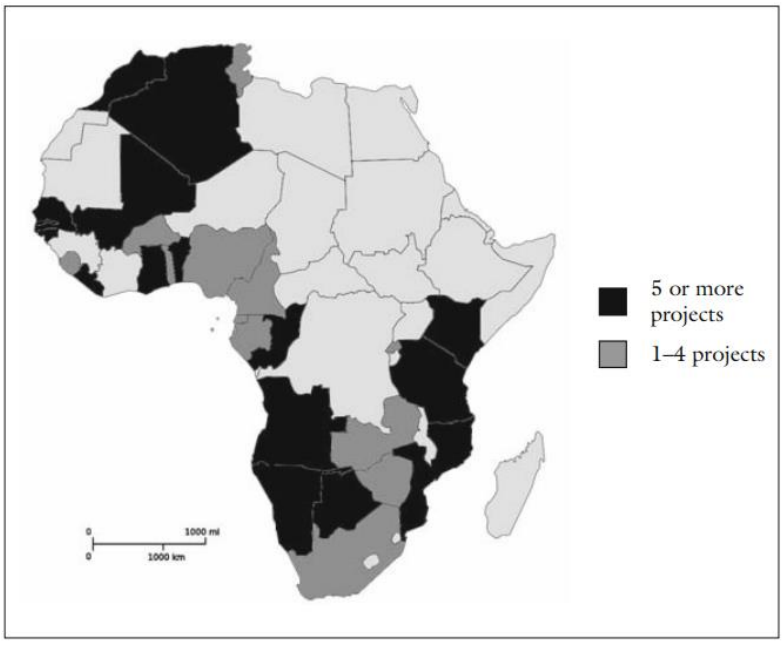


Figure 17 The geography of Brazil's development cooperation projects in Africa (Source: Stolte, 2015, p.110)

[272] de Renzio et al. 2014.
[273] Stolte 2012.
[274] Stolte 2015.
[275] Abdenur and Marcondes 2014.
[276] A figure including other government departments.
[277] Although this is disputed; see Carmody 2013, 127.
[278] Carmody 2013.
[279] Alves 2013; Stolte 2015.

and drink importer in the 1970s to one of the world's biggest exporters in the 2000s[280]. One agricultural initiative aims to develop cotton production in West and East Africa, using money from a WTO settlement. The Eastern Victoria Cotton scheme is the larger, based in Tanzania and including Rwanda and Uganda. Using Brazilian organisations, machinery and knowledge, it will involve training alongside infrastructure construction and a demonstration centre.

Within a decade therefore, Brazil concretely scaled-up its development activities in Africa, becoming a major player comparable with the other emerging powers on the continent. However, its explicit aim to share Brazil's public policies, distinguishes its development cooperation from the other emerging powers and indeed suggests deviation from a purely recipient-led South-South Cooperation template. In comparison to India, there was far stronger attention on Brazil's 'model'. As one senior diplomat stated, it was "easy to be Brazilians at this time"[281] as the country's state interventionism[282], GDP growth and poverty reduction[283] generated much international interest.

Recent Stagnation, Lavo Jato and Brazil's Political and Economic Crisis

The incoming PT government therefore initiated a step-change in Brazil-Africa ties. However, whilst the thesis' research design dictates focus primarily on Brazil-Africa's upturn, it is important to recognise recent decline. The intensity of ties already lessoned under Lula's successor President Dilma Rousseff and were further dented by a change in government in 2016[284]. In diplomatic terms, the intensity lessoned partly because of Dilma's apparent personal disregard for foreign policy[285]. The budget for development cooperation halved by 2012[286]. However, Dilma's tenure did not mark a total retreat. Within the first year, she made three visits

[280] Thaller 2013.
[281] Interview, Official, Itamaraty, 2016.
[282] Mello e Souza.
[283] Stolte 2012.
[284] Marcondes and Mawdsley 2017; Interviews, Brazilian Academics and Journalists, 2016.
[285] Marcondes and Mawdsley 2017: Interview, Senior Official, Itamaraty, 2016.
[286] Stolte 2015, 159.

to the continent[287], amounting to 6 over five years[288] and in addition her Foreign Minister kept-up an international presence, making trips abroad on average every two months, including to Africa[289]. Moreover, commentators tended to agree that Dilma's government followed the same broad policy framework as Lula, especially in support for corporate internationalisation[290], albeit that she had reservations about this policy and particularly Odebrecht's position[291]. Whilst Dilma attempted to relaunch Brazil's Africa policy in 2013, positing a new trade and development cooperation ministry[292], an economic and political crisis engulfed Brazil from 2014 and stalled such efforts.

The end of the commodity super-cycle sparked this economic crisis, but on top of that came revelations of corruption schemes involving the state oil firm Petrobras, construction firms, large infrastructure projects including dams like Belo Monte[293], and politicians in the PT government and elsewhere[294]. This created a profound political crisis. The investigation of these vast corruption schemes, nicknamed Lava Jato, has imprisoned key elite figures from across the political spectrum and private sector, including construction bosses such as Marcelo Odebrecht[295]. This 'mega-scandal' furthered the economic crisis and stalled Brazilian politics. Evidence of Brazilian corruption in African projects further stymied political and corporate will. Allegations included bribery in Angola and Mozambique[296], and Lula has himself been convicted for receiving kickbacks for supporting companies like Odebrecht to secure domestic and international projects[297]. These events lessened popular support and the government's capacity for Africa

[287] Stolte 2012.
[288] Marcondes and Mawdsley 2017.
[289] Itamaraty Official Africa-Department Statistics, Cited May 2016.
[290] Carmody 2013; Interviews, Brazilian Academics and Journalists, 2016.
[291] Alencastro 2018.
[292] Interviews, Brazilian Academics and Journalists, 2016.
[293] Poirier and Millikan 2015.
[294] Watts 2017; Marcondes and Mawdsley 2017.
[295] Watts 2017; Felter 2017.
[296] Lewis and Brooks 2017.
[297] Dom 2017; Cowie 2018.

relations. Corruption was also alleged in BNDES' international lending[298]. The change to a right-wing government in 2016 further compounded the retreat of foreign policy generally, and towards Africa in particular.

Overall, this period demonstrates that, to a degree, Brazil's Africa surge was dependent on the global commodity boom's entailed economic prosperity [299], that this enabled an internationally-focused President and internationally-expansionist companies. Moreover, analytically this recent episode exposes the limited embeddedness of Brazil-Africa relations and the degree to which the engagement is government-and even President-led. However, stagnation and crisis have not entailed complete withdrawal[300]. President Michel Temer's first Foreign Minister indicated in an inaugural speech that Africa would be a continuing focus for government, although alongside Europe and America[301]. Brazil-Africa ties thus appear settled at a lower intensity compared to the Lula period. The following sections will analyse the drivers and content of the post-2003 emergence before turning to specific consideration of Brazil's dam building in Africa.

Why the Africa Focus?

The PT

Why then did the PT government take on such a strong Africa Focus? One answer lies in Brazil's black movement. Because of the slave trade's legacy, Brazil hosts the largest African-origin population outside Nigeria. A black movement rooted in this community aims to 'decolonise' Brazil, seeking social and economic equality and greater engagement with the country's African heritage[302]. This includes increasing relations with Africa, recognising Brazil's debt to Africa from

[298] Hanlon 2016; although not concretely proven.
[299] Paulani 2007.
[300] Marcondes and Mawdsley 2017.
[301] Marcondes and Mawdsley 2017.
[302] Interview, Senior Official, Itamaraty, 2016.

the slave trade[303] and the presence of African cultural influences[304]. The black movement is a key constituent in the coalition of PT support[305] and so its ideas gained traction within the party. Another constituent of the PT are leftists interested in moving from a US-dominated[306] "unipolar world order"[307] to a multipolar order with greater prominence for Global South countries. This group asserts that "centripetal forces" are causing a shift with "the relative weakening of economic dynamism (in the North compared to) higher economic-growth rates in what were 'peripheral' areas" of the Global South. To react and further this new reality requires a "very strong valuing of relations with Africa"[308]. This was supported by PT's historic connections with third world parties like the MPLA and ANC[309] and Lula's background as an international union leader. Collectively, this meant that foreign policy, and within that Africa relations, were central to the PT government.

Itamaraty and its Goal of Great Power Status

Many in Itamaraty therefore welcomed Lula's arrival. This is rooted in diplomacy-circles long-held "self-perception of Brazil as an important actor destined for a more central international role"[310]. Different theories posit how to realise this apparent destiny. One argument, advocated by Celso Amorim and echoing the leftist position outlined above[311], argues that a multipolar world order and greater South-South partnerships will grow Brazil's power[312]. Ties with Africa are important here, given Brazil's often fractured relationship with South American countries[313]. Therefore, according to Stolte, this group saw Brazil's "neighbouring continent as a stage to

[303] de Freitas Barbosa, Narciso, and Biancalana 2009; Stolte 2015.
[304] Interview, Senior PT Government Official, 2016.
[305] Interview, Senior Official, Itamaraty, 2016.
[306] Contrasting with President Henrique Cardoso's close support for the USA.
[307] Senior PT Government Official (de Freitas Barbosa, Narciso, and Biancalana 2009; Interview, Former Senior PT Official, 2016).
[308] Interview, Senior PT Government Official, 2016.
[309] Personal correspondence, Mathias de Alencastro, 2018.
[310] Hurrell 2000, 2.
[311] Interviews, Journalists and Researchers, 2016.
[312] Hurrell 2010; Interviews; Former Senior Official, PT Government; Senior Official, Itamaraty; 2016.
[313] Stolte 2015, 56.

demonstrate its credentials for Great Power Status"[314]. Illustrating this, one senior figure stated, "when Lula came in, (it was) a very good coincidence, a convergence of views"[315] (referring to Itamaraty and PT interests in Africa). Despite convergence with PT's agenda then, for Itamaraty the goal was not solidarity but soft power[316] to advance a multipolar agenda and achieve powerful positions in global institutions. For instance, recently "Brazil has been elected as the head of the WTO and FAO with African and Latin American votes"[317] and the ultimate "obsession of Brazilian Foreign Policy"[318] from the 1970s[319], is a permanent UN Security Council seat[320].

These ambitions influenced Itamaraty's Africa engagement. For instance, one senior diplomat explained that choices over high-level visits were informed by "my interests, the security council for instance". Similarly, for opening new embassies, whilst Portuguese-speaking and Atlantic-bordering countries were selected first, two senior diplomats suggested that a country's status in international fora mattered. Explaining the decision to open the Tanzanian embassy for instance, one senior diplomat stated that the motivation came from their foreign policy leadership, a "conscious(ness) that these are important countries"[321]. Specifically, he referenced Tanzania being on the Security Council in 2005-2006 and membership of the G15 developing-country group leading on WTO meetings. Others also described considering a country's diplomatic status. For instance, one official stated "Tanzania is a big country in East Africa… a leading country (in terms of population, size and as) … they have 60 embassies here in Dar, if you want to have a presence in Africa, you have to be here (in Dar es Salaam)"[322]. Another also mentioned the pre-existing role of Petrobras as well as the fact "Tanzania was on the Security Council"[323]. Thus, as

[314] Stolte 2015, 7.
[315] Interview, Former Senior Official, PT Government, 2016.
[316] Interviews, Academics, 2016; Alves 2013, 3.
[317] Interview, Journalist; Also mentioned in Interviews; Academics, Senior Itamaraty Diplomat, Itamaraty Official; 2016.
[318] Interview, Journalist, 2016.
[319] Interviews, Academic, 2016.
[320] Hurrell 2010; de Freitas Barbosa, Narciso, and Biancalana 2009.
[321] Interview, Former Senior Official, PT Government, 2016.
[322] Senior Official Itamaraty, 2016.
[323] Senior Official Itamaraty, 2016.

"PT didn't know which countries (to engage with)", established and capable interest groups like Itamaraty influenced the nature of the government's Africa-relations push alongside corporations like Odebrecht.

Corporate Drive: The Iron Triangle

Arguably, the key actors in Brazil-Africa relations, and in the country's international dam building, are large corporations. Their prominence partly stems from internationalisation of Brazilian business being a key pillar of PT's national development policy. Domestically, the 'Brasilia model' involves interventionist state capitalism, albeit in a new permutation (labelled by some economists as "Leviathan as Minority Investor"[324]). Rather than nationalising firms, government financially supports key industries and individual "national champion" companies[325]. For instance, capitalisation through BNDESPar[326] supported major construction companies Odebrecht, Andrade Gutierrez, Camargo Correa and Queiroz Galvão[327]. Additionally, BNDES provided export loans from 2007 and diplomats lobbied on behalf of companies expanding in Africa[328]. As stated in the influential industrial policies of 2008 and 2011[329], internationalization was therefore part of Brazil's economic and foreign-policy plan. Thus, alongside, "a narrow political (foreign policy) goal of securing a key position within the emerging global architecture …. (Brazil adopted) a more pragmatic goal of promoting the expansion of Brazil's economic interests in Africa"[330]. As Campos argues, "assisted by ample state support and favouritism, (the national champions) expansion occurred … where Brazil's foreign policy was able to operate with greatest force"[331]. For instance, Brazil strategically sought greater recognition of biofuels as an international energy commodity.

[324] Musacchio and Lazzarini 2014.
[325] Pinheiro Costas 2012; Casanova and Kassum 2014; Musacchio and Lazzarini 2014.
[326] Subsidiary of BNDES.
[327] Pinheiro Costas 2012.
[328] Pinheiro Costas 2012.
[329] de Renzio et al. 2014; Interview, Interview, Former Senior Official, PT Government, 2016; Both policies explicitly state an Africa focus (The World Bank and IPEA 2012).
[330] Alves 2013, 37.
[331] Campos 2015, 159.

Seeing potential in Africa, the government pushed Brazilian biofuel-technology exports to the continent[332] and supported individual projects like the Odebrecht-managed biofuel plantation in Angola.

Although PT brought newfound intensity, such policies were not without precedent. Construction firms, and Odebrecht especially, had strong links with the Brazilian state that grew particularly under the military dictatorship[333] (1964-1985). In this era, the state also sought to strengthen and internationalise national champion companies. Thus, such firms are Brazil's foremost companies ("construction is what Brazil does well"[334]), with the capital, capacity ("the best people, best lawyers"[335]) experience and technical ability to take on government ambitions for enhanced Africa relations[336]. Odebrecht is the premier example. 40.2% of its contracts[337], and in 2010 70% of its revenue[338], came internationally, compared for instance to just 4.6% of competitor Queiroz Galvão's contracts[339]. As demonstrated by the Lava Jato corruption revelations, Odebrecht had arguably the closest relations with the Brazilian government since being "chosen by the military regime", according to one commentator because of extensive corruption schemes involving heavy kickbacks for leading politicians[340]. Moreover, evidence about Odebrecht's offshore 'corruption department', officially called the 'Department for Structured Operations'[341], shows international replication of close governmental relations in Angola, Mozambique and elsewhere. This was especially true in Angola, where its early arrival during the civil war secured Odebrecht unparalleled status with the ruling party. One diplomat suggested that in the 2000s, "Marcelo (Odebrecht, the CEO) was more important than the (Brazilian)

[332] Thaller 2013.
[333] Campos 2015; de Freitas Barbosa, Narciso, and Biancalana 2009.
[334] Interview, Journalist, 2016.
[335] Interview, Journalist, 2016.
[336] Interviews; Academics; Official, Itamaraty; 2016.
[337] Campos 2015.
[338] Official communicated Odebrecht statistics, 2016; de Freitas Barbosa, Narciso, and Biancalana 2009.
[339] Campos 2015.
[340] Interview, Journalist, 2016: Alencastro 2018.
[341] Lewis and Brooks 2017.

ambassador"[342], an opinion borne out by stories of the company supporting Angola diplomatically[343]. Angola also demonstrates Odebrecht's former capability, as it had a diverse portfolio, from diamond mining to the Nosso supermarket chain[344], that made it Angola's largest employer with some 30,000 people[345].

Such capability and closeness to power at home and abroad led Campos to conclude that the big construction firms, and especially Odebrecht, guided "domestic policy and at the same time the country's international agenda"[346]. Key corporations like Vale and Odebrecht were the experienced Brazilian actors in Africa. With close and corrupt relations to the Brazilian state, they were able to use diplomatic support and concessional finance to pursue profitable opportunities on the continent during the 2000s commodity super-cycle,. Indeed, de Alencastro[347] and Campos[348] argue that Odebrecht's experience and contacts meant that PT turned to them alongside other large companies to help achieve their foreign-policy agenda, particularly in Angola where Odebrecht had a powerfully ingrained position.

This analysis suggests Brazil's support for its major corporations abroad reflects a domestic iron triangle[349], where 'national champion' policies support profit seeking, creating a circle of mutually beneficial political and corporate agendas lubricated by corruption. Thus, one senior interviewee commented that although the PT government's Africa drive originated in political ideals, "(commercial and foreign policy agendas) are the ones who could apply (the Africa vision) … (they came) to surf the wave. The original thoughts disappeared and (Brazil-Africa

[342] Interview, Journalist, 2016.
[343] E.g. Odebrecht reportedly helped thaw USA-Angola relations through brokering Angola's observer status at the Organization of American States in 1991 (Interview, Official, Itamaraty, 2016).
[344] Seifert 2016; Stolte 2015.
[345] Carmody 2013.
[346] Campos 2015, 160: This echoes increasing private sector foreign-policy influence from the 1980s (Doctor 2017).
[347] Alencastro 2018.
[348] Campos 2015.
[349] Chapter 1.

relations) became a very conservative (agenda)"[350]. Thus, Brazil's powerful corporate interest groups, with pre-existing operations, knowledge and the most capability to implement, pushed the Africa drive and shaped its aims and activities. Brazil-Africa relations are thus the product of the "ideational side (of PT) with the deep interests of Brazilian capitalists"[351]. As analysed below, this is key to Brazil's dam building.

South-South Cooperation: "For every African problem there is a Brazilian solution"[352]

As well as pushing Africa relations, groups within PT like the black movement shaped Brazil's rhetoric; the use of affective language emphasising South-South Cooperation and a "diplomacy of solidarity"[353] was a key element in Lula's foreign policy[354]. Like India, this does rationalise some of Brazil's policy positions. For instance, Brazil often asserts itself as a "champion of the South"[355] at trade[356] and climate negotiations[357]. Illustrating this in action, one former senior diplomat[358] described a WTO conference in which an African-block representative stated that Brazil could speak for them in a smaller working-group meeting. Furthermore, this official asserted that in Itamaraty "we have a view that our presence is better than (to) … isolate a country". Thus, he explained Brazil's preparedness to engage with Gambia's President Yahya Jammeh (1996–2017) or Zimbabwe's Robert Mugabe (1980-2018): "It is not our way of doing things, isolation, we think the best thing is to promote dialogue"[359]. Like India, these ideas rationalise the limited conditionality of BNDES' international loans. Until 2014, these deals only focused on export

[350] Interview, Senior Official, Itamaraty, 2016.
[351] Interview, Academic, 2016.
[352] Saying of Foreign Minister Celso Amorim.
[353] de Renzio et al. 2014, 9; Narlikar 2010a.
[354] Marcondes, Kim, and Mawdsley 2017.
[355] Interview, Journalist, 2016.
[356] Hurrell and Narlikar 2006.
[357] Hurrell and Sengupta 2012.
[358] Interviewed 2016.
[359] Interview, Former Senior Official, PT Government, 2016; Here dialogue referred to holding discussions with opposition parties in Zimbabwe and elsewhere.

content, not the project which Brazilian services or equipment contributed to[360]. Consequently, the social and environmental impacts of infrastructure such as dams were absent from the decision-making process. Even after the 2014 regulatory changes, procedures demanded impact assessments from the Brazilian companies rather than recipient government and do not include rigorous monitoring or site visits[361].

However, just as with China and India, South-South Cooperation is also contentious. For instance, Brazil's international dams have come under critique. The first Brazilian and Odebrecht-built dam in Africa is Capanda in Angola. It was approved in 1982, started construction in 1987 but was only completed in 2004 thus leading some to label it a white elephant[362]. Odebrecht, along with Rafael Correa and BNDES' finance, produced another dam on the San Francisco River in Bolivia, controversial because the dam wall failed[363]. Arguably the most contentious impact in Africa is in Tete Province, Mozambique. Vale, dubbed the World's worst corporation by Public Eye in 2013[364], experienced local protest, partly because they employed Filipino workers[365], but mostly owing to their displacement compensation scheme. Amanda Rossi's investigation[366] found it involved arbitrary categorisation into rural and semi-urban groups, which were then relocated to separate new villages. This categorisation and relocation split families, misunderstood livelihoods, and moreover, new locations did not replicate the farming conditions or social services of former settlements. State-supported Brazilian companies therefore appear to be replicating past exploitation and long histories of extraversion[367] and dependency[368] in Africa. This impression is

[360] Interviews, Senior and mid-ranking Officials, BNDES, 2016.
[361] Interviews; Senior and mid-ranking Officials, BNDES; Journalists; 2016.
[362] Garcia and Karina 2015.
[363] Pinheiro Costas 2012; Casanova and Kassum 2014.
[364] Carmody 2013, 125.
[365] Later resolved through a local training centre (Carmody 2013).
[366] Rossi 2015.
[367] Bayart and Ellis 2000; Cooper 1981.
[368] Taylor 2014.

reinforced by the dominance of oil, minerals and construction in trade, illustrated by the statistic that 78% of Brazil's Africa investment involves Odebrecht, Vale, Petrobras and Itaú Unibanco[369].

Corporations promoted and financially supported by the Brazilian government under South-South Cooperation rhetoric have engaged in corruption, in projects with poor construction quality and practices seemingly disregarding and mis-understanding social and environmental impact. Indeed, whilst early speeches and actions seemed focused on technical cooperation and the export of Brazil's emerging socially-redistributive agenda, that grand vision was bent to dovetailing foreign policy and corporate interests. As one senior diplomat argued, "If you look at the first speeches … the first ones are authentic (with ideas of Brazil-Africa's history and empowerment from the black movement) … (Later on, it is clear that the) agenda has been hijacked"[370]. Thus the "sense of solidarity never materialised … it stayed in the rhetoric"[371]. Indeed, one journalist[372] stated that in an interview with them, Lula asserted that Brazilian companies are key to the South-South agenda: When asked about the strong corporate and extractive-industry content of Brazil-Africa ties, he argued that "he was happy when (Brazilian) companies succeed (in Africa and that they) … should replace European Countries (as) … Brazilian Companies could put in place solidarity ideas (as he) believed they were ethical". As one interviewee phrased it, rather than a "brother" to Africa focused on poverty-reducing development projects and implying benevolence and equality, this suggests a "rich cousin", frequently exploitative and with their own interests in mind[373].

[369] Alves 2013.
[370] Interview, Senior Official, Itamaraty, 2016.
[371] Interview, Academic, 2016.
[372] Interviewed 2016.
[373] Paraphrased from Interview with Journalist, 2016.

The Nature of Brazil-Africa Relations

The Governmental and Presidential Lead

This analysis demonstrates the degree to which the PT government led Brazil-Africa relations. They aggressively pursued diplomatic ties, provided significant corporate support and pushed development cooperation. The prominent role of high-level delegations reinforces this point. Such trips were central to agreeing cooperation projects and extending Brazilian business. Prior to visits, "potential areas of cooperation … (were identified, then) matchmaking (was) essential"[374]. Thus, diplomats and ministers would introduce relevant Brazilian agencies and companies to counterpart authorities. One senior official remembered such a trip to Ghana, where his counterpart explained "we have this project, we (Brazil) say, we have this company … (and) the eyes of the guy become bright". Numerous participants[375] and commentators[376] highlighted the importance of these trips, for instance "in Africa (starting with the) government very essential … the business environment is not easy and talking to the government is a way to find a good business partner … (this is especially true in) infrastructure (which) usually needs an initial kick-start from (the Brazilian) government … need a lot of networking ... (so) when we (the Brazilian government) present a company, it helps a lot"[377]. One company confirmed the key role of such high-level visits and introductions, stating that MoUs are achieved through such trips[378]. The stronger governmental role in initiating and not merely enabling public and private sector activity contrasts with India's lack of presidential leadership and government capacity. Brazil's limited policy embeddedness, as demonstrated by the decreasing importance of Africa relations through presidential transition from Lula to Dilma and now Temer, also contrasts with India's consistency. For Brazil however, this has precedent.

[374] Interview, Former Senior Official, PT Government, 2016.
[375] Interviews; Senior and mid-ranking Officials BNDES; Officials, Itamaraty; 2016.
[376] Academics, Journalists, 2016.
[377] Interview, Senior Official Itamaraty, 2016.
[378] Interview, Journalist, 206.

Historical Precedent: The Era of Responsible Pragmatism

In Brazil, foreign policy direction has long shifted from President to President. The period of 1961-1964 saw the first serious engagement with Africa[379], with the opening of 6 embassies, 4 consulates and a 1961 trade tour[380]. A foreign-policy retreat then lasted until 1974, when Brazil responded to the international oil crisis by initiating a foreign-policy era of 'responsible pragmatism', in which Brazil sought to diversify oil imports and internationalise its strong construction and manufacturing industries[381]. Thus, Itamaraty rhetorically stressed the importance of Southern ties and developed relations with Iraq, Venezuela and Angola[382]. Right-leaning military rulers consequently became the first country to recognise the Soviet-leaning MPLA regime in Angola, before its Russian backers[383]. Odebrecht then began business in Angola, building the Capanda Dam with Brazilian finance[384]. This followed the responsible-pragmatism era's national champions policy entailing close ties to construction firms and support of their internationalisation, also illustrated by Odebrecht initiating offices in Chile and Peru[385]. Foreign policy shifted towards the West under democratic governments from 1985, but South-South Cooperation persisted albeit as a lower priority, with technical cooperation institutionalised in the ABC, created in 1987, and internationalisation supported through an expansion of BNDES' operations[386]. Thus, to an extent, the Lula era represented a return to past periods of engagement in Africa.

The Broader context for Brazil-Africa

As with India, the global economic context also enabled Brazil's Africa policy. The government's ability to extend credit and expand diplomatic and development-cooperation

[379] Ioris 2014.
[380] Alves 2013.
[381] de Freitas Barbosa, Narciso, and Biancalana 2009; Stolte 2015.
[382] Campos 2015; de Freitas Barbosa, Narciso, and Biancalana 2009.
[383] Seifert 2016; Interview, Former Senior Official, PT Government, 2016.
[384] Garcia and Karina 2015; Casanova and Kassum 2014..
[385] Casanova and Kassum 2014.
[386] E. J. Willis 1995.

spending was supported by a historic period of commodity-backed growth[387]. Moreover, beyond tax receipts, the rapidly growing economy underpinned the self-confidence of the Lula era and the PT's redistributive model. Additionally, it enabled private sector investment: Brazil, for the first time, recorded outward investment equalling inward in 2006[388]. Diplomatically too, the push to Africa should be recognised as an important element in a wider South-South agenda that saw 77 new embassies open[389], efforts to strengthen the South American intergovernmental organisation MERCOSUR and a push to create the Brazil-Russia-India-China group. Just as with the other emerging powers therefore, greater Africa relations have a contemporary and a historic context.

Brazil in Tanzania

Turning to the relevant thesis' case-study country, and as a useful example, how does Brazil's recent re-engagement with Tanzania fit with this analysis of Brazil-Africa relations? Brazil opened an embassy in Dar-es-Salaam in 2007, and following this, Foreign Minister Amorim and President Lula made separate trips in 2010. Underlying, its agency in advancing diplomatic and economic ties, Tanzania quickly reciprocated sending its Foreign Minister in 2010, Prime Minister in 2011 and President Jakaya Kikwete in 2012. Largely due to these high-level visits, economic and development cooperation activities have been established (see Chapters 4 and 7). Petrobras had a somewhat longer-standing presence in Tanzania[390] and was joined by Odebrecht, who signed agreements to implement Stiegler's Gorge, and Queiroz Galvão, who have similarly developed the Mnyera Hydropower Project. Additionally, the Brazilian embassy arranged small development cooperation projects and the larger Victoria Cotton scheme (described above)[391]. The opening of

[387] Paulani 2007.
[388] de Freitas Barbosa, Narciso, and Biancalana 2009.
[389] Stolte 2015.
[390] Petrobras sold their concessions after Brazil's economic crisis and corruption scandal.
[391] Interviews, Senior and mid-ranking Officials, Itamaraty, 2016.

an embassy, active diplomacy and high-level visits therefore played a key role in these initiated development cooperation and dam/infrastructure projects in Tanzania.

The decision to choose Tanzania is surprising given Brazil's concentration on Lusophone and Atlantic Africa, and the limited prior Brazilian activity in Tanzania. However, analysis here suggests the PT's Africa drive was not reactive, but rather premised on the idea of the state's ability to forge governmental and corporate relations. Moreover, as analysed above, Itamaraty saw Tanzania as an important actor for its global governance aims, a role acquired under the prominent first President, Julius Nyerere, and his position in the Non-Aligned Movement. Additionally, precedent exists in the 'responsible pragmatism era' which saw mutual embassy openings[392] and a Brazilian financed and constructed highway, for which Tanzania continues to owe debt[393]. Thus, Tanzania-Brazil relations[394], arguably illustrate Brazil-Africa ties, particularly beyond Lusophone countries. They were forged by high-level visits bringing development cooperation and investment agreements, furthered by Itamaraty's interest in strategic foreign-policy goals and shaped by Brazilian corporations' pursuit of extractive and infrastructure-building opportunities.

Brazil as a Dam Builder in Africa

Given the degree of state-directed foreign policy, Brazil's presence as an Africa dam builder is not, as in the case of India, merely due to private companies meeting the ambitions of governments in Africa. In fact, Brazil's Itamaraty explicitly promotes dam building as its energy department places hydropower construction as its second aim after biofuel promotion[395]. Indeed, other interviewed officials in the PT government and Itamaraty confirmed a general aim of promoting hydropower alongside other 'developmental' competencies. Thais dovetails with the

[392] In Dar-es-Salaam, 1982-1991.
[393] Interview, Tanzanian Diplomat, 2016.
[394] Further analysed in Chapter 7.
[395] Interview, Senior Officials Itamaraty, 2016.

national champions policy that promotes the construction companies who constitute Brazil's major dam builders. Also reflecting a wider theme of this analysis, Brazil's international dam building extends domestic policies. Brazil engaged in a large dam building programme during the arguably high modernist military regime of the 1970s (e.g. Scott's analysis of Brasilia[396]). This programme was reasserted in the 2000s with Dilma as an Energy Minister pursuing projects like Belo Monte and dams on the Tapajos river (Chapter 1). Domestically then, the federal Brazilian government is a major dam builder, and the country hosts globally-significant dam-engineering companies of which Odebrecht is the largest.

The actors building dams in Africa therefore replicate those domestically. This also applies to finance; since the sector's privatisation, state banks, most prominently BNDES, fund dam construction domestically and BNDES replicates this internationally. Brazil therefore hosts a

COUNTRY	PROJECT (STATUS)	(TOTAL CONTRACT) GENERATION CAPCITY	COMPANY
DEMOCRATIC REPUBLIC OF CONGO	Inga III (Stalled, needs financing)	(Estimated $14Billion) 4,800 MW	Electrobras in consortium bid for tender
MOZAMBIQUE	Mphanda Nkuwa Dam (Stalled)	(Estimated $4.2billion) 1,500MW	Consortium of Camargo Corrêa, Electrobras and Mozambique Agencies
	Moamba Major Dam (Suspended pending investigations of corruption)	($466/$320million from BNDES) 15MW plus water and irrigation supply	Andreas Gutierrez
TANZANIA	Stiegler's Gorge Dam (Active planning)	(Estimated $4.2billion) 2,100 MW	Odebrecht
	Mnyera Hydropower Project (Active planning)	$700million	Queiroz Galvao
GHANA	River Oti (Funding redirected)	-	Odebrecht with Andreas Gutierrez
ANGOLA	Lauca (Functioning)	($4.3 billion) 2,096MW	Odebrecht-Led
	Capanda (Functioning)	($4billion) 130MW	Odebrecht-Led
	Cambambe Expansion (Functioning)	(Estimated $512million) 700-MW	Odebrecht-Led

Figure 18 List of dams with Brazilian engagement

[396] Scott 1998.

capable, politically-powerful dam industry and a bureaucracy supportive of hydro-power in what amounts to an iron triangle, where companies and government benefit from implementation of socially and environmentally contested dams[397]. Whilst the author knows of little proven evidence for corruption in African dam building specifically, the entanglement of these actors suggests that regulatory authorities in Itamaraty, BNDES and the Ministry of Energy support dams as developmental and have mutual interests in seeing their construction.

In Africa (see Figure 18), the most notable completed project is the Lauca Dam which, at 2,096MW, is one of Africa's largest. Odebrecht constructed Lauca and BNDES financed it alongside others[398]. Odebrecht sees the dam as exemplary, inviting international media to view the site and displaced people who are supported with compensation and a livelihood restoration scheme[399]. Whilst not independently evaluated, the scheme suggests Odebrecht's adoption of dam reforms and mitigation practices, but perhaps more pertinently, strong projection of corporate social responsibility, findings of importance for Chapter 7's Stiegler's Gorge Dam. In Angola, Odebrecht also recently completed the aforementioned, Capanda Dam and refurbished the Cambambe Dam. In Ghana, a high-level visit reportedly initiated Odebrecht's involvement with Andrade Gutierrez on a proposed dam on the river Oti, although Ghana's government redirected this BNDES loan to a road project[400]. BNDES also extended $320million for the Moamba Major Dam in Mozambique, with construction led by Andrade Gutierrez[401]. Electrobras, the state-owned electricity conglomerate, further illustrates the export of Brazil's hydropower model. Itamaraty's Energy Department is most active in supporting its engagement in renewables and hydropower, the latter being Electrobras' primary generation technology[402]. However, thus far, Electrobras' success is

[397] McCormick 2010; Fearnside 2014.
[398] Seifert 2016; Capi and Viana 2016.
[399] Interview, Journalist, 2016.
[400] ESI Africa 2009.
[401] Global Construction Review 2016.
[402] Interview, Senior Officials Itamaraty, 2016.

limited as it is involved in the stalled Mphanda Nkuwa Dam in Mozambique and stagnant Inga III in the Democratic Republic of Congo[403].

Conclusion

Overall then, Brazil's dam building echoes the country's wider foreign-policy boom and bust with Africa. Although idealists in the PT called for a vision of South-South brotherhood and development cooperation, stronger, primarily commercial, interest groups with greater capability have shaped this foreign policy's realisation, making the outcome of Brazil's Africa ties markedly corporate; following the country's strong construction and extractive industries. This conclusion contrasts with the more foreign policy-centric Brazil-Africa literature[404]. Thus, the vision for greater Africa ties initially pushed by the wider PT movement, changed with implementation. Dam building is just one such area. It primarily derives from the influence of Odebrecht and other construction firms in the Brazilian state and their capability to utilise mutually supporting political agendas. Corporate agency was not alone however, as Itamaraty shaped Brazil-Africa's implementation. In Tanzania for instance, strengthening relations fulfilled Itamaraty's aim to engage countries with global governance influence and to support internationalisation of Brazil's industries, including in dam building. These state and corporate interests fed off each other, with diplomatic initiatives and high-level delegations enabling the spread of companies.

However, the limited success of Brazil's dam-building beyond Angola, also demonstrates the fragility of Brazil-Africa relations, as does temporal concentration between 2007[405] and 2012[406]. Following Brazil's history, Lula's Africa policy had limited institutional embeddedness and therefore changed radically with new Presidents and an economic downturn. Echoing the restricted extent of Brazil's presence on the continent, its dam builders are often unable to

[403] Interviews, Journalist, 2016.
[404] Personal correspondence, Mathias de Alencastro, 2018.
[405] The year in which BNDES started major international lending.
[406] After-which Dilma's preference and the economic and political crisis brought decline.

negotiate the challenging context of infrastructure building in Africa, a theme demonstrated in Chapter 7. Analysis here also highlights how Brazil has exported its questionable developmental social-environmental impacts to Africa. As dams fulfil the various agendas shaping the Brazil-Africa drive, and in-line with South-South Cooperation, diplomatic support and financial approval for dams does not interrogate their developmental impact. This arguably follows frequent acceptance or oversight by successive Brazilian governments of the trade-offs entailed by dams, particularly when concerning the country's Amazonian periphery.

IV: Summary

In analysing Indian and Brazilian Africa relations, the chapter demonstrates many of the first section's themes. Both countries' governments adopt South-South Cooperation rhetoric in their Africa relations, asserting the principles of equality, mutual benefit and demand-led engagement. Whilst this arguably has some influence in rationalising lower conditionality in concessional finance, these ideals contrast with at least some instances of questionable socio-environmental impacts, corruption and cooperation projects with limited or negative developmental impact. Additionally, the chapter has demonstrated India and Brazil's desire to reform rather than abolish systems of global governance, seeing closer African relations as a key strategy to realising that goal. Whilst finding some similarity, the chapter also demonstrates contrasts between India and Brazil's Africa engagements. In particular, India's relatively sluggish diplomacy[407] differs from the stronger presidential role of Brazil. Equally the extent to which Africa relations are embedded as a foreign-policy priority in India, contrasts with the politically fragile and temporally-limited engagement by Brazil.

However, the chapter's key contribution to the thesis is to explain the motivations and actions of India and Brazil's dam builders. Overall, research finds Indian and Brazilian government support for dam building in Africa as an unintended outcome of a political aim to broadly increase Africa relations. This is in-turn rooted in more materialist drivers that are diplomatic, concerned with furthering international status and influence, and about boosting domestic companies. High modernism, although present in rationales and practices of both countries' domestic dam building (Chapter 1), therefore does not seem a significant factor driving their Africa policies. The other key group of actors in Brazil and India's dam building are entrepreneurial and capable construction companies. In both countries, they drove the wave of international-relationship building,

[407] Which may be changing.

advancing arguments for subsidised credit and shaping governmental policies towards mutually-compatible dams and infrastructure building. In the process, this fulfils the ambitions of African governments. The chapter therefore stresses the importance of considering the agency of such private sector actors and recognises the role of governments in Africa, although subsequent chapters demonstrate this further. Significantly then, developmental outcomes are not the primary goal for either India or Brazil's corporations or foreign ministries. Rather, these key actors seek profits and foreign-policy aims respectively. Stemming from this, and the principles of non-interventionist South-South Cooperation, governments and financing institutions do not closely examine developmental impact or socio-environmental outcomes, rather expressing openness to the desires of African governments.

Chapter 3

Why is Rwanda Building Dams?: 'Meta-unrealism' in the Megawatt Mission

Rwanda, after suffering state and societal collapse in the 1994 genocide, has experienced rapid developmental change under the Rwandan Patriotic Front[1] (RPF). As Jones states, "the reconstruction of an average state in Africa would be impressive, this is extraordinary"[2]. Particularly since their election in 2003, the RPF has advanced big visions for wholescale transformation, imagining a technologically-advanced, modern future. In line with this rapid reconstruction and development programme, the government has orchestrated significant electricity generation building, with overall on-grid capacity moving from 39.95MW[3] in 2003, to over 200MW today (see Figure 19). Electrification (electricity-grid extension) has also seen marked change, rising from 6% of households connected in 2009[4] to 24% in 2017[5].

This chapter analyses the increase in installed electricity generation capacity (henceforth 'generation'). Specifically, the chapter examines Rwanda's energy transformation, asking why the country is undertaking large-scale dam building. Hydropower is the most turned-to energy-generation technology historically, as Figure 20 demonstrates. Moreover, although all domestic sources are being pursued in the present generation surge, hydropower will remain the dominant technology in the near future[6].

[1] The RPF were coalition leaders in the interim government (1994-2003) and elected governments post-2003.
[2] Jones 2012, 232.
[3] Although the majority of plants at this time were non-functional.
[4] Ministry of Infrastructure, Republic of Rwanda 2009.
[5] The World Bank 2017b.
[6] Figure 20 shows hydro-plants dominance in installed generation capacity, but they also constitute the largest number of individual projects (appendix 3).

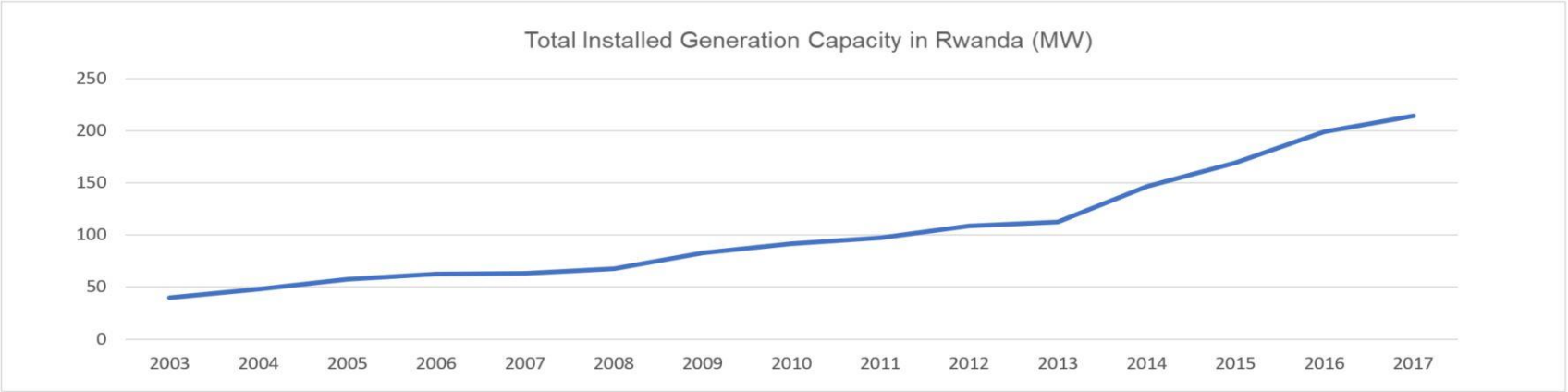


Figure 19 Demonstrating the significant increase in capacity under the RPF (Source: Author using Ministry of Infrastructure (Mininfra) statistics)

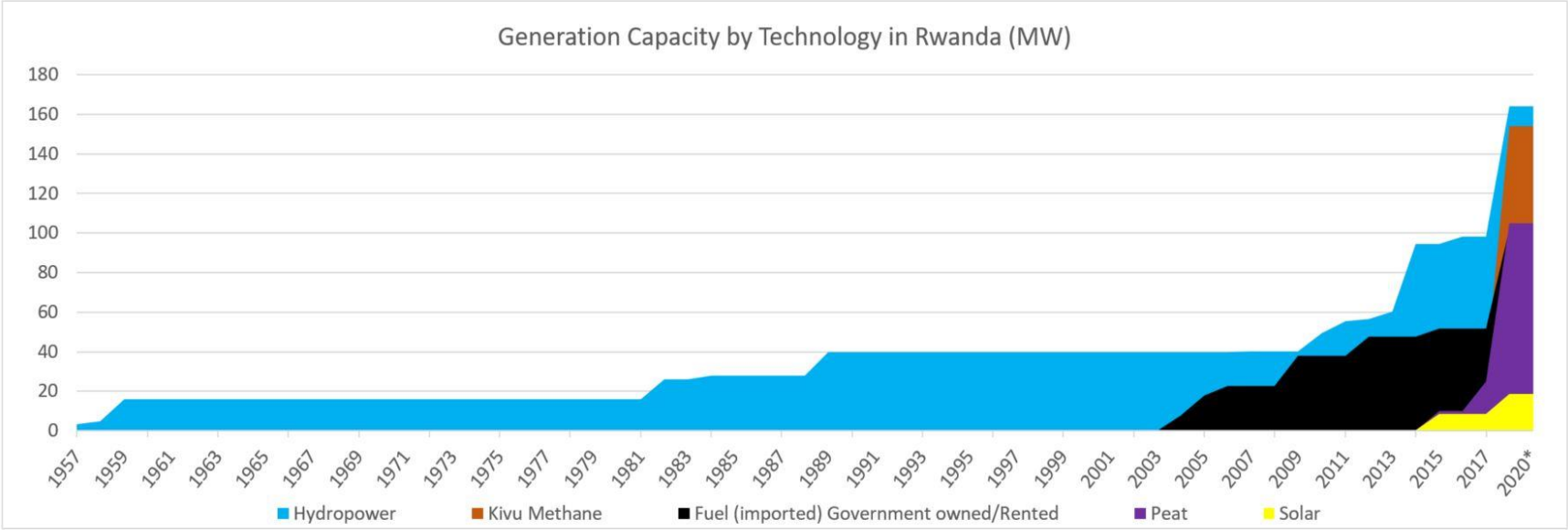


Figure 20 Depicting hydropower's long and continued dominance in Rwanda's energy generation (Source: Author using Mininfra statistics)

This prominence is controversial given that Chapter 1's discussion of the dam debate questions the infrastructure's economic efficacy[7]. Furthermore, many of the social and environmental impacts of dams are pertinent to Rwanda. This chapter therefore analyses energy-sector planning to unpick the factors behind, and the short-sightedness of, Rwanda's electricity planning and dam building. Consequently, it addresses the thesis' questions about *why* the resurgence of hydropower is taking place, but also about processes of dam planning and implementation. The chapter therefore foregrounds case studies of Rusumo and Nyabarongo Dam. Central to the chapter's analysis is the presence of high modernism in the ruling party's development vision, discourse and policies. It justifies the empowerment of experts and influences degrees of blindness to more critical appraisals of the demand for electricity, financial risks and of the economic, environmental and political impacts of dams. However, introducing the evidence for the thesis' theory of bricolage, the chapter also examines Rwanda's adoption of reformist dam building policies, namely involving environmental regulation, and the ideational and materialist factors behind this.

This analysis requires a close focus on the strategies, visions and political power of the Rwandan government and so the chapter starts by reviewing the polarised academic debate on the regime. It then examines the RPF's modernising statebuilding project and the key tenants of this development vision that lead to Rwanda's megawatt mission. Consequences of the energy boom are then assessed to demonstrate the narrowness of the government's focus in choosing hydropower and constructing singular generation capacity targets. Through this close examination of the state, the chapter asserts that alongside ideology, strategies to maintain the regime's political power, to secure international and internal legitimacy and to achieve economic growth, figure as drivers of Rwanda's dam building bricolage. They explain its degree of reformist practices and centralised, often *invisiblising* knowledge production and policy making. In addition to its

[7] Ansar et al. 2014.

main role in advancing the thesis, this chapter contributes to the polarised debates praising or dooming Rwanda because of its political economy and illiberal governmentality. The chapter details apparent developmental progress in Rwanda including poverty reduction, economic growth[8] and infrastructure construction[9]. But analysis here also reveals the narrowly-focused implementation culture and pyramidal decision-making entwined in delivering that progress. Additionally, in contributing to the debate on high modernism in Rwanda, the chapter refutes commonly asserted descriptions of the state as static and unyielding[10]. Rather, in line with the thesis' theory of bricolage and nuancing of Scott's[11] work, it also evidences instances of flexibility, learning and reform.

The Literature Debate

Analysis of Rwanda's dam building necessitates a close understanding of the RPF regime, its development visions, policy-making and materialist and ideational drivers. This requires engagement in the notably polemic debate which marks academic literature about Rwanda's politics and development[12]. On one side sit academics[13], journalists[14] and consultants[15] who praise its fast-paced transformation, signified by a post-1994 GDP growth rate of over 6% (except in 2003 and 2013)[16], and its deregulated, investment environment, as demonstrated by its ranking as 2nd in Africa's 'ease of doing business' index[17]. Moreover, Rwanda appears to be an adopter of global best practice, for instance in gender equality[18] or inclusive social policies from universal primary education to the Girinka (one-cow-per-poor family) scheme[19]. It has also reduced absolute

[8] Ansoms 2009; Ansoms 2013.
[9] Booth and Golooba-Mutebi 2012.
[10] E.g. Newbury 2011.
[11] Scott 1998.
[12] Fisher 2015.
[13] Kelsall 2013.
[14] Jeff 2009; Dagan 2011; CNN 2009.
[15] Campioni and Noack 2012; Crisafulli and Redmond 2012.
[16] Behuria and Goodfellow 2016, 3.
[17] Crisafulli and Redmond 2012, 23.
[18] Rwanda has the highest number of women MPs (Debusscher and Ansoms 2013).
[19] Purdeková 2012, 200.

poverty[20]. Clark's nuanced academic work[21] highlights meaningful attempts at genocide reconciliation, including the village-level Gacaca Courts[22]. Another academic analysis by Booth and Golooba-Mutebi[23] deconstructs Rwanda's market-friendly label using the neopatrimonialism thesis to highlight the government's role in stimulating economic activity[24]. The government uses party and military-owned investment companies to create and grow business in perceived strategic sectors, from mobile-phone networks to coffee and tea[25]. The investment firms also enable centralisation and tight control of 'rents'[26] stemming from such economic activity, allowing for their productive reinvestment rather than self-enrichment[27]. Kelsall[28] consequently argues that, to some degree, this economic management requires a centralised and somewhat authoritarian regime.

Another school of thought contests this positive appraisal of Rwanda, highlighting, elite-enrichment, violence and human-rights violations to critique the regime. Leaders of this thinking such as Reyntjens[29] characterise President Paul Kagame as a dictator suppressing the people in favour of a narrow, Tutsi-dominated elite. Countering the narrative above, this school paints the RPF and military's corporate investment as elite enrichment[30], attempts at reconciliation as enforced coercion[31], and anti-genocide laws as politically repressive[32]. Moreover, this school tends to describe developmental achievements as the "illusion of success"[33], pointing to growing

[20] The World Bank 2015. Additionally, Ansoms and Rostagno (2012) provide detailed analysis of rural poverty achievements and their limitations and inequalities.
[21] Clark 2011.
[22] Village-level courts tried lower-level genocide participants, allowing a degree of public acknowledgement and locally-defined justice.
[23] Booth and Golooba-Mutebi 2012.
[24] Also analysed through the political settlements framework: Behuria 2015; Behuria 2017.
[25] Behuria 2015; Behuria 2016; Behuria and Goodfellow 2017.
[26] Rents broadly defined as excess, unusually high returns that require little investment to maintain profits.
[27] Kelsall 2013.
[28] Kelsall 2013.
[29] Reyntjens 2013.
[30] Reyntjens 2013.
[31] Thomson 2013.
[32] Waldorf 2011.
[33] Reyntjens 2013, XVI.

inequality[34]. Typically, the RPF's "political, economic and social engineering" is alleged to follow the "high modernist ambitions and tactics theorised by Scott"[35]: Rwanda in this narrative, follows a top-down, unresponsive process of development focusing on the implementation of an elite vision, based on a binary idea of 'modernity' and rejection of the 'traditions' of the mass of Rwandan society[36]. The school is most characterised by its assertion that such injustice, repression and reliance on support from only a narrow elite make the RPF's downfall inevitable:

> "Rwanda's dangerously flawed political governance not only risks destroying the achievements of technocratic/bureaucratic governance, but that it also engendered large-scale structural violence. Straddling the African rift valley, the metaphor that naturally comes to mind about Rwanda is that of a volcano waiting to erupt, thus opening the way for renewed violence, the scale and consequences of which are impossible to predict"[37]

Reconciling the Portrayals: Developmental-Ambitious Statebuilding

These two portrayals seem hard to reconcile. However, the approach followed here[38] presents both appraisals as different sides of the same Rwandan coin. Attempting to distance normative debates about developmental success, human rights and the RPF's flawed governance[39], this analysis uses empirical contributions from both schools to build a more nuanced analysis of Rwanda's contradictions: Its limited but genuine inclusivity, high modernist ideology and adoption of certain global reformist norms and policies. The reconciling approach followed here argues that Rwanda's two faces are the product of the RPF's central statebuilding project. This statebuilding drive took hold with the RPF's ascent to complete power in 2003[40] and

[34] Ansoms and Rostagno 2012.
[35] Straus and Waldorf 2011, 4 (as in Scott 1998).
[36] Huggins 2017.
[37] Reyntjens 2013, XVI–XVII.
[38] E.g. Behuria 2015; Behuria and Goodfellow 2017; Goodfellow 2014; Jones 2014; Mann and Berry 2016; Chemouni 2016.
[39] Also following Klingebiel et al. 2016; Kelsall 2013, 123.
[40] From 1996-2000 the President was from a moderate-Hutu political party in coalition with the RPF. First election 2003; Mann and Berry 2016.

was enabled by the party's total victory at the end of the genocide and civil war which offered an extraordinary moment to redefine Rwanda's future[41].

Rwanda's Statebuilding Drive

Vulnerability and Legitimacy

The importance of this statebuilding mission to the regime is partly rooted in strategic concerns about *vulnerability* and of the need to build internal and external *legitimacy.* Threats to the regime's stability and security continued after the genocide with members of the former Hutu government and army continuing to attack from the Congo[42]. Moreover, Mann and Berry[43] describe a fear among the predominantly Tutsi elite in the RPF that grievances among rural peasants, fostered by previous Hutu-nationalist governments through the 20th century[44], are still widely held. Moreover, and perhaps more importantly, the current governing elite come from an even smaller sub-section of that ethnicity, with roots in urban refugee camps in Uganda and few connections to rural Rwanda[45]. As rulers their key claim to legitimacy rests on a perception that they effectively deliver mass development[46]. Therefore, to garner legitimacy and overcome a context of external and internal threat the regime pursues a rapid statebuilding programme, believing they have only a limited window in which to transform society and prevent a backslide to ethnic violence. The centrality of the statebuilding mission is reinforced by an awareness of the economy's economic and geopolitical position: As Zorbas[47] writes "Rwanda is a poor, landlocked, aid-dependent country with few natural resources (and) unstable neighbours". Indeed, Rwanda is

[41] The absence of opposition and destruction of infrastructure offered a blank slate (Jones, Verhoeven, and Soares de Oliveira 2013).
[42] Jones 2014.
[43] Mann and Berry 2016
[44] Namely based around a narrative that the historically-powerful Tutsi minority exploit the rural and poorer, Hutu rural majority. Such narratives stem from the late colonial period and were propagated under Hutu governments, see Verwimp 2013.
[45] Jones 2014; Van Damme, Ansoms, and Baret 2014.
[46] Mann and Berry 2016.
[47] Zorbas 2011, 103.

among the most globally aid-dependent. In the late 2000s donors contributed 30% of its GDP[48] and 40% of the government budget, the latter moving to 35% in 2015[49]. Economic transformation freeing Rwanda from these structural constraints and external dependence therefore takes central importance[50]. In this context, pursuing a rapid development agenda is also key as it can help maintain donor support. Western aid agencies welcome countries delivering change 'on the ground' and performing development effectively, including through building new infrastructure. This is because development successes help justify their institutions' existence, demonstrating that aid works[51].

Overall then, perceptions of internal and external vulnerability contribute to a belief in the need for a rapid statebuilding drive to create a post-ethnic, economically secure, modern economy and society[52]. It also rationalises tight political control of decision-making (further discussed below), as this maintains the ruling elite's power, but also because such control can support economic transformation. For instance, the political settlements literature suggests that centralising power can stop fragmentation of the elite, enable discipline against wasteful corruption and influence the allocation of economic rents, ensuring returns are largely reinvested in strategic sectors and companies[53].

High Modernism in the Statebuilding Drive

High modernism also appears as a strong presence rationalising the drive, content and characteristics of Rwanda's statebuilding project. A number of academics find high modernist ideas about a vanguard, an enlightened elite bringing progress to backward peasantry, in

[48] Hayman 2009. Note, in response to evidence of Rwanda's sponsoring of Congo militia, donors froze budget contributions in 2013. Demonstrating aid's importance, a 4% drop in GDP growth followed (Behuria and Goodfellow 2016).
[49] The World Bank 2016a, 33.
[50] Recently publicly reiterated by President Kagame (Kagire 2016).
[51] Marriage 2016; Hayman 2009.
[52] Jones 2014; Mann and Berry 2016.
[53] Behuria and Goodfellow 2016.

justifications for Rwanda's centralised decision-making[54]. Hasselskog therefore argues that the RPF's policy vision assumes that universal knowledge can dictate paths to progress, that expertise can dive Rwanda's correct policies, consequently meaning "major development concerns are reduced to technocratic management"[55]. Much of the state's workings are thus projected as apolitical, there to fulfil targets, to implement the pre-decided development plan. Rather than ministers being powerful political appointments and the government conceptualised as a thinker, in Rwanda the state appears more as a tool. Jones's[56] research reinforces this characterisation. He describes an almost parallel structure of significant power lying with a smaller cadre of often military families who founded the RPF in the 1980s in Uganda. This does not suggest the irrelevance of a ministerial government void of power. Rather, it asserts differences between the visible state of organisations and those elites wielding the greatest political influence and deciding core policies[57]. Such analysis leads to a characterisation of much of the visible Rwandan government of ministries and agencies as largely a *technician's realm*, the arena for implementation[58].

This is further demonstrated by Rwanda's strong implementation culture. *Imihigo* performance-target agreements, taken from pre-colonial 'traditions'[59], are the most discussed manifestation of Rwanda's centralised implementation practice. They exist at Cabinet, ministerial, government agency and local government levels, even extending to contracts between village leaders and households[60]. Chemouni[61] and Ingelaere[62], researching local government, demonstrate the way Imihigo centralise decision-making authority and thereby reduce district

[54] Jones 2014; Huggins 2017; Ansoms 2009: Echoing the RPF's Leninist past.
[55] Hasselskog 2015, 161.
[56] Jones 2012, 237; Jones 2014.
[57] Jones 2012; Mann and Berry 2016.
[58] Technicians can contest elites and military institutions but in the context of the implementation but cannot contest the plan itself.
[59] Chemouni (2016) also highlights civil servants' long working-days.
[60] Klingebiel et al. 2016.
[61] Chemouni 2014.
[62] Ingelaere 2011; Ingelaere 2014.

government to an implementation agent. The use of external consultants by the Presidency and ministries to make key policy-enactment decisions in the pursuit of targets, furthers this characterisation of the state-as-implementer. Examples of this include the international recruitment of managers in strategic institutions and companies[63]. For instance, my fieldwork recorded donor-funded 'experts' taking on important policy-implementation roles from Tony Blair's Africa Foundation, GIZ (German Development Agency) and BTC (Belgian Technical Cooperation. Arguably, Rwanda's strategic interest in rapidly achieving development and centralising political power is also important in creating this pressured, target-driven policy-making environment. However, this analysis asserts that high modernist ideas about the ability of the enlightened few to direct the best course of development also underpinned this element of Rwanda's governance practice.

Intertwined here are apparent beliefs contrasting Rwanda's civil servants and leaders with the country's backward, rural majority, a core high modernist binary[64]. For instance, the thesis' fieldwork recorded elite interviewees joking about rural Rwandans, describing the need to modernise their livelihoods and thinking. This binary underpins a belief in the need for a social engineering project to create what Purdeková[65] calls "developmental subjects": "there is literally a government philosophy hinging on ideologies and mindsets rather than resources and aid"[66]. The aim is to create acceptance of the government's development programmes, and therefore of the need to change and reject the past. Therefore, a key focus is on behaviour and the aesthetics of modernity: As Ansoms writes, many rural policies are "concerned with the appearance of poverty, rather than alleviation of the actual experience"[67]. She also describes local authorities issuing fines for being barefoot or part-naked[68], and Newbury analyses the drive to replace thatch roofs with

[63] Booth and Golooba-Mutebi 2012.
[64] Chapter 1.
[65] Purdeková 2015.
[66] Purdeková 2012, 193.
[67] Ansoms 2009, 304.
[68] Ansoms 2009.

costly, but more visually-modern, tin ones[69]. The social engineering project also extends to agriculture. Huggins[70] examines attempts to consolidate farmland, often through the expansion of cooperatives, and introduction of monocropping. This changes the norm of smallholder multi-cropping. Additionally, Van Damme et al.[71] demonstrate attempts to control crop selection, rejecting banana-beer cash-crops that constitute an important income source. Villagisation programmes are another flagship of the RPF's rural agenda. The government wants people to live in Umudugudu, essentially concentrated villages on hills. Newbury[72] focuses on the negative aspects of this change to rural livelihoods[73], and others study resistance to the policy[74], but the author has evidenced a more nuanced reality elsewhere[75].

Regardless, villagisation appears as part of a programme to make the country legible, whether for service provision or political control. As Chapter 5's Nyabarongo Dam evidences, this social engineering project extends across rural Rwanda[76], with new infrastructure projects providing opportunities for its implementation. Development is therefore presented by the state as apolitical with implementation, not debate or critical thinking required: There is a "firm belief in 'the power of planning' and the possibility, desirability and rightfulness of intervening" to transform[77]. As articulated by Mann and Berry's nautical metaphor[78]:

> "At the helm, the GoR (Government of Rwanda) has prioritised developing a class of capable and ideologically committed elites with the skills and networks needed to jump-start the economy and consolidate political legitimacy. In the hull, the GoR pursues massive social engineering with the

[69] Newbury 2011.
[70] Huggins 2014.
[71] Van Damme, Ansoms, and Baret 2014.
[72] Newbury 2011.
[73] Commonly cited issues being the increased distance to fields, which also entailing more theft.
[74] Hahirwa, Orjuela, and Vinthagen 2017.
[75] Dye 2016c: Interviewees residents stated that villagisation also had benefits of more social collaboration and service provision.
[76] Hasselskog 2015; Huggins 2017.
[77] Hasselskog 2015, 101.
[78] Mann and Berry 2016, 130.

aim of creating a 'modern' population with an entrepreneurial spirit, which operates within the rules laid out at the top"

A further demonstration of high modernist influence in the statebuilding drive comes from the plan's centrepiece document, Vision 2020[79], which Chemouni[80] describes as having almost "sacred" treatment. It spells out a path to progress: Rwanda will be a middle-income, urbanised country with a large service sector underpinning its status as a secure business hub for Africa[81]. Perhaps Vision 2020's pinnacle element is the Kigali City Master Plan, which involves transforming the city's slums and informal housing into an unrecognisable Dubai-aesthetic landscape of skyscrapers and shopping malls[82]. Pertinent here is that such ambitions require large energy generation increases. Moreover, they present an updated version of modernity, embracing business hubs and skyscrapers, whilst following an assumption of a linear, technologically-enabled path to progress with similarities to Chapter 1's description of modernisation theory[83].

Limits to a High Modernist Characterisation

Rwanda's statebuilding mission consequently features specific high modernist ideas. This mission's central importance is also entwinned in strategic rationales rooted in a need for legitimacy and the overcoming of political and geographic vulnerabilities. In addition, it is also important to appreciate alternative ideational influences. For instance, Goodfellow[84], drawing on cases of iterative planning and the inclusion of tradition, argues that Rwanda's policy also embodies postmodern characteristics. For instance, the state embraced at least a veneer of tradition by reincarnating precolonial Gacaca courts for genocide reconciliation[85], in Ubudhe[86] and

[79] Ministry of Finance and Economic Planning, Republic of Rwanda 2000.
[80] Chemouni 2016, 186.
[81] Booth and Golooba-Mutebi 2012.
[82] Goodfellow 2014 describes the Kigali plan's politics.
[83] Referring to Chapter 1; Jones, Verhoeven, and Soares de Oliveira 2013, 14–15).
[84] Goodfellow 2017.
[85] Clark 2011.
[86] Poverty orientated community activities.

Umuganda[87] community action days[88] and when designing military codes of conduct[89]. Furthermore, beyond ideational influences, a number of academics stress that the Rwandan state does not simply embody Scott's authoritarian model. Huggins[90], for example, demonstrates that Rwanda's high modernist rural social engineering, rather than enforced through brute authoritarianism, follows a Foucauldian[91] governmentality process conditioning the *biopolitk* through the construction of new social and behaviour norms. Moreover, Behuria[92] argues that there are numerous instances of the Rwandan state learning from policy experiences, demonstrating this with Goodfellow[93] using economic policy examples, including a shift in focus from pure services towards industry and manufacturing. Another example comes from Rwanda's adoption and fusion of development-policies from different states, such as Ethiopia and Singapore[94]. This theme of learning and responsiveness is further analysed below and in Chapter 5 but is significant as it rejects application of Scott's characterisation of authoritarian states as static and unyielding.

Another important ideational nuance is an acknowledgement of the presence of market-led liberal economic policies alongside developmental state interventions. As mentioned above, as part of a strategy of rent control, the RPF and military own and invest in important economic sectors and companies, a policy typical of so-called development states[95]. However, this happens relatively clandestinely[96], with the regime maintaining the rhetoric of private sector support and adopting many liberal market policies[97]. Moreover, Rwanda closely follows many of the 'good

[87] Monthly compulsory community work.
[88] Hasselskog 2018.
[89] Influences being a strong educational focus on the country's history and its non-ethnic pre-colonial military (Jowell 2014).
[90] Huggins 2017, 61.
[91] Foucault 2010.
[92] Behuria 2015.
[93] E.g. Behuria and Goodfellow 2016.
[94] E.g. in creating the Rwandan Development Board (RDB) the government adopted elements of Singapore's development state but alongside market-economy policies (Behuria 2017).
[95] Booth and Golooba-Mutebi 2012; Behuria 2015.
[96] E.g. interviewees in government rarely acknowledged well-known examples of government investment.
[97] Such liberal market policies are instrumental in achieving a high ease of doing business index ranking.

governance' reforms[98] discussed in mainstream global policy-making fora, including on issues like gender equality, care for the environment and climate change. Whilst academic interrogation, for instance on gender[99], demonstrates that such policies can be part veneer, following these globally mainstream social and economic policy themes can garner legitimacy among Rwanda's Western aid donors. However, roots for such thinking are also ideational. Much of the Rwandan elite is internationally educated, and the government is a keen attender of continental and global policy fora[100]. Thus, building on Harrison's post-conditionality thesis[101], it is reasonable to argue that politicians and civil servants have adopted such development policies because of a belief in their ability to deliver development. Therefore, whilst the regime can be characterised as a top-down and centralised state, Rwanda's policy making is open to reforms and is not static or unyielding. Analysis of the energy sector further demonstrates this fusion of influences, dynamism and complexity.

The Megawatt Mission

This analysis of the state underpins the following examination of Rwanda's energy sector and dam building. Assessment here does not contest electricity's developmental importance, or necessarily assert alternatives to the path Rwanda has taken**.** Rather it explains the origins, nature and arguably necessary sanitisation of Rwanda's dam building. Key institutions empowered to implement energy policy are the Energy Division of the Ministry of Infrastructure (Mininfra) and

[98] Meaning the apolitical and technocratic prescription for growth and development exemplified by the work of economist Paul Collier.
[99] e.g. Debusscher and Ansoms 2013 recount Rwanda having the highest number of female politicians globally, but that this doesn't shift the average women's economic or political structural position.
[100] As demonstrated by President Kagame taking prominent roles in the World Economic Forum and elsewhere (Chapter 8).
[101] Harrison 2001.

the nationally-owned electricity utility company, hereby referred to as the Utility as it underwent numerous name changes during the timeline below[102].

First Phase

Policies to build energy infrastructure emerged slowly after the RPF's consolidation of power in the 2000s[103]. Reconstruction and institution building took initial priority. However, a 2003-2004 drought sparked government attention. It exposed the crippled power system and its reliance on hydropower. As demonstrated by Figure 21 and 22, Rwanda's colonial-era hydropower capacity was expanded to by three 1980s hydro-plants. The system had suffered significantly from 1994's violence[104] and been rendered more vulnerable by exploitation of the Rugezi marsh which supplied the main hydro-stations' river[105]. This left Rwanda with just a quarter of its generation capacity after 2000[106]. Commentators of this era expressed consensus that "when you have a (power) crisis like (the one in 2004/5), action is required"[107]. A "scramble for (electricity) resources"[108] then ensued.

The "immediate solution"[109], was to rent[110] and construct[111] thermal power, with diesel and heavy-fuel driven from distant Dar es Salaam or Mombasa. Consequently, these plants are expensive, contributing to electricity tariffs' sharply rising from 17Rwf (per kWh) in 1995 to 112Rwf by 2008. The cost has continued to rise, being at 189Rwf for top rate residential and industrial payers in 2017[112]. According to civil servants in the commerce and infrastructure

[102] The utility's name changed from Electrogaz to RECO (Rwanda Electricity Company) to EWSA (Electricity Water and Sanitation Authority) to REG (Rwanda Energy Group) and subsidiaries EDCL (Electricity Development Corporation Limited) and EUCL (Electricity Utility Corporation Limited).
[103] Hayman 2009.
[104] The Genocide and the civil war, alongside state collapse, entailed no infrastructure maintenance.
[105] Hove, Parry, and Lujara 2011.
[106] African Development Bank Group 2013.
[107] Interview, Former Senior Official, Mininfra, 2016.
[108] Interview, Former Senior Official, Mininfra, 2016.
[109] Interview, Former Official, Mininfra, 2016.
[110] Delivered by UK-based specialists Aggreko.
[111] Government/World Bank financed.
[112] http://www.reg.rw/index.php/our-business/customer-services/electricity-tariff (Accessed 26/5/2017). Conversion rate US$1dollar-836.366RFW

ministries, energy prices are among the main impediments to attracting business, especially as they are now the highest in East Africa[113]. However, megawatt generation, rather than cost, took priority. As one former utility director described; "at the time, had serious blackouts …(so) generators were brought in … that was when the government started putting a lot of emphasis on energy"[114].

Longer term solutions were also initiated. However, a donor-pushed[115] private-sector management of the Utility from 2003[116] and a World Bank-pushed staff cut of 60% frustrated these efforts[117]. The government therefore ended this contract in 2006, bringing the sector back to a megawatt-mission alignment. Hydropower featured prominently[118]. This is partly because of prior preparation of dam projects in the 1980s including feasibility and design studies for Nyabarongo Dam of 28MW (Chapter 5), Rukarara I of 9MW and four micro-hydro sites[119]. Additionally, approximately 100 micro-hydro sites were identified in this decade[120]. Securing finance and contractors for these projects began in 2006. The government also pushed international projects like Rusumo Falls Dam[121], with a cross-governmental Joint Programme Agreement in 2006[122]. Additionally, the BTC supported a micro and pico-hydro study and funded individual hydropower projects along with the GIZ[123] (see Figure 21).

[113] Economic Consulting Associates 2010.
[114] Interview, Former Senior Official, Mininfra, 2016.
[115] Somewhat paralleling Tanzania (Chapter 4).
[116] The contracted management company focused on the Utility's profit, and therefore on tariffs and revenue collection, not on expanding generation. It therefore rejected micro-hydro development (Pohl 2016).
[117] Pohl 2016.
[118] Demonstrated by the number of micro-hydros commissioned from 2011 (figure 20 and 22).
[119] The World Bank and UNDP 1991.
[120] United Nations Economic Commission for Africa 1995.
[121] Chapter 7.
[122] Nile Basin Initiative 2006.
[123] Government of Rwanda, REG, and GIZ 2016.

	Project name	Installed capacity (MW)	Year of commissioning	Ownership	Company	Grant support by
1	Ruzizi I (regional)	3.5	1957	Public	SINELAC	
2	Ntaruka	11.45	1959	Public	REG/EUCL	
3	Mukungwa	10	1982	Public	REG/EUCL	
4	Ruzizi II (regional)	12	1989	Public	SINELAC	
5	Nshili	(0.4)	2012	Public	REG/EUCL (out of operation)	
6	Nyabarongo I	28	2014	Public	REG/EUCL	
7	Gisenyi	1.2	1957	Leased	Prime Energy ltd	
8	Gihira	1.8	1984	Leased	Rwanda Mountain Tea ltd	
9	Keya	2.2	2011	Leased	Energicogel & Adre Hydropower	BTC
10	Nkora	0.68	2011	Leased	Energicogel & Adre Hydropower	BTC
11	Kimbili	0.3	2011	Leased	Energicogel & Adre Hydropower	BTC
12	Mukungwa II	2.5	2013	Leased	Prime Energy ltd	
13	Rukarara II	2.2	2014	Leased	Prime Energy ltd	
14	Rugezi	2.2	2011	Leased	Rwanda Mountain Tea ltd	
15	Rukarara I	9	2010	Leased	Ngali Energy ltd	
16	Murunda	0.1	2010	Private	REPRO ltd	GIZ EnDev Rwanda
17	Mazimeru	0.5	2012	Private	Energie Nyaruguru ltd	GIZ EnDev Rwanda
18	Musarara	0.4	2013	Private	SOGEMR ltd	GIZ EnDev Rwanda
19	Giciye I	4	2014	Private	Rwanda Mountain Tea ltd	
20	Giciye II	4	2016	Private	Rwanda Mountain Tea ltd	
	Total	**97.8**				

Table 1: On-grid hydropower plants in operation **Source REG/MININFRA**

Figure 21 Listing Rwanda's on-grid hydropower projects (Source Document, EDCL, 2016)

However, hydropower was not the only technology developed from the period, as shown by Figure 22. The government built a heavily greenhouse-gas-polluting peat electricity plant in 2017, and a Turkish-led firm, Hakan AS, has been contracted to construct a future 80MW-capacity plant. Rwanda, from 2006, has also pinned future energy generation hopes on methane. It has an unusual source of this fossil fuel in Lake Kivu. Organic decomposition in the lake's depths produces large quantities of methane, which dissolves in lake water to a high concentration. It is then emitted slowly, or occasionally in deadly bursts. The technology is therefore somewhat renewable and potentially reduces the lake's greenhouse emissions: Burning methane produces CO_2, which has four times less greenhouse effect than methane. Remarkably, the recently-commissioned methane power plant is a global first. Figure 22 and appendix three demonstrate the scale of

projects and technologies pursued from 2006 to 2009. They show the ambition of Rwanda, its overriding development drive pushing construction of all established sources of domestic energy-generation, even in experimental peat, geothermal and, most notably, methane. It is rare for a developing country to successfully take on such a technologically difficult generation programme, at a relatively large scale (compared to Rwanda's size). This record therefore underlies the government's ability to deliver and create an attractive environment for investors.

Second Phase

Ambition and pressure intensified over time. This is demonstrated by generation-capacity targets for 1000MW of installed capacity and a household electrification rate of 70%, both by 2017. Introduced in the 2011 Energy Policy[124] when the country had a capacity of ~100MW (see Figure 22), they contrast with a 1995 prediction for a total demand of 171MW by 2015[125] and the 2008-2012 Energy Policy's[126] 150MW target for 2012[127]. According to a consultant involved, the new 1000MW by 2020 plan came from a "supply-led demand forecast". By this he meant a forecast based on government ambition, not on predictions of energy need. This aspirational forecast was then rationalised using China's electricity demand growth during its record braking 8% GDP growth peak[128]. Such models produced a "straight line to (the) 2017 … 1000MW target", refuting analysis funded by the Japanese International Corporation Agency and the World Bank that predicted demand of 200MW by 2020[129]. Unsurprisingly then, the target provoked much criticism. One consultant asserted that it was a "target that (is) based on targets (for the economy that are all unrealistic)" leading to "meta-unrealism"[130].

[124] Ministry of Infrastructure, Republic of Rwanda 2011.
[125] United Nations Economic Commission for Africa 1995.
[126] Ministry of Infrastructure, Republic of Rwanda 2009.
[127] This figure was achieved in 2015/16.
[128] Interview, Consultant, 2016. Also see Chapter 4, footnote 125.
[129] Interviews; Officials, Donor Agencies; Consultant; 2016.
[130] Interview, Official, Donor Agency, 2016.

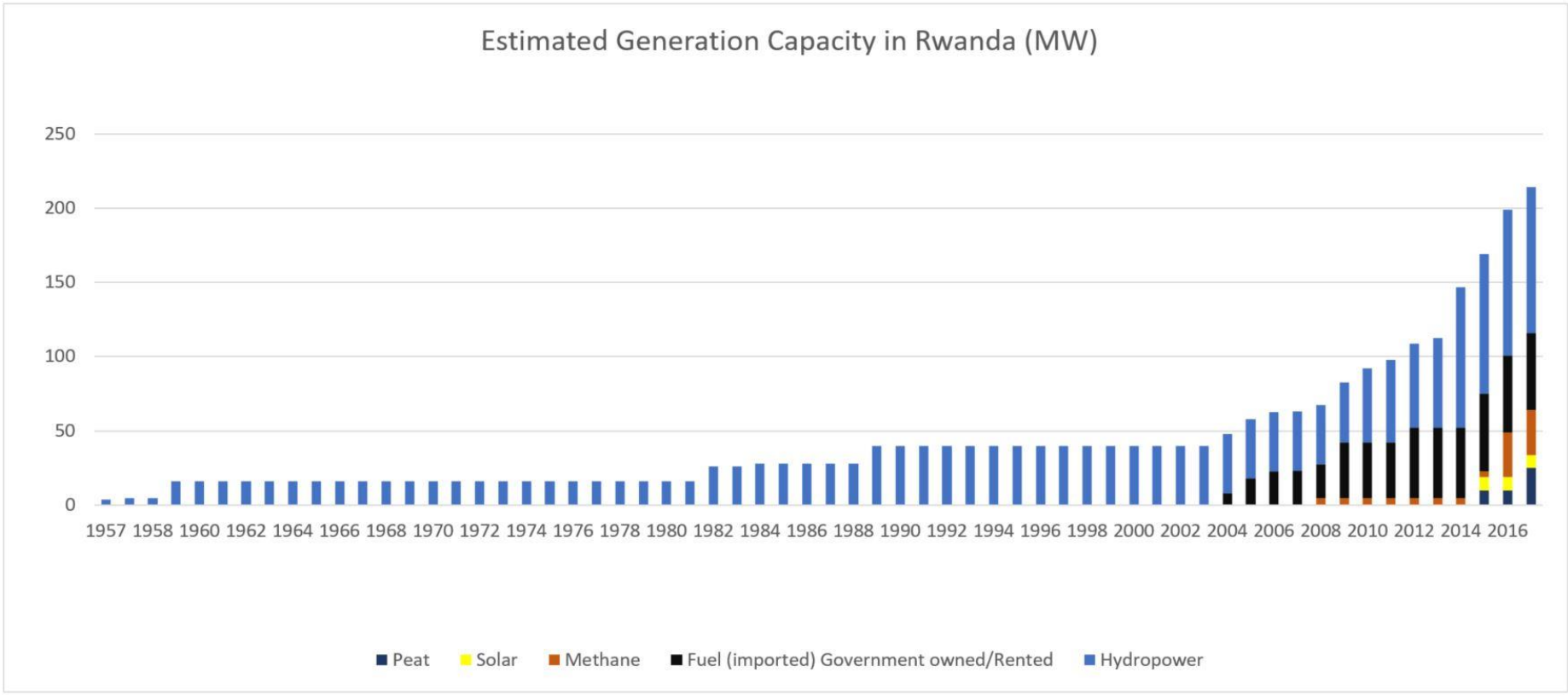


Figure 22 Emphasising Rwanda's energy infrastructure boom and the persisting role of hydropower alongside increasing diversification (Source: Author using Mininfra statistics)

Some officials at the lower levels of the Ministry acknowledged this but, arguably due to Rwanda's top-down, implementation-driven style of government, their influence was limited. Interviewees involved described growing internal criticism among Mininfra's officials eventually convincing the Energy Minister of the need for change. However, this could only be actioned after petitions to the President[131] were accepted at the annual government retreat in 2013 which reduced the target to 563MW, *merely* a fivefold increase. Although demonstrating Rwanda's narrow decision-making circle and almost feudalistic policy-making structure, this episode also depicts some overall ability to learn and respond.

Nevertheless, these growing ambitions translated into increased pressure. 2009 to 2014 saw the inauguration of four Ministers of Infrastructure, three Energy Ministers and three heads of Utility, all attributable in different ways to imperfect infrastructure delivery and failure to achieve energy targets. This underlines Rwanda's implementation culture, its insistence on realising rapid development. Financing for the sector, including for Nyabarongo Dam's rising costs[132], also increased from central government, partly through the novel use of raising Rwandan government bonds on international markets[133]. However, with rising generation ambitions, the government decided to turn to private investment, allowing companies to build and own power plants. This section therefore details the policies aiming to increase generation, but not why megawatts were so important, nor why consultants' forecasts were dismissed in favour of such large targets.

Why Energy Generation?

In short, the answer lies in beliefs about electricity's relationship to economic development. As a senior energy official described: "all chicken and egg really ... energy is the

[131] The Prime Minister initially blocked changing the target, unwilling or unable to accept challenges to it.
[132] Chapter 5.
[133] The first bond issue was in 2013 (Wigglesworth 2013).

source for all sectors": Electricity should be seen "as a prime mover for the economy, so as Rwanda started to build after war and after genocide (energy became a focus)"[134]. A leading RPF figure echoed this early stage recognition of energy stating it was one of the "pillars of this Vision 2020"[135]. An important element of this thinking is practical: The government's vision is of Rwanda having IT, manufacturing and economic-hub service sectors, all of which require power generation. Guaranteed electricity for factories and offices is an important concern for large investors. Therefore, civil servants engaged in economic planning expressed concern about the "key constraint" of energy which "investors directly cite"[136], recounting stories of companies rejecting Rwanda as a base for new operations because of electricity's absence[137]. Given argument above about the strategic value of performing development, constructing megawatts also has symbolic importance, demonstrating its ability to deliver promised progress and thereby assure domestic and international audiences.

However, such factors don't necessarily account for the scale of the megawatt targets where Rwanda disregarded conventional electricity demand forecasts and instead insisted on first ten, then five-fold, increases. Officials often rationalised this scale through high modernist ideas. The 2009 Energy Policy[138] imbues the megawatt with development potential and implies a causal relationship in the statement; "internationally there is a strong correlation between electricity consumption, poverty reduction and economic performance". Moreover, another former senior official used a confusingly-linear chicken and egg analogy, stating that demand and supply of electricity were like a "chicken and egg … power has to come before investment … They (investors) don't want to hear (about Rwanda as a destination if it doesn't have such power, but when it does, investors and electricity demand will follow)"[139]. Importantly, he used this argument to refute

[134] Explained in Interview, Former Senior Official, Mininfra, 2016.
[135] Interviews, Former Senior Official, Mininfra, 2015.
[136] Interview, Senior Civil Servant, 2015.
[137] One Interviewee (Former Senior Utility Official) described Google expressing interest in creating a server bank, only to look elsewhere for guaranteed energy.
[138] Ministry of Infrastructure, Republic of Rwanda 2009, 3.
[139] Interview, Former Senior Official, Utility, 2016.

concerns about growing oversupply, dealt with below. Therefore, some Rwandan planners appear to assert high modernist assumptions, imbuing electricity with linear development potential.

Planning Process

The planning process therefore seems defined by a single-minded focus on increasing installed megawatts. This is important for the construction of dams because, as one Utility official stated, it meant the Presidency gave a "mandate" to Mininfra and the Utility "to look for power… whatever resources are available"[140], therefore including all known dam sites. Another consultant described; "they look at everything that is available … targets are ambitious … Rwanda not anyway the best resource endowed"[141]. The impression then, because of target ambitions, is of an implementation drive rather than strategic thinking about generation projects and technologies. A former senior ministry official, stated that the Ministry does "have some debate internally (about different technologies), but up to now firefighting (had) not reached scale (of generation) … where you can sit down and think". Similarly, a senior Utility official explained that "when in crisis mode, we don't focus on "this is a clean energy (project) … more focusing on resources that are available"[142]. The key political decision then, was to pursue generation capacity, with other priorities such as having cheaper generation costs or a greener electricity system, coming second. Consequently, civil servants and ministers[143], the majority of whom were chosen on technical credentials, were made mere implementers in what is termed here 'the megawatt mission'.

Decision-making was therefore expert-centric. Phol's[144] anthropological research argues inclusion was deliberately rejected:

> "(In line with the donor priorities their seconded staff worked on) a strategy to implement a concept for civic participation (to produce better outcomes and

[140] Interview, Official, Utility, 2015.
[141] Interview, Energy-Sector Consultant, 2016.
[142] Interview, Official, Utility, 2015.
[143] Ministers are frequently academics and practitioners, rather than RPF MPs.
[144] Pohl 2016, 63.

> increased effectiveness). These changes were not really seen as a feasible option by the departmental authorities, who supported the argument that the populations lack of participative capability would render such efforts fruitless. While the foreign engineers promoted the position that local inhabitants were to be involved, even if this included greater efforts and higher costs during decision-making, the Rwandan directors defended a top-down approach explaining that without sufficient literacy and education, civic participation was useless and would not lead to beneficial results". (Fieldwork 2006-2007)

A participative process could have raised hydropower's displacement and agricultural impacts, discussed below. Rejection therefore underlines the presence of a *technician's realm*, the idea of the sufficiency of expertise and of an enlightened elite acting in the best interests of the 'backward peasantry', thereby demonstrating the presence of high modernism.

A lower-level concern within energy-sector planning was a preference for indigenous resources; "our own solutions"[145]. This is significant given that imported power from the growing Eastern Africa Power Pool[146] is an increasingly available alternative and comes at lower tariff prices. Furthermore, importing power could provide Rwanda with the flexibility to respond to sudden demands made by investors, meeting their needs whilst building long-term domestic generation. Rwanda has even signed an MoU to import up to 400MW from Ethiopia[147] and 30MW from Kenya. However, arguably in-line with the security-conscious regime, senior figures[148] indicated these weren't part of long-term plans and that the priority was domestic development.

International enablers also play an important, albeit secondary, role in energy planning. Despite novel bond issues[149], the government cannot finance its economic infrastructure ambition. International concessional finance, whether from supposedly 'traditional' donors or the

[145] Interview, Official, Mininfra, 2016.
[146] Uganda, Kenya and Ethiopia's electricity export plans have cheaper tariffs.
[147] Interview, Former Senior Official, Mininfra, 2016.
[148] Interviews, Senior Official and Senior Official, Mininfra, 2016.
[149] Wigglesworth 2013.

emerging powers[150], to an extent determines project possibilities and the timings of implementation. Detailed discussion of these external actors goes beyond the purposes of this chapter, but it is worth noting the significance of China's finance and firms in construction, particularly roads[151], and Indian companies' engagement in energy[152]. Additionally, Indian government finance in Nyabarongo Dam likely reduced its preparation time, whilst a Turkish firm is developing peat[153]. This highlights the benefits of the emerging powers to Rwanda. Evidencing Chapter 2's analysis, they have increased the regime's options, offering cheaper prices and tolerance to polluting peat that climate-conscious Western donors and companies have shunned[154]. Nevertheless, Western companies and governments also remain important. For instance, analysis below records World Bank and European support for micro-hydro projects. Their advocacy and offer of private-sector financial support arguably influenced the government's backing for corporate micro-hydro development[155]. Therefore traditional and emerging power 'enablers' play an important role in producing and shaping Rwanda's rapid energy generation development, even if the state is the most important actor[156].

Why Hydropower?

Given the singular pressure for megawatt construction there seems an inevitability to Rwanda pursuing hydropower, and even arguably, a practicality given its abundance in a country with few alternative established energy sources. However, many of the technologies' shortcomings and controversies[157] are also relevant to Rwanda. Therefore, whilst remembering

[150] Grimm et al. 2010.
[151] Nanda 2012.
[152] Chapter 2 records Novel Energy's micro-power plants and Angelique and Oversees Infrastructure Alliance as contractors. An Indian firm was involved in peat electricity generation (Nanda 2012), although their inactivity caused eventual replacement by Turkish firm Hakan.
[153] Interviews, Official, RDB, 2016.
[154] With the exception of Finland.
[155] Interviews; Official, Donor Agency; Official, Utility; 2015-2016.
[156] Agreeing with analyses by Jones, Verhoeven, and Soares de Oliveira 2013; Grimm et al. 2010; Hayman 2009.
[157] As demonstrated in Chapter 1.

that the government is pursuing a "drive for power, not dams"[158], it is important to examine the planning process that raised hydropower to such prominence in the energy sector; what *is* and *is not* considered, without giving a normative pronouncement on whether dams are good or bad.

On the one hand, hydropower's prominence seems passive. Like other indigenous resources its utilisation stems from its mere availability during a time of intense pressure to increase generation capacity. Thus, civil servants rationalised choosing dams because "you have a lot of water ... you have many falls, not enough in all rivers, but very good sites for hydropower development"[159]. It was even plausibly claimed that "micro-hydro is the most (plentiful) resource we have in Rwanda"[160]. Equally, officials outside the energy sector asserted that Rwanda pursued "hydropower because the rivers we have are ripe"[161]. Hydropower's comparatively shorter construction time was also significant. A main alternative was the technologically-challenging and globally-novel extraction of lake methane for electricity. Moreover, Finland and Turkey are some of the only other countries using large-scale peat generation, and geothermal requires extensive exploration. Hydropower, from an engineering construction standpoint, looks contrastingly attractive. Many in the sector asserted this point with a private developer stating that "hydros were the easiest"[162], and a senior planner that their "straightforward technology is best"[163]. Given the premise that Rwanda requires rapid change dams became the comparatively quick and reliable indigenous energy technology. This suggests the importance of dams' path dependence in Rwanda, captured by one interviewee asserting that it was the "familiar one"[164]. As Figures 21 and 23 show, hydropower has been the sole energy provider for much of Rwanda's history**,** mirroring neighbours Uganda and Tanzania[165]. Crucial to Rwanda's megawatt mission, the 1980s

[158] Interview, Hydropower Construction Manager, 2015.
[159] Interview, Senior Official, Utility, 2016.
[160] Interview, Official, Utility 2015.
[161] Interview, Senior RPF Official, 2016.
[162] Interview, Investor, 2016.
[163] Interview, Official, Utility, 2015.
[164] Interview, Civil Servant, 2015.
[165] Gore 2017; van der Straeten 2017.

saw significant energy-sector investment focusing on hydropower and including detailed dam planning[166]. These documents generate a degree of path dependency, making project development faster and cheaper[167]. They also generate their own momentum: With the pressure to meet ambitious targets, known generation potentials are hard to ignore. For a senior official in the mid-2000s, this meant that "when you look at it (hydropower was the) … low hanging fruit option … not necessarily the cheapest (but) … a known technology, proven technology"[168].

Donors also played a role, favouring dams because of their low emissions[169]. The World Bank is notable for financing the Ruzizi II hydropower plant in 1989 and, along with BTC and the UN, funding 1980s hydro-plant studies. In the present era, BTC financed the HydroAtlas which identifies potential sites. Project financing by the Rwandan government and, for private companies, by the World Bank, GIZ, UNIDO and BTC[170], then underpinned a micro hydro boom on these identified sites. This has seen 43 hydropower projects under development or completed by 30 Rwandan and international companies[171]. Given the nature of Rwanda's statebuilding drive, donors' actions are important: During the megawatt mission, planners are unlikely to reject studied or financed projects, thereby allowing donors' agendas to shape the energy-sector's trajectory. Additional motivations for hydropower include their perceived low cost[172]. Nyabarongo Dam is supposedly Rwanda's cheapest energy source[173]. Additionally, some civil servants described hydropower as environmentally friendly. Whilst pursuit of peat-power suggests this arguments' limited importance, citing such concerns fulfils Rwanda's strategic external good governance projection. Overall then, hydropower in the eyes of civil servants, has "so many

[166] Safari 2010.
[167] Thereby producing path-dependent 'increasing returns' (P. Pierson 2000).
[168] Interview, Former Senior Official, Mininfra, 2016.
[169] Interviews; Officials, GIZ, BTC, DfID; 2015-6.
[170] These donors supported 20 of the 39 hydropower projects under the RPF (Government of Rwanda, REG, and GIZ 2016).
[171] Government of Rwanda, REG, and GIZ 2016.
[172] Ministry of Infrastructure, Republic of Rwanda 2013. Hydropower once constructed has low maintenance cost.
[173] Interview, Energy-Sector Consultant, 2016.

advantages; … environmentally friendly project, technology available, technical companies to build them are readily available". Unlike lake-methane, for which there are "no other power plants (outside Rwanda)", hydro is "easy to maintain" and has "been around for a hundred years or more"[174].

Consequently, with top-down implementation and megawatt targets, hydropower's availability, along with its degree of path dependency, explains the prominence of dams. The infrastructure served a crucial purpose in Rwanda's megawatt mission, increasing generation whilst the development of more complex technologies proceeded. Crucially though, the thinking analysed in this planning process centres on electricity generation, emphasising hydropower rather than dam infrastructure. Dams are not built for their spectacle or embodiment of modernity but are rather chosen on their technical grounds and, most importantly, to fulfil megawatt targets. The following section explores this decision-making process' oversight.

Thoughtlessness and Faith in the Megawatt Mission

Choosing Hydropower

In Rwanda's rationales, dams appear as apolitical hydropower, a technically derived solution for projected energy needs. Status as a known technology with available sites matters most. *Pervasive appraisal optimism,* the dismissal of dam impacts, is at work in such decision making. This is demonstrated by consideration of downstream effects. Chapter 1[175] demonstrates the potential significance of dam-induced downstream changes, from halting nutritional sediment delivery, to altering hydrological cycles that underpin ecologies and agricultural systems. These effects are relevant in Rwanda. The country's main river, the one on which large dams are underway[176] and in whose basin the majority of micro-hydros are constructed, is the Nyabarongo

[174] Interview, Former Official, Mininfra, 2016.
[175] E.g. Adams 1992; Everard 2013.
[176] Nyabarongo I is complete and Nyabarongo II, planned for construction over next 10 years.

River. Ansoms[177] describes the Nyabarongo as a key farming river, one on which the government's main agricultural projects are situated, such as drained-marshland plantations. Despite historical evidence that having many dams on one river is likely to have negative agricultural effects, no interviewed Rwandan officials acknowledged such an impact. A typical response argued that reservoir creation is the only impact: "most of the time you find things business as usual (downstream) … only upstream you will find things will change"[178]. Consequently, hydropower dams in Rwanda have not had potential cumulative impacts investigated, a finding also relevant to Chapter 5[179]. One pretext justifying this, are Rwandan dams' run-of-river design, which engineers assert, does not impact rivers[180], something studies have questioned[181]. Another argument declares that dams improve agriculture. An energy Utility official argued dams are "better to have for agriculture downstream" and an official involved in water regulation explained that the effects were "so far … the other way around" meaning that dams have improved environments downstream because of the "quality of water" produced after a dam and the way they "play a role in mitigating floods and storing sedimentation"[182]. This seems contradictory as removing sediment in a reservoir reduces its water storage for floods. Moreover, Rwanda's dams do not have planned flood-mitigation capacity. Furthermore, given the number of wetlands drained for agriculture downstream[183], the principle that it is positive to store sediment whose fertility supports these plantations, further demonstrates faith in hydropower technology.

Attitudes to hydropower's seasonality reiterate the planning process' short-sightedness. Seasonality is important in Rwanda with power cuts occurring in the dry season in response to hydropower's lower contribution. Officials are aware of this limitation in dams providing reliable,

[177] Ansoms 2013.
[178] Interview, Official, Utility, 2016.
[179] Dye 2016c.
[180] E.g. Research recorded interviewees stating hydropower is 'environmentally benign' (Tyldesley and Hogarth 2011, 24).
[181] Skinner and Haas 2014, 60–63.
[182] Interview, Civil Servant, 2016.
[183] Ansoms 2009; Ansoms 2013.

all-year power. Planners stated that hydropower "depends on the season"[184], or that "(in dry seasons) some rivers close and some are useless"[185]. Officials even pointed out that this is worse in run of river designs[186] that constitute the vast majority of the country's dams. For instance, the CEO of the Utility consequently stated a preference for the weather-independent Kivu methane plant[187]. However, whereas the following chapter demonstrates this contributed to the stalling of dam projects in Tanzania, Rwanda continued construction. The energy sector therefore seems characterised by a total consensus on the overriding priority of installing electricity. For some, a belief in expertise informed a dismissal of dam concerns. One long-time policy-maker stated that "hydropower seasonality (is) a problem of design … if it's designed (with wet and dry season accounted for, it will be fine)". This allows him to assert equivalence with thermal power; "adding hydro now just replaces diesel"[188]. This ignores Rwanda's continuing use of thermal power to mitigate hydropower's seasonality[189], suggesting a simple belief in technology and expertise to solve what are inherently climatic problems.

Rwanda's environmental regulation and attitude to displacement follow a somewhat different pattern. Environmental regulations partly grew up as a response to issues with seasonality and sedimentation in dam projects[190]. As a former senior ministry official explained "(we do have issues with) micro-hydro … too much rain, terrible silt problems ... and dry spells that (mean) less water". Therefore, the climate "is really an issue and should not be ignored like in the past"[191], here referencing the first phase of hydropower construction that occurred without prior Environmental Impact Assessments (EIA, see Chapter 5). This spurred the growth of the Rwandan Environmental Management Authority (REMA). It technically began in 2005 but its

[184] Interview, Former Senior Official, Mininfra, 2016.
[185] Interview, Official, Utility, 2015-16.
[186] Because these designs do not include storage capacity.
[187] Interview, CEO, Utility, 2016.
[188] Interview, Official, Donor Agency, 2016.
[189] Interview, Senior Official, Utility, 2016.
[190] Shortening lifespan (Interview, Official, Private Company, 2016) and damaging plants (Munyaneza et al. 2015).
[191] Interview, Former Senior Official, Mininfra, 2016.

establishment took time. Only by 2010 did all infrastructure projects in Rwanda need REMA clearance in practice. One former senior Utility official asserted that "it is tough … even on a government priority project … they want you to have ABC, … to show you are addressing (all their environmental requirements)"[192]. This suggests Rwanda's adoption of reformist ideas about dam building, of the need to consider dams' impacts and have standards in construction practices. However, this quote also indicates the nature of this environmental regime: important, but firmly placed in the realm of implementation, a tick-box exercise to complete. Whilst REMA has made some high-profile suspensions of EIAs[193], its guiding mantra, for strategic government projects especially, focuses on implementation processes[194] as opposed to critically appraising and stopping infrastructures. This means a focus on *how* construction happens, not *whether* it should, based on measuring impact and system-wide cumulative appraisals. The transfer of EIA approval to the RDB, the institution whose premise is to facilitate economic development, reinforces this.

The absence of cumulative, country-scale impact appraisals in the Rwandan Natural Resource Agency (RNRA) and REMA further underlines this analysis. For example, the RNRA has "so far not carried out any cumulative impact studies"[195] of energy projects and REMA's strategic energy-sector EIA, something that normally connotates assessing cumulative impacts, was in fact about "streamlining environmental (concerns)" into policy thinking[196]. This is a notable absence, given the concentration of operating and under-construction micro-hydros in one region where the vast majority of households rely on agriculture[197]. For one interviewed company official, environmental protection policies thus "felt like a box-ticking process". The presence of environmental regulation is significant, following global norms that saw similar institutions

[192] Interview, Former Senior Official, Mininfra, 2016.
[193] E.g. suspending construction of Kigali golf course (Nkurunziza 2015) and an amusement park (Karama 2007).
[194] As a senior civil servant asserted our "(focus on) implementation (of projects and their following of the EIA certificate)" (Interview, Governmental Environmental Organisation, 2016).
[195] Interview, Official, Governmental Environmental Organisation, 2016.
[196] Interview, Official, Governmental Environmental Organisation, 2016.
[197] Ansoms 2013.

enacted internationally, including in Tanzania, and there is evidence that REMA enforced standards in project-implementation practices[198]. However, Rwanda's governmental environmental institutions fall short of being a vehicle to contest energy projects or substantively mitigate designs at the cost of electricity production. A similar pattern occurs with displacement, relevant to Rwanda as it is particularly dense[199]: The country has an average of 340 people per km^2 whilst 30% own less than 0.2ha and 11.5% are landless[200]. Whilst a number of planners acknowledged this displacement as regrettable, they indicated it did not affect key decisions about the approval of projects or choosing of energy generation technology. Rather, as one official in the Utility insisted, "displacement is a technical not political decision"[201]. Foregrounding Chapter 5's case study, this demonstrates engagement with displacement, but only as an implementation issue, not a political challenge to dams.

Evidence here therefore finds that high modernist understandings of development as apolitical and of the ability of scientific approaches to derive optimum solutions, rationalised an uncritical decision-making process. Whilst policies designed to reform dam planning are present, such as the insistence on EIAs, this analysis suggests that a political consensus on megawatt construction trumped all concerns. Thus, ministries operated in a *technician's realm* which *invisibilised* many of the impacts of development decisions. The history of hydropower, their downstream and displacement costs, and their problematic seasonality, are all relevant to Rwanda. However, whilst officials in the sector were not completely blind to hydropower's impacts, negative effects are presumed solvable or technical and were therefore absent from the crucial decision of whether to construct. This suggests a new form of exaggerated *pervasive appraisal optimism* in which, rather than dismissing negative changes wrought by dam

[198] E.g. the aforementioned suspensions.
[199] High density being relative to a predominantly rural country.
[200] Huggins 2011.
[201] Interview, Official, Utility, 2015.

infrastructure, officials increasingly acknowledged their existence but insisted that science and expertise could solve them.

Demand and Debt in the Energy System

Analysis of issues for the wider energy sector further evidences the megawatt mission's short-sightedness. Rwanda's focus on the megawatt, on increasing generation capacity has neglected concerns over demand and cost. In the likely scenario that the generation projects under contract at the time of writing are constructed, Rwanda will acquire approximately 600MW, roughly 80% of which will be owned by private companies. The Power Purchase Agreements (PPAs) with these companies, state that the Utility, often underwritten by Mininfra, is obliged to pay for 90% of power made available whether it is used or not[202]. Consultants projected demand forecasts of just 200MW, compared with the ~480MW signed in PPAs, suggest this will create a financial predicament: "PPAs (would be) … creating a deficit (as the government would be) … buying more energy than it can sell"[203]. Moreover, many of the PPAs were agreed at a relatively expensive power price, due to the need to attract investors, the experimental nature of methane and the high construction cost of the micro-hydros in remoter areas. Additionally, payment is in dollars, which have continually appreciated against the Rwandan Franc[204]. These difficulties underline the narrowness of decision-making in the energy sector and further demonstrate the government's assumption of electricity's ability to create its own demand.

However, there is a growing acknowledgement of the need for action among Utility and ministry officials. Steps taken include a new law which dictates that the Ministry of Infrastructure, rather than the private sector, should initiate generation projects, enabling checks against further oversupply. Additionally, the Utility is attempting to stimulate electricity demand through

[202] Interviews; Official, Mininfra; Senor Official, Utility; Energy-Sector Consultant; 2016.
[203] Interview, Official, Donor Agency, 2016.
[204] Demonstrated by one study between 2003-2012. Appreciation was reported to have continued (Interviews; Official, Utility; consultant; 2015-2016).

economic growth schemes and lower tariffs, with such efforts supported by a new World Bank loan[205]. Again, this highlights an instance of the Rwandan state's, albeit delayed, learning. Another oft-cited[206] strategy for oversupply would be to sell internationally, but this option appears undermined by Rwanda having the region's highest power price and the active regional marketing of Kenya and Ethiopia's far cheaper power.

A further cost pressure of the megawatt mission stems from Rwanda's daily demand profile. As Figure 23 indicates, demand has a pronounced, short, evening spike constituting approximately 25% of peak demand. Addressing this without absorbing significant cost requires specifically purposed electricity infrastructure (such as peaking plants or storage facilities). However, thus far Rwanda's energy planning and the signed Power Purchase Agreement contracts are for baseload power, meaning generators that run throughout the day. Rwanda is therefore building baseload power to cover peak demand periods. Consequently, debts are likely to accrue in the majority of non-peak hours, an issue that consultants working in government suggest has already begun with Rwanda reaching a capacity of 200MW in 2016. Present coping practice is to turn off government-owned hydropower like Nyabarongo during non-peak hours, using them to

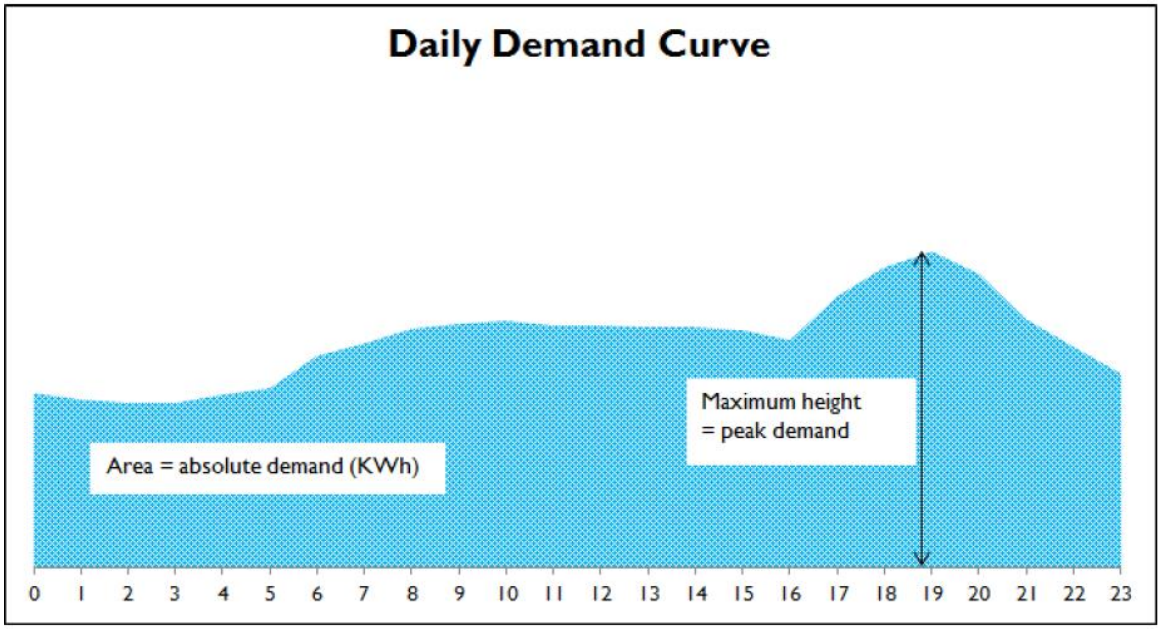


Figure 23 Showing the daily demand curve (Source: Energy Sector Strategy 2013-2018). There is no y axis but the area is accurately drawn to represent absolute demand

[205] The World Bank 2017b.
[206] Interviews; Senior and Junior Officials, Mininfra and Utility; 2015-2016.

meet the evening spike[207]. This is also problematic in high-tariff Rwanda, as these hydropower plants provide the cheapest energy, thereby leaving more expensive thermal and privately-owned plants to produce the majority of electricity.

Analysis here therefore demonstrates insufficient critical thinking and short-sightedness in decision-making processes. Thinking about the merits of different technologies or the dangers of pursuing ambitious agendas seems largely absent. Alongside high modernist ideas about the linear ability of technology to create development, analysis here demonstrates that Rwanda's centralised, decision-making structure, with its strict implementation regime, contributed to these outcomes. The key political decree to make generation itself a priority and empower civil servants to exclusively implement narrowed the decision-making process.

Conclusion

In many ways, Rwanda's energy sector is remarkably successful. Chiefly, total generation capacity has increased fivefold from ~40MW in 2003 to 213MW[208] in 2018 and is on course to produce over 523MW by 2020[209]. Moreover, the government has overseen 37 energy plants' construction in just over a decade, with at least a further 10 under construction. This has involved multiple technologies including globally-novel lake methane extraction. In this sense, the RPF regime markedly breaks with Rwanda's past of limited increases in generation exclusively through dam building (see Figure 20 and 22). The ability to plan and contract construction at such scale even marks Rwanda out in Africa, particularly considering its relatively poor resource base and land-locked, mountainous geography. Underpinning this apparent success is the capable Rwandan state, with a virtually all-powerful ruling regime dictating clear planning, kept-to targets and a

[207] Nyabarongo for instance offers the cheapest kWh power in Rwanda.
[208] The World Bank 2017b, 14.
[209] Author's calculation, based on known pipeline projects with timelines indicated by official publications and interviewees.

strong implementation culture. Moreover, the regime ably negotiated concessional finance and mobilised private investment for independently-owned power projects.

This megawatt mission thus exemplifies the RPF's statebuilding drive. The perception of energy as central to future development created the ambition and the pressure to implement all technologies, including dams. This contrasts with past-era dams like Akosombo, Kariba, Aswan or Cahora Bassa[210], as there, the infrastructure was itself emphasised as a statebuilding tool. Rwanda's development mission largely relegates the visible state of ministries and a utility company to the role of implementer, exclusively empowering officials to work in top-down ways. This chapter therefore stresses the presence of high modernism in an assumption of megawatts' linearly transferring to economic growth and thus the 'meta-unrealism' of targets based on aspirations. The ideology also rationalises the empowering of experts to implement in a *technician's realm*. Consequently, this chapter argues that high modernism not only influences Rwanda's grand visions but features in policy practice, echoing Huggins in demonstrating the regime's "faith in technical expertise and science as a means of overcoming social and environmental constraints"[211]. Despite this, specifically for hydropower, interviewed officials acknowledged some dam impacts about displacement and shortcomings in electricity generation. However, given an apparent total consensus on the need for electricity, these were treated as technical issues for planning and implementation and seen as discreet and thus separated from downstream farming projects, ecologies and livelihoods. Appraisal of dams' more controversial history, and their power-laden costs and benefits, were consequently absent. Reformist ideas about the need to study dam impacts and compensate the displaced were therefore partially and contrarily incorporated into a high modernist *technician's realm*[212]*.* This also demonstrates an exaggerated form of *pervasive appraisal optimism* that acknowledges certain shortcomings of

[210] Chapter 1.
[211] Huggins 2017, 40.
[212] Links to research by Van Damme, Ansoms, and Baret 2014; Ansoms and Rostagno 2012.

dams, but in a depoliticised way. Additionally, decision-makers *invisibilised* negative downstream impacts of dams' socio-ecological intervention.

In conjunction with these ideational factors, the chapter demonstrates how dams' electricity, alongside that of methane, petroleum fuels, peat and solar, reinforce the vital image of a development-focused state. As argued by Mann and Berry [213] this is crucial for generating external and internal legitimacy, which brings aid and investment and garners support for the RPF's rule. Pursuing an ambitious megawatt mission thus becomes part of the regime's survival strategy. This chapter therefore deepens understanding of the Rwandan state, showing the materialist and ideological drivers for the centralised and illiberal political system behind the wider energy-sector transformation and dam's resurgence in particular. Moreover, the chapter demonstrates the risks of imbuing the megawatt with such elite importance in a government without holistic and critical appraisals, particularly with regards to potential agricultural impacts and the financial risks of significant electricity oversupply. Therefore, it adds empirically to the relatively understudied politics of electricity planning in Africa[214]. Furthermore, conclusions here contrast with Reyntjens[215], Straus and Waldorf[216] and Huggins[217], who characterise Rwanda as a menacing authoritarian state whose unyielding, centralised power make it doomed to fail. However, this chapter, following Jones et al.'s [218] arguments about Africa's illiberal authoritarians, argues that the Rwandan government's narrow and exclusionary policy-making process is not necessarily fatal. Analysis shows a capable state with strong implementation abilities, and even one which can react and learn from experiences. The chapter does not therefore intend to be normative, refuting the developmental importance of electricity or hydropower. Indeed, debates about alternative, decentralised energy systems reach beyond the self-imposed scope of this

[213] Mann and Berry 2016.
[214] Other examples include: Cuesta-Fernández 2015; Kraak 2012; D. A. McDonald 2009; Zarfl et al. 2015; Gore 2017.
[215] Reyntjens 2013.
[216] Straus and Waldorf 2011.
[217] Huggins 2017.
[218] 2013.

thesis. Rather, the chapter has analysed Rwanda's decision-making practices to understand why and how the state returned to dam-building.

Chapter 4

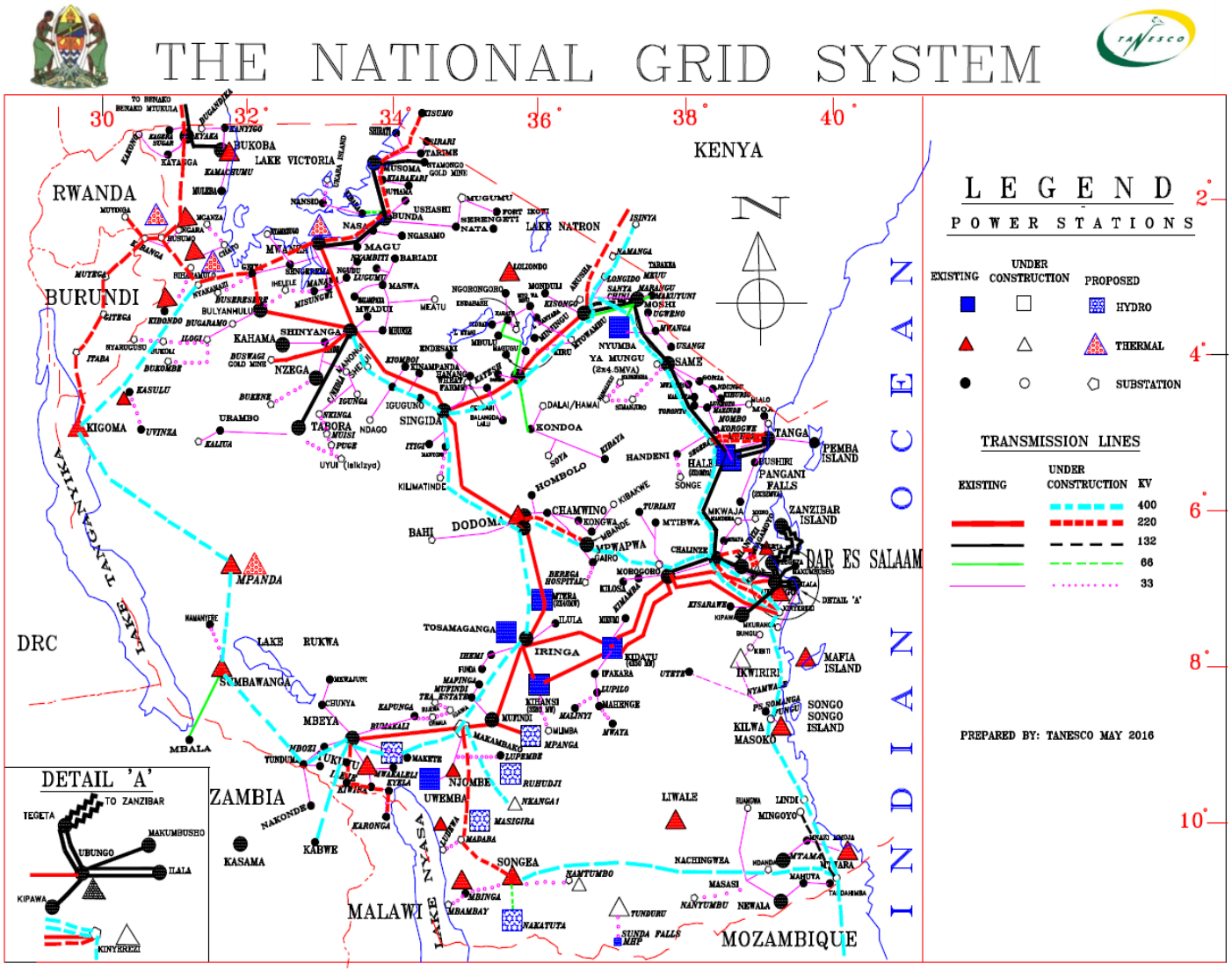
Centralised Power and Fragmented Government: Tanzania's Contested Dam Resurgence

From the mid-2000s, a revival of Tanzania's energy sector took place. The arrival of President Jakaya Kikwete's government in 2006, supported by Tanzanian economic growth, boosted planning and construction of generation (see Figure 25), transmission and distribution infrastructure. For the first time in Tanzania, this included large-scale rural electrification. The planning and construction of long-imagined dams is a central feature in this unfolding megawatt mission. This includes the Ruhudji, Rumakali, Mnyera, Rusumo and Stiegler's Gorge Dams. This chapter analyses this resurgence. Similarly, to Chapter 3, it establishes the changing high modernist rationales imbuing megawatts, not the dams themselves, with developmental potential. This chapter therefore addresses the thesis' question on *why* Tanzania has pursued hydropower. Alongside this focus, the chapter is concerned with the decision-making processes involved in the planning of dams and understanding of their impacts. Here, the *how* of Tanzania's dam-resurgence also features high modernist ideology as dams are understood apolitically, with minimally-recognised effects overlooked and officials empowered in decision making. Subsequent chapters on Rusumo and Stiegler's Gorge Dams further this analysis of Tanzania's dam planning and implementation.

This chapter also presents a contrast with Rwanda. It demonstrates the importance of factors beyond ideology, not least Tanzania's history, which had a greater role shaping the content of the country's megawatt mission and position of dams. Additionally, Tanzania's experiences of

hydro-failure and of the impact of dam-building reforms have created a stronger critique of the technology. Therefore, as well as adding to the analysis of the dam resurgence's drivers and practices, this chapter also examines the limitations of the empirical phenomenon and the degree to which reformist ideas challenge contemporary dam building. Moreover, in comparison to Rwanda, Tanzania has not implemented as many electricity-generation projects (see Figures 26 and 28). This stems from the fragmentation of the ruling party Chama Cha Mapinduzi (CCM). Importantly, this furthers Scott's formula for the ideology's enactment by advancing the importance of the state: Not only must the state be authoritarian to implement high modernist projects, but authority must be concentrated and cohesive.

Given the role of path dependency, the chapter begins with the ideology, political economy and dam building of the colonial and independence eras. This historical focus is also significant because, unlike Rwanda, independent Tanzania continues to be ruled by CCM (called Tanganyika African National Union (TANU) until 1977). With the incorporation of literature and primary research, the chapter then analyses the energy-sector boom and its limitations under President Kikwete (2006-2015). This culminates in the final two sections which ask why a dam resurgence has happened and why ambitious planning has not translated smoothly into large-scale construction.


THE NATIONAL GRID SYSTEM
KENYA
RWANDA
BURUNDI
DRC
ZAMBIA
MALAWI
MOZAMBIQUE
LAKE VICTORIA
LAKE TANGANYIKA
LAKE RUKWA
LAKE NYASA
INDIAN OCEAN
DAR ES SALAAM
DODOMA
IRINGA
MBEYA
SONGEA
TANGA
MOROGORO
KIGOMA
MPANDA
SUMBAWANGA
MBALA
KASAMA
KABWE
NAKONDE
NJOMBE
MAKAMBAKO
MAKAMBAKO
KIDATU
KIHANSI
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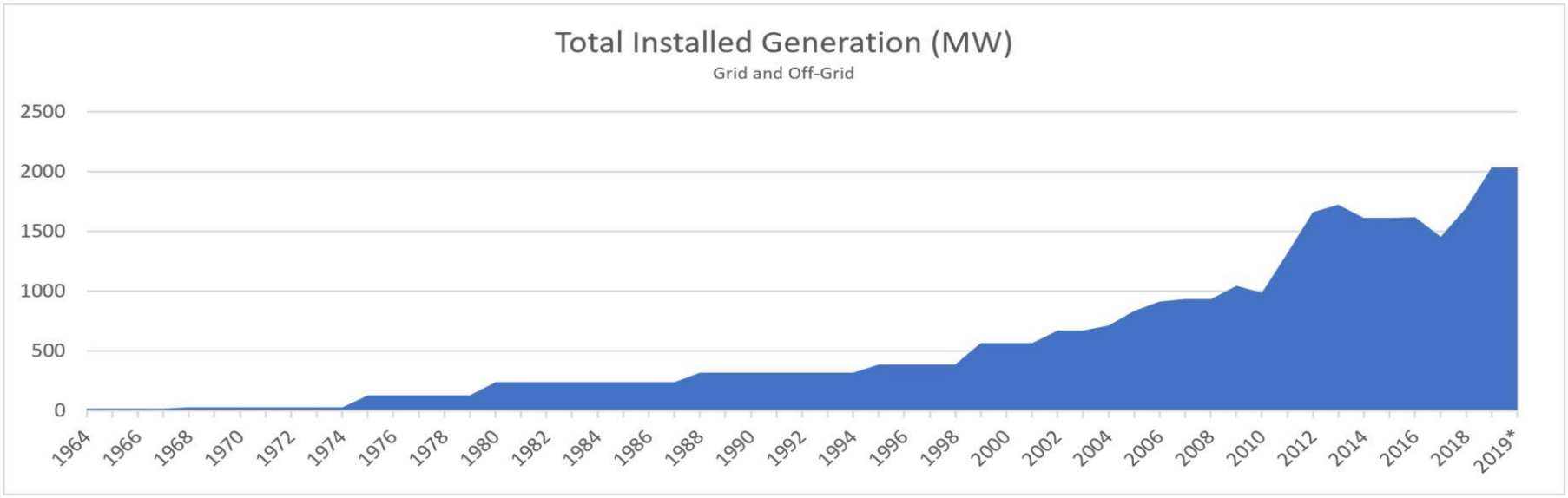


Figure 25 Demonstrating the significant upturn in the 2000s. Note that not all installed generation in working order (Source: Author Using MEM Statistics)

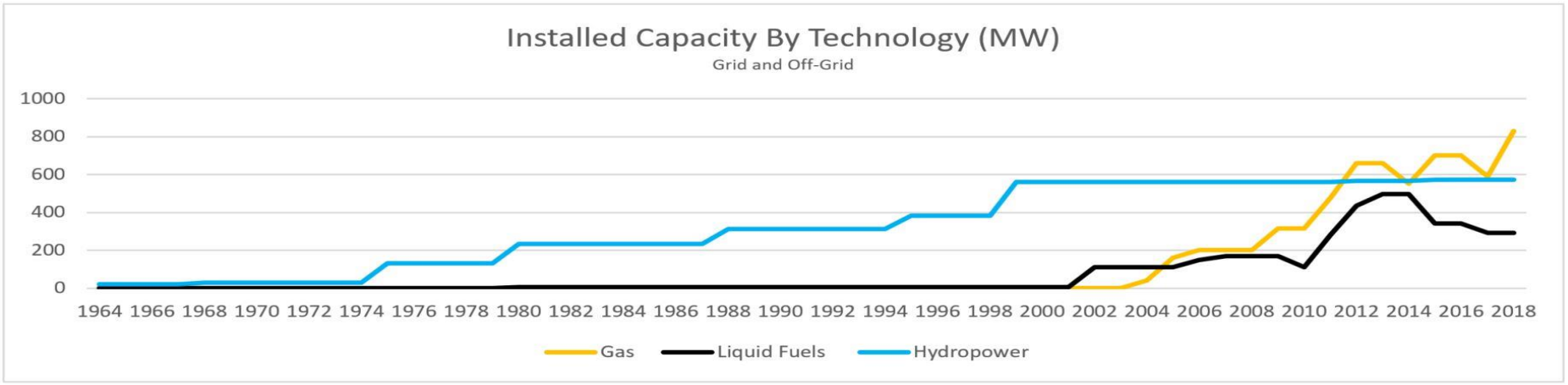


Figure 26 Demonstrating the long dominance of hydropower technology with recent diversification (Source: Author using MEM Statistics)

Tanzania's Dam Building History

Colonial Origins

The seeds for state-led development and of ideas that imbue dams with development began under British colonialism. In neighbouring Uganda, Queen Elizabeth opened the Owen Falls Dam in 1954 with the aim to emulate the USA's hydro-development model[1]. A colonial secretary described the dam as an "act of faith"[2], based on a belief that it would create development and sustain imperial rule through control of the river and the generation of 180MW[3]. Capturing this, a key engineer on the project proclaimed "where electricity is abundantly available, progress in all fields of human activity inevitably follows"[4]. This became known as "building ahead of demand"[5], short-hand for a belief in electricity to create development and thereby energy-demand, consequently justifying construction of rapid increases in energy generation. Therefore, van der Straeten, with regards to Owen Falls, asserts: "the assumptions of the planners and engineers behind the project … resembled an unwavering faith in the power of planning economic development (that is an) … inherent component of high modernism". The ideology travelled beyond Uganda to Britain's neighbouring territories: "British colonial Tanganyika had been one of the most fertile grounds for high modernist ideology and was the site of some exemplary cases of state-induced engineering of social and natural environments" [6]. Preeminent of these was the large-scale groundnut scheme, premised on the ability of planners to determine optimum agricultural production through collectivised and scientifically-organised plantations[7]. This period also saw preparation of large dams in Tanganyika, with surveys in the late 1920s continuing to

[1] Gore 2017.
[2] van der Straeten 2017, 156.
[3] Hoag 2013, 151–52.
[4] Quoted in Gore 2017, 44.
[5] van der Straeten 2017, 155; Hoag 2013: 'Demand' meaning predicted energy demand.
[6] van der Straeten 2017, 47.
[7] Hogendorn and Scott 1981.

1940[8]. Emerging United Nation development institutions[9] furthered dam planning. The FAO financed surveys on the Rufiji that identified the Stiegler's Gorge Dam site in the 1950s[10], and UNDP similarly surveyed other basins including the Kagera River and Rusumo Dam site in the 1960s. Thus, the colonial era laid the groundwork for "hydro-developmentalism", the assumption that hydropower represented the best source of electricity and would lead to national development[11]. As Figure 26 demonstrates, dams would then dominate energy-generation technology until the 2010s.

The Nyerere Era

High-modernist and hydro-developmentalist ideas continued into independent Tanganyika. The *Ujamaa* programme of Julius Nyerere, Tanzania's prominent independence leader, asserted an African socialism that invoked communitarian democracy (albeit with democracy redefined through the authoritarian one-party state)[12]. Central policies here included attempts to modernise society through villagisation and collectivising farms[13]. There are important nuances here, with Schneider[14] insisting that Nyerere's early writing espoused the importance of participation in development and the value of situated local-level knowledge, especially in smallholder agriculture. Moreover, villagisation was inspired by the independently-organised, participatory Ruvuma Development Association[15]. However, after the 1967 Arusha Accords, the state's enactment of *Ujamaa* became increasingly top-down, coercive and frequently violent. Schneider blames such authoritarianism, not high modernism, for the failure of villagisation and also evidences the state's incapacity, which prevented the creation of coherent

[8] Havnevik 1993; Hoag 2013.
[9] As in Hart 2001.
[10] Chapter 7.
[11] van der Straeten 2017, 214.
[12] Jennings 2008; Coulson 2013; Havnevik 1993; Havnevik and Isinika 2010; Legum and Mmari 1995.
[13] These two policies were primarily between 1969-1976 (Hydén 1980).
[14] Schneider 2007.
[15] This organisation was founded in 1968: Ibbott and James 2014.

ideological plans[16]. However, both Scott and Schneider agree that Tanzania's socialist programme was justified by underlying core high-modernist binaries that legitimated the transformation of backward, traditional and irrational peasants[17] and the conquering of Tanzania's nature[18]. This also involved "politicians and officials insisting that they and they alone held the key to Tanzania's development"[19]: As Scott writes, "little wonder that electrification and tractors, those emblems of development, were on the tip of Nyerere's tongue as well as Lenin's"[20].

High modernism is also present in the socialist era's dam building. Planning for the 20MW Hale Dam started under colonial authorities and indeed Britain, aiming to prove continued relevance and support its companies, provided finance[21]. In 1961, under then Tanganyika's home-rule[22], Hale, as Hoag writes, became "a striking example of the role of large dams in the symbolic construction of 'modern' nations"[23]. The infrastructure enabled a centralised national grid controlled by the Tanzanian Electricity Supply Company (TANESCO) and at the dam's 1964 opening Nyerere declared:

> Schemes such as this one, are in fact the bricks and mortar evidence of the revolution which our country is deliberately and purposefully undergoing. It represents the application of science to the needs of the people. And it does this in such a way that our whole country takes further steps out of the poverty which now imprisons it. For this hydro-electric station is an example of the combination of brains, scientific knowledge, sweat and discipline which will in practice transform our nation.[24]

[16] Schneider 2014, 115.
[17] Also asserted in Coulson 2013, 199–201; Havnevik 1993; Bryceson 2010; Jennings 2008.
[18] Schneider 2007, 10–11.
[19] Schneider 2014, 4.
[20] Scott 1998, 231; Also quoted in van der Straeten 2017, 48.
[21] British finance mandated tendering to Balfour and Beatty (Hoag 2013).
[22] Full Tanganyikan independence in December 1961; Zanzibar incorporated in 1964.
[23] Hoag 2005, 249.
[24] Quoted in Hoag 2005, 249.

This invokes a high-modernist idea about dams' embodiment of modernity aesthetics and the ability of science and technology to derive paths to progress. This statebuilding project, however, primarily benefited the few connected to the national grid, mainly present in Dar-es-Salaam[25] .

An upstream control dam with 8MW capacity, Nyumba-ya-Mungu, followed[26], but Tanzania's energy sector took its leap forward with the Great Ruaha project. The Swedish International Development Cooperation Agency (SIDA) envisioned this 2-part hydropower scheme (commissioned in 1975 and 1983) as part of a strategic effort to internationalise its hydropower industry[27]. Tanzania's installed capacity jumped from 29MW to 280MW. This made the Mtera reservoir, and connected Mtera and Kidatu hydropower generators, Tanzania's electricity backbone. The government chose Great Ruaha over the British-proposed Wami Dam that included a smaller, incremental generation increase and a large irrigation project[28]. Given its arguably more appropriate scale of increased installed-electricity capacity, Nyerere's emphasis on agriculture and the Mtera reservoir's flooding of 600km^2 of fertile farm land[29], the choice of the Great Ruaha is arguably surprising. However, Öhman argues that the ability of the Swedish state and corporate actors to play Nyerere off against the former colonist proved important in the choice of Great Ruaha over Wami, as did rationales asserting the dam's ability to bring industrialisation and development through electrification[30]. Alongside the Great Ruaha project, planning of the 600-2100MW Stiegler's Gorge project was institutionalised with the 1975 launch of Rubada[31]. Furthermore, Nyerere's government supported the inauguration of the Kagera Basin Organisation (Chapter 6). Such attempts to simultaneously construct unprecedented quantities of hydropower echoes the colonial-era 'building ahead of demand' practice: There was apparent faith that dams would create economic development and not become costly, unused white elephants. Dams

[25] van der Straeten 2017.
[26] van der Straeten 2017.
[27] Öhman 2007.
[28] Öhman 2007.
[29] van der Straeten 2017.
[30] Hoag 2013; van der Straeten 2017.
[31] Chapter 7.

therefore featured prominently in Tanzania's developmental imaginaries, symbolically capturing statebuilding visions[32].

Great Ruaha also demonstrates certain high modernist implementation practices. Studies largely invisibilised the geography of the river and its hydrological specificity: Models based on Swedish rivers insufficiently calculated the Ruaha River's seasonality and sediment load, leading to inadequate reservoir storage and undermining hydropower production[33]. Impacts were also underestimated. Initial calculations stated that 1,100 people would be affected, but further work during dam construction found the number to be over twenty times higher at 28,000[34]. Öhman[35] relates this to a limited attention on the valley's geography. A basic compensation scheme existed but moved villages far away from the river and thus the ecological underpinnings of their former livelihoods. Rationales and implementation practices in independent Tanzania therefore followed Chapter 1's description of high modernist dam building, all enabled by Tanzania's authoritarian one-party state and international partners.

Dam Building and Tanzania's Economic Collapse Beyond Nyerere

However, a growing economic crisis from the mid-1970s, stemming from external[36] and internal issues[37], engulfed Tanzania's development plans. At first glance, this didn't appear to significantly affect dam building. In the first-half of the 1990s, Tanzania signed off on two large dams with the support of Scandinavian aid[38], indicating hydropower's persistence. Usher[39]

[32] Hoag 2013, 178.
[33] Öhman 2007: This included one engineer using Swedish river data collected from his back garden to estimate river flow.
[34] Öhman 2005.
[35] Öhman 2007.
[36] These economic pressures stemmed from commodity-price falls, oil-price rises and the costs of Uganda's 1978 invasion of Tanzania (War till 1979) (Bryceson 1993).
[37] Particularly lost production from villagisation's upheaval and growing inefficiency of industrial (Coulson 2013; Kelsall 2013 Chapter 2).
[38] Norad (Norway), Sida (Sweden) and Finnida (Finland) Usher 1997e; Channing et al. 2006: Continuing a historical precedent (Simensen 2010).
[39] Usher 1997e.

conceptualised Chapter 1's *pervasive appraisal optimism*[40] based on the Pangani Dam (68MW), constructed between 1991 and 1994. Consultants Norplan decided to re-design this colonially-planned dam as a run-of-river scheme, removing the reservoir's storage capacity despite designs for upstream river-water abstraction for irrigation. Usher[41] describes how Pagani's planners dismissed consideration of a potential trade-off between irrigation and generation, believing that, if necessary, an expert-derived formula could solve any issues. Additionally, Mung'ong'o[42] asserts that smallholder river users were invisibilised by the EIA's "positivist notion that the (scientific) methodology offers objective, value-free information to inform the political process"; thereby masking decisions that implicitly preferenced electricity over smallholder livelihoods. Following Pangani, the larger Kihansi Falls Dam (180MW) started construction in 1995. This dam's limited Environmental Impact Assessment (EIA) meant that an endemic species, the Kihansi Spray Toad, was only discovered in the waterfall-generated rainforest during construction, delaying the project's commissioning. Initially, planners deployed a technical fix involving artificial sprays to prevent habitat destruction, but construction workers also brought a fatal disease, leading to the launch of a captive breeding programme[43]. Again, this suggests a planning process ruled by technicians and one that paid limited attention to impacts.

However, from the 1980s, political changes and economic crisis were transforming the energy sector. Structural adjustment programmes, formally starting after transition to President Mwinyi in 1985[44], compounded economic decline. To some degree this liberalised market economy programme was externally directed, reflecting Tanzania's donor dependence (aid contributed 40% of the government's budget into the 1990s)[45]. However, Harrison[46] asserts that much of the political elite shared these ideas, producing jointly-agreed good governance reforms

[40] A constitute idea-practise of high modernism.
[41] Usher 1997e.
[42] Mung'ong'o 1997, 105.
[43] Channing et al. 2006.
[44] 1970s average growth of 7% compared with 0.6% between 1986-1997 (Kelsall 2013, 52).
[45] Kelsall 2013.
[46] Harrison 2001.

such as an anti-corruption taskforce, Presidential term limits and regular elections from 1995. Reflecting this economically-liberal programme[47], the 1992 Energy Policy allowed independent power producers[48] and, in 1999, the government listed Tanesco for privatisation[49].

The post-1980s period also changed Tanzania's distribution of political power. Under Nyerere, the state's size and centralised power increased. The ruling party also instituted disciplinary procedures for bureaucrats and ministers for corruption and reduced official's involvement in business[50]. This changed with President Mwinyi who did not impose the same control over policy making[51], or discipline on private enrichment. Whilst power is still concentrated in central government, the result has been a splintering of CCM and uncontrolled, often corrupt, rent seeking[52]. This has seen the emergence of what Lofchie calls a "political-economic oligarchy embedded within the CCM hierarchy (and) the propensity of many members of this oligarchy to use corruption as a means of consolidating and maintaining their dominance"[53]. Elite fragmentation changed the energy sector, turning it into a site for grand corruption, best demonstrated by the decades-long IPTL (Independent Power Tanzania Limited) scandal. Brian Cooksey[54] investigated IPTL's corruption, which started during negotiations in the 1990s and included investors, politicians and civil servants. IPTL significantly burdened Tanesco[55], and thereby central government, with debt: In 2006, 50% of Tanesco's revenue covered IPTL payments, with the plant contributing 37% of installed capacity, but 62% of generation-system

[47] Such initiatives at privatising and unbundling are also evident in neighbouring Uganda (Gore 2017).
[48] The policy was reportedly initiated by donors (Gratwick, Ghanadan, and Eberhard 2006).
[49] Gratwick, Ghanadan, and Eberhard 2006.
[50] Kelsall 2013; Gray 2013: As stated in the Arusha codes.
[51] Kelsall 2013; Gray 2013.
[52] Bryceson 1993. Noting that rent-capture is not inherently corrupt and, as with Rwanda, can be developmental (Gray and Khan 2010; Gray 2018).
[53] Lofchie 2014, 199.
[54] Cooksey 2017; Cooksey 2002; Cooksey 2011.
[55] Non-corrupt Songas plants also created cost pressures (Kapika and Eberhard 2013; Cooksey 2017).

costs[56]. IPTL's backers also allegedly slowed development of cheaper Songo-Songo gas[57] that started negotiations in 1991 but was only commissioned in 2004[58].

Thus, after instigating two dams in the mid-1990s, the fragmentation of the political elite, and the associated rise of debilitating rent-seeking, destabilised coherent energy-sector decision making. The utility's debt was also increased by Tanzania's economic downturn, costs from IPTL and increasing arrears from Zanzibar and parastatals to Tanesco[59]. Retreat from a state-led development mission is again emphasized by ambitions to privatise Tanesco from 1999. However, Tanesco's debt stymied this process, leading to President Mkapa's government handing management over to South African firm NET-Solutions, in 2002[60]. Private management substantively improved revenue collection[61] and additionally made Tanesco's tariffs the highest in Africa by 2003[62]. Such changes proved unpopular. Senior civil servants remembered "the cash flow was improved very well, but this meant no studies, no maintenance, no expansion"[63]; "all the effort on the financial side … no effort on investment, no maintenance or new investment …. (they were just) going to debtors and collecting, did that well"[64]. Thus, construction of electricity-generation plants stopped keeping pace with demand whilst the grid infrastructure suffered[65]. A 2005 drought followed those in 1997 and 2000, causing ever greater hydropower failure and load shedding[66], leading to public outcry in an election year.

[56] Gratwick, Ghanadan, and Eberhard 2006, 39.
[57] Discovered in 1974 (Gratwick, Ghanadan, and Eberhard 2006).
[58] Kapika and Eberhard 2013; Gratwick, Ghanadan, and Eberhard 2006.
[59] Kapika and Eberhard 2013; Eberhard et al. 2016; Cooksey 2002.
[60] Kapika and Eberhard 2013.
[61] Revenue collection moved from $11million a month in 2002 to $22million by 2006 (Gratwick, Ghanadan, and Eberhard 2006, 46).
[62] Kapika and Eberhard 2013.
[63] Interview, Senior Official, MEM, 2016.
[64] Interview, Senior Official, Tanesco, 2016.
[65] A senior official stated (Interview, MEM, 2016) that Tanesco was "still doing that maintenance (issues caused from that time)".
[66] Kapika and Eberhard 2013.

This analysis traces the empowerment of a centralised authoritarian state system and its drift from post-independence statebuilding: The 1990s saw an increasing retreat from state led energy-sector planning, with corporate development of generation and partial-privatisation of the decision-making Utility Tanesco. With growing elite fragmentation in decision-making and personal enrichment an increasing driver, Tanzania's formula for policy implementation changed. Whilst still a centralised, de-facto one party state, fractures within the political regime hampered implementation capability and moreover, market-led economic development ideas marginalised the former, high-modernist state-led model. An appreciation of this decline is important, foregrounding this chapter's analysis of Tanzania's return towards statebuilding and its entailed energy-generation construction. However, this state retreat was not uniform, with donor-financed dam building continuing to be approved until the mid-1990s. Furthermore, regarding dams, this analysis demonstrates some historical continuity: Throughout the 20th century, from colonialism through socialist and market-led independence eras, dams have remained the turned-to electricity generation technology. Moreover, throughout Tanzania's history, dams were treated as apolitical with justifications emphasising the infrastructure's spectacle of modernity and practices following ideas of scientifically-derived, technologically-produced development.

The Arrival of President Kikwete and Revival of the Energy Sector

Tanzania's revival under President Kikwete partly stemmed from global economic circumstances. High growth returned, averaging between 6-8% in Kikwete's first term (2006-2010)[67]. Commodity prices played an important role here[68], especially in Tanzania's gold mining which includes numerous informal, small-scale operations[69]. Additionally, in 2012 Tanzania's economic prospects rose further with the announced discovery of 55tcf of off-shore gas, an

[67] Coulson 2013, 10.
[68] Gray 2018.
[69] Bryceson and MacKinnon 2012.

internationally significant quantity[70] that brought investment in anticipation of a gas boom with extraction firms from Britain, Brazil and Norway. International investment rose with active support by the government[71], not least from Kikwete's significant number of often investor-orientated international trips. This collective level of foreign investment markedly contrasted with its near absence in the 1980s and 1990s[72].

However, analysis of the energy sector here contends that President Kikwete's administration also played an active role in Tanzania's upturn, reverting to a more state-led model of development particularly in his second term. Whilst policies were often premised on the private-sector's prominence, not direct state intervention, and although rhetorically espousing free-market principles, Kikwete's tenure marked a return to large-scale planning. Five-Year Plans, starting in 2010/2011, marginalised the donor-driven 5-year MKUKUTA policy documents[73] (re-branded Structural Adjustment Poverty Reduction Strategy Papers). Another flagship initiative was the 2012 Big Results Now (BRN), a programme prioritising and coordinating specific development projects taken from Malaysia's 'Big, Fast Results' model[74], in-turn drawn from Tony Blair's Prime Minister's Delivery Unit[75]. It set targets on chosen priority projects over a three-year time-horizon and attempted to instil an implementation ethos not dissimilar to Rwanda's. Whilst the cultural changes started by this programme were resisted[76], and although it did not meet all of its objectives, collectively, these initiatives amount to a centrally-designed development push. Gray also argues that there was more emphasis on implementing industrial policy in this period[77]. In contrast to Kelsall[78], who has characterised post-Nyerere Tanzania as ridden by grand

[70] 5tcf is just outside the top-20 national gas reserves.
[71] The key institution being the Tanzanian Investment Centre's, which increased efficiency (Kelsall 2013).
[72] Eberhard et al. 2016.
[73] Interviews, Senior Official, Donor Agency, 2015 and 2016.
[74] Anyimadu 2016.
[75] Interview, Official, Presidential Delivery Unit, 2016.
[76] Stemming from a factionalised cabinet analysed further below.
[77] Gray 2018, 181–85.
[78] Kelsall 2013.

corruption and development drift, this analysis contends that Kikwete's administration oversaw a return to planning developmentally-ambitious statebuilding.

This shift is further demonstrated by the energy sector, President Kikwete brought an early decisive change. The government abandoned Tanesco's privatisation and contract management was suspended. Many officials welcomed this because of a belief that, as one interviewee explained, you "cannot privatise the pillars of the economy"[79]. Moreover, preparations for sale focused on capitalising Tanesco at the expense of infrastructure and maintenance spending[80]. Therefore, once de-listed, "(we) started planning afresh"[81]. This was evident early on, with a 2006 parliament speech outlining the Ministry of Energy and Minerals' (MEM) push to implement long-planned dams through private-sector investment at the proposed Stiegler's Gorge and Ruhudji hydropower sites, alongside a coal electricity plant at Kilwa[82]. Power System Master Plans restarted, with one produced in 2008 (although then revised and released in 2009). It outlined an ambitious plan to build all established generation technologies, from gas to coal, to hydropower and renewables (the latter mainly referring to wind). As Figures 27 illustrates, subsequent 2012[83] and 2016[84] PSMP updates increase these demand predictions, justifying ever larger development programmes (Figure 29). The grand scale of these targets echoes colonial and Nyerere-era practices of 'building ahead of demand'. However, Figure 27 also demonstrates that these ambitious plans changed in their preference for electricity-generation technology, moving from hydropower and coal to gas. The 2009 PSMP, after an immediate gas building programme, primarily envisioned hydropower, and secondarily coal, construction. By 2012 both hydropower, coal and gas shared long-term parity, although gas took short term priority, as demonstrated by government pledges to finance Kinyerezi I and II. The 2016 PSMP furthers this trend, pushing

[79] Interview, Senior Official, Tanesco, 2016.
[80] Interview, Former Senior Official, Tanesco, 2016.
[81] Interview, Senior Official, MEM, 2016.
[82] Minister of Energy and Minerals 2006.
[83] Ministry of Energy and Minerals, United Republic of Tanzania 2013.
[84] Ministry of Energy and Minerals United Republic of Tanzania 2016.

hydropower projects into the future. As analysis below describes, this was caused by a variety of factors, from ministerial change, to experiences of hydropower's climatic weakness, to the short-termism created by Big Results Now's time-horizon.

Regardless of these plans, gas-turbine plants have been primarily constructed in Tanzania's energy-sector upturn, competing with the rented[85] or corrupt[86] diesel projects (see Figure 28 and Appendix Four). New gas plants include extension of the privately-owned Songas[87] and new government-owned plants at Ubungo[88], Tegeta[89] and Kinyerezi[90]. To supply these plants, on-shore gas reserves at Songo-Songo have been connected to larger reserves at Mnazi Bay[91]. This pipeline was a flagship achievement of the BRN. Future plans include two Kinyerezi gas-turbine plants which have public-private agreements with Chinese firms. Beyond gas, Tanzania seeks to use its coal reserve of between 1.5 and 5 billion tonnes and plans a government-owned power station at Kiwira[92] and public-private partnerships at Ngaka[93] and Mchuchuma[94]. However, these plants have yet to materialise. A similar trajectory faces a wind project at Singida, long advocated by donors[95] but yet to start construction.

[85] Rented units from APR and Aggreko between 2007-2009 and only Aggreko, 2011-2014/2016.
[86] IPTL and Richmond.
[87] Songas' began generating in 2004 and expanded in 2006 and 2007.
[88] Ubungo I (2009); Ubungo II (2012).
[89] Tegeta Gas (2009).
[90] Kinyerezi I (2015); Kinyerezi II (2018).
[91] Gratwick, Ghanadan, and Eberhard 2006.
[92] Jacob 2017.
[93] Agreement with an Australian firm (Jacob 2017).
[94] This plant involve a $3billion deal with a Chinese firm (Jacob 2017).
[95] Eberhard et al. 2016 (Danish Government Support): Interviews; Senior Officials, MEM; Officials, Donor Agencies; 2015-2016.

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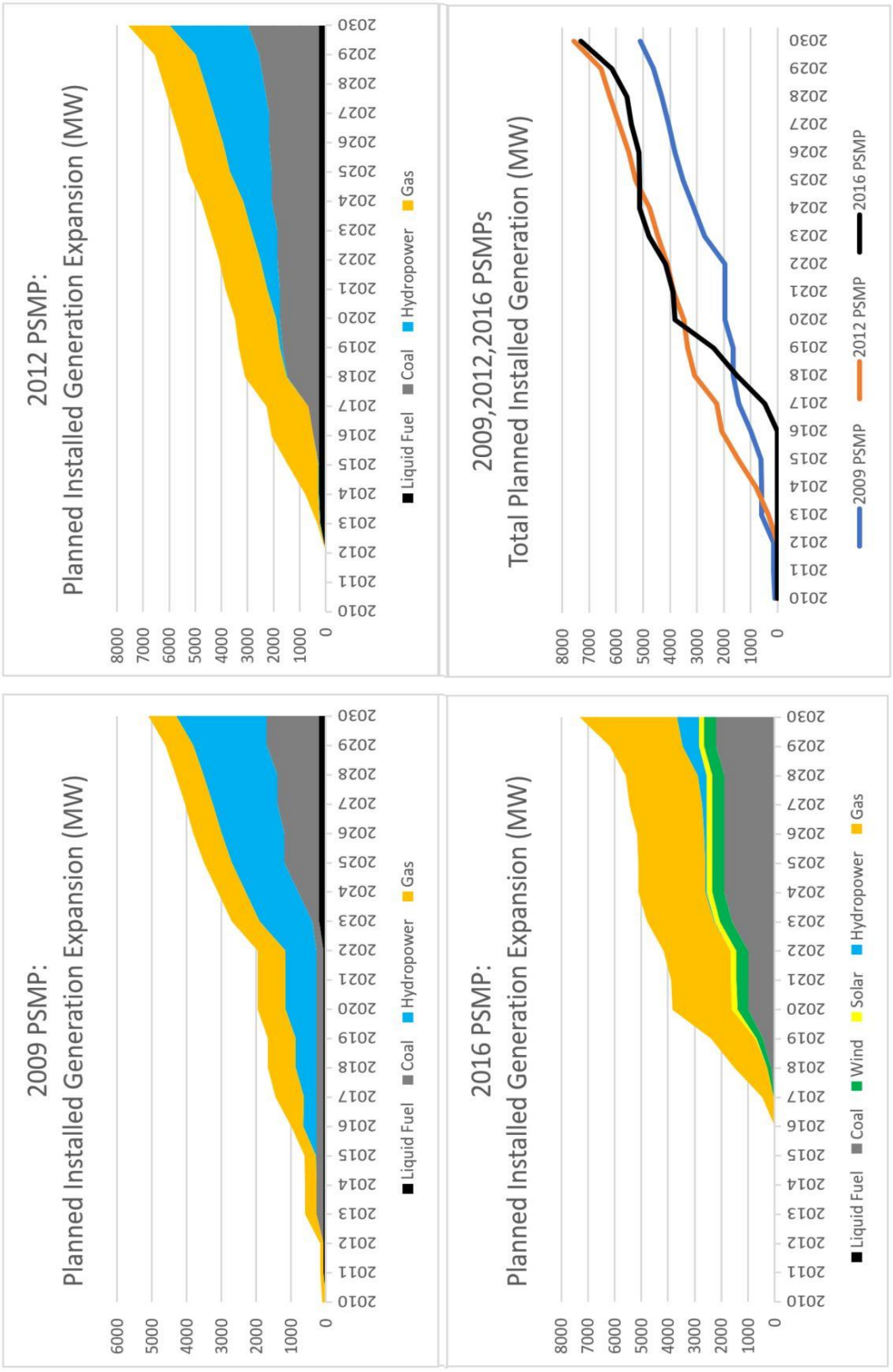


Figure 27 Comparing the projected generation plans: Demonstrating increased ambitions, the initial dominance of hydropower, the 2012 shift towards gas and coal and 2016 dominance of gas (Source: Author Using MEM Statistics)

[96] In the 2016 PSMP, post-2030 increases are primarily expected from hydropower.

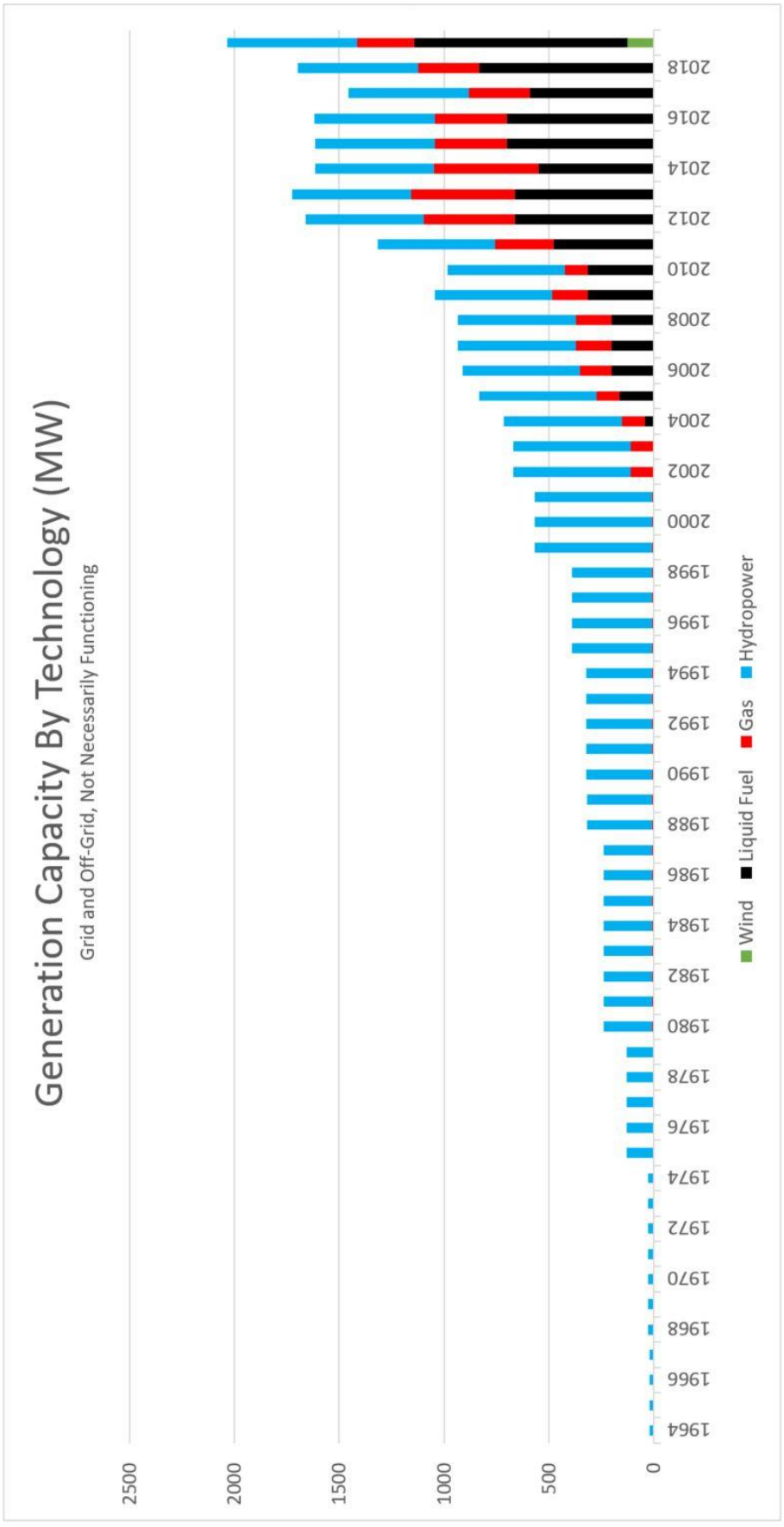


Figure 28 Highlighting significant recent increases in generation with diversification of generation technology (Source: Author Using MEM Statistics)

Arguably dams have made more progress than coal and wind. Breaking with most dams' historically-planned multipurpose benefits[97], almost all projects are solely for hydropower. Early-on, Kikwete's government stated its intention to construct long-planned dams through private finance in an investor/IPP build-own-operate model. Rusumo Falls Dam is an exception here[98], achieving government sign-off in 2012. As Chapter 7 analyses, efforts towards implementing Stiegler's Gorge restarted, with the appointment of a new chairman of Rubada in 2006. Presidential and Ministerial efforts drew in international companies eventually securing a deal with Odebrecht in 2012. With such wider government support Rubada, the institution overseeing most Rufiji-basin dams, also secured MoUs on the Iringa Dam with a Korean firm[99], on Mpanga with Sinohydro[100] and Mnyera with Queiroz Galvão. Moreover, these companies completed further studies on feasibility, design and impact assessment. Ministry of Energy and Minerals' (MEM) most actively pursued dam is the 358MW Ruhudji. Negotiations began with the British firm Aldwych, allowing the company to secure a World Bank insurance guarantee and backing from investors[101]. However, discussion stalled over a power purchase agreement (further detailed below)[102]. MEM also advertised Rumakali Dam (525MW) and paid for further studies by Studio Pietrangeli[103]. Malagarasi Dam came closest to implementation. It secured funding from the US-led Millennium Challenge Corporation (MCC). However, echoing Kihansi, further EIA work found an endemic snail, causing the project's suspension and relocation[104]. Finally, the Kakono Dam (87 MW), near to the Rusumo Falls Dam, looks set to proceed, having won African Development Bank finance in 2016. Alongside the development of new plants, a substantive rehabilitation

[97] E.g. Rusumo and Stiegler's Gorge projects previously included irrigation infrastructure
[98] Rusumo has World Bank governmental finance but is structured as a jointly-owned Rwanda-Tanzania-Burundi IPP
[99] K-Water 2013
[100] Sinohydro Corporation Ltd. and United Republic of Tanzania 2010
[101] The World Bank 2011
[102] Interview, Senior Official, Dam Construction Company, 2015
[103] Reportedly, Studio Pietrangeli conducted an ESIA and feasibility design for Rumakali (Studio Pietrangeli 2018)
[104] Hovland, Bingham, and Nash 2010

programme has commenced, focusing on increasing and replacing national transmission lines and restoring electricity plants like the Hale Dam[105].

Collectively then, this financing, planning and deal-making represents a significant change in state intervention in the energy sector, reversing the deterioration experienced under structural-adjustment austerity and the period of contract management. As Figure 28 highlights, towards the decade's end, new infrastructure began increasing generation, which had fallen to a working capacity of only 630MW (of ~1000MW installed) as late as 2009[106]. Also noteworthy is Tanzania's rural electrification drive[107]. Orchestrated by a new Rural Energy Agency that was initially pushed by donors in the early 2000s[108], it has become politically popular because of electrification's vote-winning potential[109]. As a result, the institution has a ring-fenced budget from fuel taxes which is topped up by donors and government[110]. The agency has been effective, initiating Tanzania's first mass electrification, increasing grid connections from 10% in 2005 to 41% in 2015[111]. Overall, this analysis suggests that the Kikwete administration, riding on the back of a wider economic boom, has overseen a significant change in the energy sector. Installed capacity more than doubled with plans laying out a ten-fold increase by 2025 whilst transmission and distribution significantly expanded. The following sections explore the rationales behind this policy, particularly asking why dams were included.

[105] Interviews, Officials, Donors Agencies, 2016.
[106] Ministry of Energy and Minerals, United Republic of Tanzania 2009.
[107] Interview, Senior Official, MEM, 2016.
[108] Interviews, Officials, Donor Agencies, 2016; Ministry of Energy, and Minerals United Republic of Tanzania 2009.
[109] Jacob 2017.
[110] Muhongo 2016.
[111] Jacob 2017; Eberhard et al. 2016.

Why the Return of Dam Planning?

Tanzania's Megawatt Mission

Energy-sector planning was, from the start, ambitious. All PSMPs model electricity demand based on economic data[112] and predictions of the Ministries of Planning and Finance. The latter allowed results to reflect political ambition[113], thereby influencing the scale of the PSMPs' predicted demand increases. As Figure 29 shows, the first PSMP, prepared primarily by engineering consultancy SNC-Lavalin[114], predicts a lower increase, contrasting with the MEM-led updates in 2012 and 2016. These forecasts are significant because such "demand (predictions) drives us (in generation planning)"[115]. Consequently, their ever-increasing predictions dictate ever-grander construction plans, depicted in Figures 27 and 29. Targets for installed generation capacity rise from 3,500MW installed capacity by 2025 in the 2009 plan, 6,260MW in the 2012 PSMP and 6,350MW in the 2016 PSMP[116]. Furthermore, a more ambitious target of achieving 10,000MW by 2025[117] was the most frequently cited in interviews[118].

In part, these ambitious plans respond to public anger at repeated blackouts. Severe, politically-unpopular, drought-induced power failures started in 1994 and 15-hour blackouts occurred in 2005-2006, 2011-2012 and 2014-2015[119], the latter costing between 5-7% of

Predicted Demand Year	2009 PSMP	2012 PSMP	2016 PSMP
2020	2,218	3,573.3	5,091
2025	3,200	4,724.3	6,991
2030	4,761	6,084.6	9,867

Figure 29 Table of the PSMPs predictions for total energy demand (MW)

[112] Interview, Official, Tanesco, 2016.
[113] Interview, Former Official, MEM, 2016.
[114] SNC-Lavalin were also involved in Nyabarongo and Rusumo Dams.
[115] Interview, Officials, MEM, 2016.
[116] The latter two PSMPs have a baseline of ~1500MW.
[117] Listed in the 2013 Electricity Roadmap (Ministry of Energy and Minerals, United Republic of Tanzania 2014) and BRN (Eberhard et al. 2016).
[118] Interviews; Officials, Tanesco; Officials; MEM; Officials, Donor Agencies; 2015-2016.
[119] Jacob 2017; Kapika and Eberhard 2013; Interviews; Senior Officials, MEM; Senior Officials, Tanesco; 2016.

Tanzania's GDP[120]. However, the above targets' scale of up-to tenfold increases in generation, move beyond merely keeping up with demand or the prevention of dry-season power failures. Like Rwanda, MEM's plans do not explicitly address such seasonal hydro-power failure. Moreover, the proposed increases are very likely beyond the potential needs of industrial investment in Tanzania, at least in the next decade[121]. This is because their predicted tenfold rises were typically seen during the 2000s growth peaks of East-Asian industrialisers like China[122], growth which contrasts with Tanzania's piecemeal, stuttering industrial progress to date. Future energy demand therefore seems more likely to be below the ambitious, but more gradual, SNC-Lavalin-produced 2009 PSMP.

Thus, such quantities of predicted demand suggest a belief in electricity to create development and energy demand. Tanzania chooses to pursue a supply-led demand forecast: As one interviewee involved in the 2016 PSMP stated, the "controversial part (was that they) conducted analysis of demand and supply … (low, medium and high scenarios were not enough so) prepared a super high case … (but) even this is unsatisfactory (for the Ministry)"[123]. The process was "controversial"[124] because, as in Rwanda, increasing generation capacity is an economic risk, especially when involving IPPs that require guaranteed payments. If demand, and therefore electricity sales, do not cover capital spending (and potential capacity payments to independently-run plants), Tanesco and the state's debt will significantly increase. Thus, external consultants and donors have tried but failed to reduce the ambitions of the demand forecasts: MEM "has a strong focus on megaprojects. We are trying to describe a more realistic approach"[125]. This tension is even revealed in the 2016 PSMP which states that the initial economic model predicted a 2260MW

[120] Conway et al. 2017, 946.
[121] Interviewees commented on the targets' unrealistic nature, that they go beyond Tanzania's needs (Interviews; Officials, Donor Agencies; 2015-2016; Kapika and Eberhard 2013).
[122] Nan and Moseley 2011, 2; Dong et al. 2017, 215: Before the tenfold increase rate, China and other East Asian industrialisers followed the rule of thumb where demand roughly doubles every decade in developing countries.
[123] Interview, Official, Donor Agency, 2016.
[124] Interview, Official, Donor Agency, 2015-2016.
[125] Interview, Official, Donor Agency, 2015.

demand by 2020, an unacceptably low figure for the government, requiring "additional demand" factors to produce Figure 29's numbers[126]. MEM is therefore determined to keep high demand predictions, rejecting ambitious but lower demand forecasts. They also dismiss a flexible approach that could respond to demand from investment by importing power from cheaper exporters like Kenya and Ethiopia, whilst domestic supplies are built. Tanzania's supply-led demand forecast suggests a belief in the technology of the megawatt to deliver development: As one leading official stated "you can't talk of development without power", tellingly quoting Lenin's phrase[127] about electricity producing communist development[128]. Consequently, civil servants were aware of the political prioritisation of electricity generation: "Ministry and President want a lot of power" (i.e. irrespective of economic forecasts) and so PSMPs are prepared accordingly[129].

This megawatt mission is crucial to explaining the re-engagement with dams. As one senior figure explained, from the start of Kikwete's term "attention very high (on the energy sector) … a serious focus on power generation in the country"[130]. This scale of pressure and ambition led to plans including all major known projects: The 2009 PSMP and its updates "include everything that is possible, all the resources we have"[131]. With such ambition, dams are seen as an inevitable inclusion. As two senior Ministry officials stated, "if you have 4.7-gigawatts of hydropower and these targets, up to 10,000MW, have to include hydropower"[132]. The megawatt mission also helps explain dam's being exclusively purposed for hydropower[133]. The infrastructure also received specific high-level support. The 2007-2012 Minister of Energy and Minerals reportedly "believed in a generation mix" that explicitly included hydropower[134], reflected in the

[126] Ministry of Energy and Minerals, United Republic of Tanzania 2016, 12.
[127] Chapter 1.
[128] This linear relationship is also suggested by official statements asserting energy's centrality in "promoting socio-economic development in Tanzania" (United Republic of Tanzania 2015a, 12).
[129] Interview, Senior Official, Tanesco, 2016.
[130] Interview, Former Senior CCM Official, 2016.
[131] Interview, Senior Official, MEM, 2016.
[132] Interview, Senior Officials, MEM, 2016. Also reflected in: Interviews, officials, Tanesco, 2015-2016.
[133] Conversely, dams can be multipurpose and designed for power, irrigation, transport, water supply etc.
[134] Interview, Former Senior CCM Official, 2016. Also supported by interviewed dam investor (Interview, 2015).

technology's prominence in the 2009 and 2012 PSMPs. Moreover, a number of officials asserted Kikwete's support for hydropower, referencing his 1990-1994 tenure as MEM Minister that included Pagani Dam's construction and Kihansi Dam's approval. Additionally, once President, he reportedly pushed Rubada and advertised dams internationally[135]. His 2012 visit to Brazil certainly advanced Odebrecht's role in the proposed Stiegler's Gorge Dam and Queiroz Galvão's in Mnyera Dam[136]. Moreover, one Tanesco official stated that "Kikwete our Minister before, … (he) pushed Ruhudji"[137], an idea corroborated by a private-sector official[138]. Alongside this high-level backing as part of a megawatt mission, Tanzania's return to dams relates to historic legacies and the way impacts were overlooked.

Path Dependence Favouring Dams

Dams' historic position informs hydropower's centrality. As established above, hydropower was Tanzania's primary generation source and has a dominant historical position. A number of project-sites are known, and many have existing feasibility or pre-feasibility studies. Such knowledge creates path-dependent momentum[139]: A definitive potential at an identified site reduces a project's preparation costs, gives planners a conclusive option and decreases build time[140]. Thus, for Tanesco, dam projects like Ruhudji, Malagarasi, Stiegler's Gorge and Rusumo are never rejected, but rather "continuing projects"[141]. Moreover, historic high-modernist status can give dams popularity, as one civil servant remarked, "people don't like to have reports, want an icon on the ground"[142]. Pitcher and Askew's analysis of post-socialist Tanzania[143] furthers this

[135] Interview, Senior Official, MEM, 2016: Chapter 7.
[136] Interview, Senior Official, Dam Construction Company, 2015-2016.
[137] Interview, Senior Official, Tanesco, 2016.
[138] Interview, Senior Official, Dam Construction Company, 2015.
[139] Introduction Chapter.
[140] These factors constitute sunk costs and could also mean that pursuing dams produces increasing returns.
[141] Interview, Civil Servant, Tanesco, 2016.
[142] Interview, Senior Official, Ministry of Water (MoW), 2016.
[143] Pitcher and Askew 2006.

argument, pointing to the way totemic socialist projects can become embedded in the popular consciousness, a conclusion further evidenced with Chapter 7's Stiegler's Gorge Dam.

Additionally, dam's historic prominence creates a group of civil servants trained in hydropower building and operation[144] and supportive of dams. A variety of interviews with long-standing civil servants demonstrated this. When asked about the lack of dam implementation, there was a common assertion that "(we are) not leaving them out but going for the maximum (number of technologies)"[145]; "(that we) can't stay away (from hydropower)"[146]; "(that they are the only) long term solution"[147] . This becomes significant because of the bureaucracy's political empowerment to implement Tanzania's megawatt mission. The process of choosing generation projects was often described as de-centred. A former Minister explained that approval and planning of generation projects was primarily for the commissioner for energy[148] and others asserted the significance of Tanesco in dictating implementation choices, partly because of their unique expertise[149]. Whilst analysis below argues that the MEM Minister Sospeter Muhongo (2012-2015/2015-2017) had more direct influence, civil servants' degree of agency, and their familiarity with hydropower, does help explain the persistence of dams[150]. Parastatal Rubada further demonstrates this. Although disbanded in 2018, it was expressly created in 1975 to build the Stiegler's Gorge Dam, with a wider mandate to develop Rufiji valley hydropower plants. Whilst Rubada existed, its institutional premise of dam development ensured Rufiji projects were included in every PSMP.

[144] Described in: Interview, Official, Donor Agency, 2016.
[145] Interview, Senior Official, Ministry of Water (MoW), 2016.
[146] Interview, Senior Officials, MEM, 2016.
[147] Interview, Senior Official, Tanesco, 2016.
[148] Interview, Former Minister, MEM, 2016.
[149] Interview, Former Tanesco Board Member, 2016.
[150] Also suggested by former senior CCM official (Interview 2016).

The Nature of Decision-Making: Overlooked Dam Impacts

Another aspect of Tanzania's governance favours dams. In line with the country's adoption of good governance type institutional reforms, environmental regulations have increased over time. As of 2004, impact assessments are mandatory and examined by the National Environmental Management Council (NEMC) who, for large hydropower, require consideration of upstream and downstream impacts and a public hearing[151]. However, following Tanzania's history, the process of assessment does not appear to act as a check against hydropower, serving more as a pre-implementation tick-box. Kihansi Dam's NEMC-approved EIA illustrates this, as the discovery of endemic species meant the report only demanded the addition of artificial sprinklers. Furthermore, Malagarasi Dam was suspended by its USA funders, not the Tanzanian state after assessors found endemic species. Ministry officials derided this "toad not power"[152] choice, dismissing inclusion of environmental trade-offs in energy-sector planning. This subordinate, implementation-modification role for impact assessments was further evidenced in their approval process. Officials described how national-interest energy projects are speeded through EIA approval and are not blocked: "We are giving priority to energy sector projects … as we are still poor in access to energy … (Projects of national interest) will be shortened" (i.e. dealt with quicker): it is only "a technical process (not a politically-challenging one)"[153].

Moreover, for Tanesco and Ministry officials, where attention is given to impact, it tends to be limited to the immediate site and reservoir. The scope of the EIA for Malagarasi[154], like that of the older Pangani Dam[155], demonstrates this, as does planning of Stiegler's Gorge Dam in Chapter 7. Moreover, like its Rwandan counterpart, the NEMC has yet to conduct strategic assessments of the cumulative impacts from successive large and small dams. This absence is

[151] Interviews, Junior and Senior Officials, NEMC, 2016.
[152] Interview, Officials, MEM, 2016.
[153] Interview, Civil Servant, 2016.
[154] Hovland, Bingham, and Nash 2010.
[155] Usher 1997e.

notable as dams are highly concentrated, particularly in the Rufiji Basin (see Figure 30). This again suggests the limited nature of reforms in Tanzania that overlook socio-ecological impacts and therefore the infrastructure's political trade-offs against fishing, farming and pastoral livelihoods. Assertions by civil servants and ministers that expertise can solve impacts on water users and the environment[156] further demonstrates this depoliticised understanding. Compared to colonial and independence eras, the Tanzanian state has higher impact-assessing standards and undertakes greater mitigation measures, these assessments make limited changes to dam plans and continue to overlook socio-environmental effects.

Overall, analysis here argues that a high modernist belief in the technology of electricity to deliver development rationalised Tanzania's megawatt mission, with public anger over load shedding adding pressure to this energy-generation drive. Government developed the known

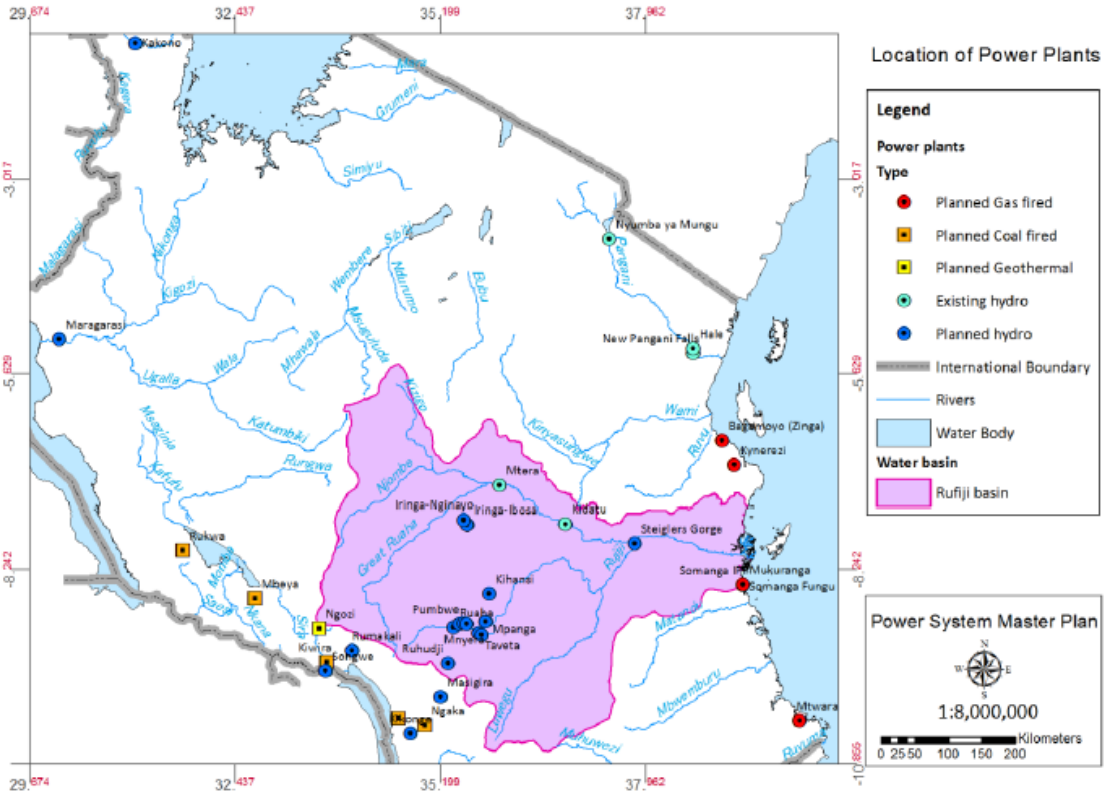


Figure 30 Location of planned power plants (Source: PSMP 2016 p109)

[156] Reflected by one official stating that expertise could solve trade-offs with upstream water users on the Ruaha. (Interview, Senior Official, MoW, 2016) and another that science could overcome hydropower and coal's carbon emissions (Interview, Former Senior CCM Official, 2016).

major energy potentials, principally gas, coal and hydropower, with the latter's historic role favouring its prominence despite some public hydropower critique (below). The invisiblising of impacts and treatment of their effects as apolitical, as solvable and limited, also supported the official resurrection of Tanzania's major dam projects.

Why So Little Dam Implementation?

The Critique of Hydropower

However, alongside support for dams, hydropower is also publicly critiqued. This primarily stems from experience of the infrastructure's climatic vulnerability. It is demonstrated in World Bank-Government of Tanzania documents: "The current financial and supply crisis in the power sector is partly explained by recent poor rainfalls"[157]. The aim is to "diversify the power supply mix …. This in turn will reduce the power supply's vulnerability to climatic conditions and make Tanzania more resilient to hydro shocks"[158]. Similarly, the government's second Five Year Plan states: "the country's electricity production has remained largely reliant on hydropower, rendering it vulnerable to the vagaries of the weather"[159]. Decades of drought-induced power crises have therefore produced a critical hydropower discourse that asserts the technology's vulnerability and initiates resolve to diversify electricity production[160]. Indeed such climate-vulnerability concerns are supported by recent academic research[161].

This hydropower critique has gained traction over time (see decrease in hydropower in Figure 27). The earlier phase of power-sector planning, as demonstrated by the 2009 PSMP, focused on coal, a small number of gas projects, but primarily hydropower. This contrasts somewhat with the 2012 PSMP's diversified approach still featuring hydropower and differs

[157] International Development Association, The World Bank 2013, 46.
[158] International Development Association, The World Bank 2014, 63.
[159] Ministry of Energy and Minerals, United Republic of Tanzania 2015a, 4.
[160] Stated in: Interviews, Junior and Senior Officials, MEM, 2016.
[161] Conway et al. 2017.

strongly from the 2016 PSMP's delayed envisioning of hydropower. The change in the 2016 PSMP is partly the product of the BRN programme that began in 2012 and whose short-term implementation goals excluded coal and hydropower projects over gas[162]. As one official stated, BRN changed Ministry spending on future generation projects, "robbing Peter to pay Paul"[163]. A more decisive factor was a political change as Energy and Minerals Minister Muhongo (2012-2014/2015-2017) contrasted with Minister William Ngeleja's (2007-2012) "belief in a mix (of power sources)"[164]. Muhongo's policy, also stated in public, involved a clear preference for gas, followed by coal and then hydropower[165]. Consequently, interviews with officials frequently reported a: "Focus on generation from natural gas"[166], as it "does not depend on the weather"[167], "that is the government priority, (it is the) … only source that can meet… immediate demands"[168]. Interviewees from donor organisations[169] and the private sector[170] widely commented on the "Energy Minister's deliberate policy"[171], reporting conversations or speeches where he said "we are just going to do gas, … it (hydropower) has failed us"[172]. This Ministerial preference reputedly stalled negotiations on contracts for dam and renewable projects including Ruhudji Dam, Singida Wind farm and other Rufiji Dams[173].

Alongside discussing seasonality issues, officials emphasised dams' frequently lengthy build-time and the difficulty of raising project finance because of their environmental impacts. The Malagarasi Dam was often used to illustrate the latter, with one official involved in the project

[162] Janus, and Keijzer, 2015; United Republic of Tanzania 2014: Interviews, Civil Servant, 2016.
[163] Interview, Senior Official, MEM, 2016.
[164] Interview, Former Senior CCM Official, 2016.
[165] Makoye 2015: Sospeter Muhongo, Inaugural Speech, Sustainable Energy for All Launch Event, July 2016.
[166] Interview, Senior Official, Tanesco, 2015.
[167] Interview, Officials, MEM, 2016.
[168] Interview, Senior Official, Tanesco, 2016.
[169] "Most of his neck bending towards natural gas and coal" (Interview, Official, Donor Agency, 2016).
[170] Interviewed in London, Dar-es-Salaam, Brasilia and Kigali, 2015-2016.
[171] Interview, Official, Donor Agency, 2016.
[172] Interview, Senior Official, Dam Construction Company, 2015.
[173] Chapter 7.

stating how it "shows that financing requirements are a difficulty"[174]. Planners in the Ministry and Tanesco referred to such issues as a reason for hydropower project delays, particularly given emphasis on build time: Whilst supposedly following a least cost rationale, the 2016 PSMP's plan, and interviews with officials, suggested speed was more significant in deciding priorities[175], with gas projects taking only one to two years compared to the complexity of coal and especially hydropower, with its need for numerous studies. To some extent then, hydropower has become less attractive because of Tanzania's adoption of time-consuming and expensive impact assessments and because of the decreasing acceptability of environmental impacts among international financiers. Reflecting this, and arguably the bias brought by MEM Minister Muhongo, the 2015 National Energy Policy states "challenges in developing hydro systems include vulnerability to hydrology and climate change; capital intensive; relocation and resettlement of affected persons; long lead times; inadequate hydrological data; and conflicting and competing land and water uses between various sub-sectors of the economy"[176].

Many energy-generation decision makers therefore increasingly recognise the limitations of dams in delivering development. However, this does not extend to a political understanding of the infrastructure entailing trade-offs. Moreover, prominent counter-narratives blamed hydropower failure on upstream communities. For instance cattle grazers in the Ruaha plain were held responsible for falls in Mtera Dam's reservoir[177]. Another narrative blames dams' operation[178]: Mtwara's water "used more than supposed to … rules on how to operate (the big Mtwara reservoir not followed)"[179]. Thus, Ministry and Tanesco planners have not abandoned hydropower. Even in the most critical Muhongo-era 2016 PSMP, large hydropower is part of

[174] Interview, Former Senior Official, Tanesco, 2016.
[175] Examples including interviewees citing of "gas' speed" (Interview, Officials, MEM, 2016) or "quick fix … only one year for gas" (Interview, Senior Official, Tanesco, 2015). This principle seems to have trumped the statistics in 2016 and 2012 PSMPs that state hydropower comparatively lower cost.
[176] Ministry of Energy and Minerals, United Republic of Tanzania 2015b, 12.
[177] E.g. "There is the 'issue of livestock keeping' that has hampered hydro, as well as other water pressures from agriculture and domestic supply" (Interview, Senior Official, MoW, 2015): Walsh 2012.
[178] Also stated in: Interview, Official, Donor Agency, 2016.
[179] Interview, Former Senior Official, Tanesco, 2016.

generation plans: "Seasonal variation of energy generated and vulnerability to climate change should be taken into consideration. … Still, hydro is the most economical source of power generation. … Therefore, maximum hydro capacity to be added will be limited to 4,700MW"[180], a figure in fact estimated to be Tanzania's total hydro-capacity. The advertising of Rumakali and Ruhudji Dams to investors in 2016[181] also demonstrates the continuing pursuit of hydropower, as does President Magufuli's recent steps in the sector: Firing Muhongo[182] in 2017, the President and new Energy Minister Kalemani now publicly proclaim the government's policy to pursue Stiegler's Gorge Dam's construction, making several speeches about the need for its implementation[183] and undertaking a construction tendering process[184].

In contrast to Rwanda then, Tanzania's more active debate about dam's climatic limitations, and their consequently vulnerable power production, has led to a less positive discourse around hydropower which played a role in delaying dam construction. Consequently, for many officials, dams are not the icons they were for Nyerere, nor are they asserted in a high modernist framing as deliverers of statebuilding and development through man's control over nature. However, the planning actions, interviews and statements analysed here, also demonstrate governments' continued hydropower pursuit. Therefore, the disconnect between strident dam planning and partial implementation is not merely related to the constrained hydropower debate, but to wider political factors holding back energy-generation construction generally.

The Nature of Tanzania's Fragmented Government

A key dynamic inhibiting government is the ruling CCM's fragmentation. As Gray argues:

[180] Ministry of Energy and Minerals, United Republic of Tanzania 2016, 56.
[181] United Republic of Tanzania, UNDP, and AfDB 2015.
[182] Muhongo's firing was immediately caused by a scandal on mining tax collection.
[183] E.g. Lugongo 2017; Luhwago 2017a.
[184] Mirondo 2017.

> "In contrast to the pervasive presidentialism in many African countries, the Tanzanian case suggests that behind the formal constitutional rules, power is considerably fragmented even at the top of a dominant party system. Despite the appearance of centralised authority, neither the President nor any one particular faction could enforce its particular agenda within the ruling party"[185]

This is echoed by Anyimadu:

> "Pacts between CCM factions have influenced the development of a governance culture that, although based on democratically held elections, carves up political space between secret elite groups"[186]. Therefore, "inner party workings are likely to hold as much political implication as inter-party competition"[187].

Under Kikwete then, although powerful, Tanzania's fragmented regime made cross-government planning and centralised implementation difficult. As Schneider[188] and Gray[189] argue, the state's inability to implement and coordinate its lower level officials and agencies is not new. However, academics report that it became particularly pronounced under Kikwete, with rival groups falling out, one led by Rostam Aziz and Edward Lowassa (Prime Minister between 2005-2007) and the other by Parliamentary Speaker Samuel Sitta[190]. Such fissures created policy disconnects. For instance, Jacob[191] records Kikwete's Pan-African leadership on climate change, with calls to maximise renewable power and chart a 'greener' growth path. He contrasts this with Minister Muhongo's pronouncements of Tanzania's right to pollute and planning for large coal generation.

[185] Gray 2015, 15.
[186] Anyimadu 2016, 5.
[187] Anyimadu 2016, 33.
[188] Schneider 2007.
[189] Gray 2018.
[190] Gray 2015. This later precipitated in a dual between Lowassa and the Kikwete-backed Bernard Membe for CCM leadership. Both factions cancelled each other out, allowing current President Magufuli to break through (Tsubura 2018).
[191] Jacob 2017.

This absence of unified authority and degree of ministerial independence, contrasts with the previous Rwanda chapter. There, numerous ministerial changes produced little to no policy shift. Conversely, for Tanzania, infrastructure projects did not need Presidential or wider cabinet sign-off if coming from within departmental budgets[192]. Thus, for Rusumo Falls Dam, after discussions concluded between the World Bank and the Ministry of Finance, the MEM Minister only reported the project's approval to the President, apparently not needing his, or the cabinet's, explicit endorsement[193]. Individualised power is further demonstrated by the above-mentioned policy change in MEM from Minister Ngeleja to Minister Muhongo that reputedly deprioritised advanced discussions on hydropower and renewable projects and contrasted with the President's apparent dam support[194]. Political fragmentation and independence also contributed to vagueness in government priorities, uncertainty over projects' decision-making process and confusion amongst investors and donors.

High level fissures fed into civil servant independence. A legacy of Tanzania's socialist period and its apparent belief in policy making by technocratic officials, is the state's large and empowered civil service and set of parastatals. These institutions and individuals played an important role in project implementation, particularly for private sector plant development. The latter must obtain an MoU, followed by a PPA with Tanesco, Water Permit, IPP Licence and various construction and health and safety licences[195]. This requires time-consuming engagement with myriad agencies and presents bureaucrats with opportunities to delay projects, and extract bribes[196]. One consultant consequently advised clients that to secure implementation, they were better off talking to lower-level bureaucrats than senior officials, ministers or the President[197]. Another investor described the importance of getting support from a respected mid-ranking

[192] Interview, Senior Official, MoW, 2016.
[193] Interview, Former Senior CCM Official, 2016.
[194] Further analysed in Chapter 7.
[195] Process described in: Interviews, Former and Current Senior and Junior Officials, MEM, 2016.
[196] Interview, Dam Investment Company, 2016.
[197] Interview, Official, Consultancy, 2016.

Ministry official[198]. An additional issue for investors is the lack of facilitation, for instance through the government undertaking preparatory design and feasibility studies[199]. Again, this contrasts with Rwanda's partially successful efforts at preparatory mapping of project potentials and in streamlining decision making through the RDB, or Gore's case of Uganda's large, privately-financed Bujagali Dam[200].

Grand corruption is an interweaving factor here. As Kelsall[201] and Gray[202] argue factionalised politics makes disciplining corrupt practices, and directing economic rents to national development, difficult. Thus, following CCM's increasing fragmentation under Kikwete, the energy sector suffered further grand corruption schemes after 2005, compounding ongoing costs from IPTL. The first of these in 2007, involved a project contracted to supply 100MW of power. The company engaged, Richmond Ltd, was registered to a residential address in Houston and had no prior energy-sector experience. Under its ownership, and that of subsequent proprietor Dowans Holdings, no electricity was produced despite both companies receiving capacity payments from Tanesco[203]. Generation only began under US-firm Symbion[204] in 2011[205]. The other major energy-sector scandal involved the escrow account accumulating payments from Tanesco to IPTL from 2007 whilst lawsuits proceeded. US$222million was taken from the account in 2013 on the pretext that a new company had bought-out IPTL's original Malaysian owners. However, this original Malaysian firm was in receivership from 2005 and there is no verifiable evidence of IPTL's legal sale. Subsequent investigation by Brian Cooksey[206] and the Parliamentary Public Accounts Committee unearthed a list of officials bribed to allow the escrow transaction to proceed[207]. Such

[198] Interview, Official, Dam Investment Company, 2016.
[199] Micro-hydro, wind and solar projects have little support (Interview, Civil Servant, 2016).
[200] Gore 2017.
[201] Kelsall 2013.
[202] Gray and Khan 2010; Gray 2015; Gray 2013.
[203] Eberhard et al. 2016.
[204] This company also operates in Rwanda.
[205] Gratwick, Ghanadan, and Eberhard 2006.
[206] Brain Cooksey is a long-standing energy-sector corruption researcher.
[207] Cooksey 2017; Africa Confidential 2017b.

debilitating corruption was not isolated with other notable cases involving military procurement from BAE-Systems[208] and the Central Bank's External Payments account[209].

Energy-sector corruption has several consequences. The first is Tanesco's increasing debt, with Cooksey estimating IPTL's accumulated cost from the 1990s to 2017 to be $2-3billion. Such corruption, along with the continuing expensive IPP payments (accounting for 90% of Tanesco's revenue in 2009[210]), hampers new infrastructure spending and makes fulfilling contracts with corporate electricity generators difficult. Consequently, after high-profile defaults[211], Tanesco's PPAs lack international 'bankability'[212]: As investors use such PPA contracts to raise finance, Tanesco's low financial credibility makes private-sector electricity-generation construction difficult. This is an issue given the government's preference under Kikwete for IPPs, particularly in dam development. Grand corruption also pushed government to facilitate fuel-driven emergency power rather than long-term generation. Relatedly, "prior to his election Magufuli alleged that Tanesco employees were purposefully sabotaging dams in order to cut electricity supply so that they could receive kickbacks from fuel importation"[213]. In interviews, donors and private sector officials made similar allegations when explaining electricity-generation projects' lack of progress.

A further entailed characteristic of Tanzania's fragmentary regime structure is the governments' relative passivity. The state's limited political and financial ability to plan and implement means that beyond insistence on a broad megawatt mission, the agency of donors and of private sector investors is significant in influencing some projects' implementation. Donors influence partly stems from their financial contribution to the national government and MEM budget: Donors, for instance, provided 20% of the national government budget between 2012-

[208] Lofchie 2014, 219.
[209] Gray 2015.
[210] Africa Confidential 2011.
[211] Tanesco has defaulted on payments to Symbion in 2016 and previously IPTL (Cooksey 2017; Eberhard et al. 2016).
[212] Interviews; Senior Official, MEM; Official, Donor Agency; 2016.
[213] Anyimadu 2016, 23.

2014[214]. More significant, is the enabling role of their finance, as analysed in Chapter 6 in regard to Rusumo Falls: Given Tanzania's passivity, World Bank funding and Nelsap's policy work were crucial elements in the progress of that dam. The African Development Bank's finance has also accelerated Kakono Dam[215]. Both projects planning has progressed despite being excluded from initiatives like the BRN and despite the 2016 PSMP stating Kakono's implementation for 2027. This dynamic also factored in the 1990s Kihansi and Pangani Dams, where Nordic-finance pushed the projects' construction during a period of growing state retreat in the energy sector. The micro-hydro sector demonstrates a similar outcome. Developers like Rift Valley Energy[216] and donors including UNIDO, the EU and a recent DfID-SIDA scheme, construct micro-hydros[217] despite this technology receiving little mention in MEM's flagship plans or in interviews with government officials[218]. Moreover, as already discussed, the state's lack of specific-project planning means that private companies undertake studies of electricity potentials on specific hydropower, solar and wind sites and push the process of negotiations.

Civil servants in MEM thus understand their role in a passive way. For instance, one stated that "MEM's purpose is to mobilise resources"[219] rather than direct change, and another that the "private sector leads", choosing and driving projects stated in the PSMPs[220]. External actors are not all powerful as demonstrated by Songas' status as the only commissioned large-scale, ostensibly non-corrupt[221] IPP to date. Additionally, although written into the 2013 Sector Roadmap and pushed by USAID, the AfDB and the World Bank, an initiative to unbundle and privatise Tanzania's energy sector to a UK-style, competitive-market model[222] has not been

[214] Anyimadu 2016.
[215] AfDB 2018.
[216] The company recently commissioned the Mwenga Dam.
[217] Interviews, Official, Donor Agency, 2015-2016.
[218] MEM; Tanesco, 2015-2016.
[219] Interview, Senior Official, MEM, 2016.
[220] Interview, Former Senior CCM Official, 2016.
[221] Non-corrupt in comparison to Richmond-Dowans and IPTL.
[222] The UK is arguably the most liberalised energy sector globally.

implemented by MEM and Tanesco[223]. This reinforces this chapter's characterising of Tanzania's energy sector as unpredictable and marked by a contrast between stated ambition and minimal implementation across all technologies. This is perhaps most notable in coal, promised from the start of Kikwete's Presidency but with no on-the-ground presence. Therefore, to explain the lack of progress in Tanzania's energy sector, analysis of the state is key. Here the fragmented, non-pyramidal nature of government entailed financially-crippling grand corruption, preventing an implementation regime with a clear, prioritised agenda for future electricity-generation projects.

Conclusion: Fragmented Authoritarianism and the Altered Context of the Dam Resurgence

The Tanzanian government's core rationale for resurrecting the planning and building of dams follows a high modernist megawatt mission, with the scale of its ambition premised on an assumption of electricity's potential to generate development, an idea stretching to colonial 'building ahead of demand' principles. Furthermore, practices overlooking dam impacts and displaying a total consensus on the regime's empowerment of technician's in decision making, knowledge production and construction, render dams apolitical. This demonstrates that the *how* of dam implementation continues to follow particular elements of high modernism, even if rationales differ by focusing on the megawatt not the dam. Thus, this chapter demonstrates specific areas of energy sector planning and project implementation that follow high modernist idea-practices, albeit alongside non-ideological rationalisations: Having been *the* electricity producer, dams have path dependency. They are the familiar option for energy-sector planners, with major dam sites and their potentials known or even studied to feasibility stages.

However, government planners also understand dams as problematic infrastructures. Experience of their climatic vulnerability, of the withdrawal of finance by institutions sensitive to

[223] This was dismissed by interviewees at Tanesco (Senior and Junior Officials, Tanesco, 2016).

socio-environmental effects and of encounters with time-consuming impact assessments and expensive mitigation and compensation, all inform this less positive discourse: Dams are no longer celebrated symbols of modernity. This finding highlights the thesis' claims about the different context of the dam resurgence: Reforms outlined in Chapter 1 in response to protests, the World Commission on Dams and international dam-industry initiatives, have created a set of policy-practices that entail longer planning processes and costly benefit sharing. Partial adoption of these policies contributed to decreased enthusiasm for dams, delaying some project's construction. This finding builds the thesis' theorisation of bricolage, furthered in the following chapters' case studies. Moreover, it speaks to Pitcher and Askew's[224] concept of post-socialism that describes continuity and change caused by legacies of socialist-era policies that coexist with growing reforms.

Despite stated intentions, investment and planning, Rusumo is Tanzania's only major dam under construction. This marks two of the chapter's key contributions, the first evidencing the limitations of dam resurgence and the second, furthering the thesis' conceptualisation of the formula enabling high modernist development. Given that this chapter demonstrates the presence, and at times the influence, of high modernist rationales and given Tanzania's continued authoritarian statehood[225], based on Scott's model, one would expect implementation of energy-generation projects. However here, as government power fractured between different blocks within CCM, so too did the ability to act uniformly, preventing the realisation of ambitious energy-sector plans. Infrastructure projects are still possible but with different, often corrupt agendas ruling areas of government, facilitating investors, raising finance and coordinating complex dam implementation is difficult. As Chapter 6's analysis demonstrates, that Nelsap undertook such key planning roles in Rusumo Dam, makes its status as Tanzania's only dam project under construction is less surprising. The chapter therefore demonstrates the need for a complex understanding of

[224] Pitcher and Askew 2006.
[225] Paget 2017a; Gray and Khan 2010; Kelsall 2013.

the state that goes beyond the label of authoritarianism. It indicates the need for pyramidal centralisation of decision making in order to construct ambitious, coercive and potentially-impactful dams along high modernist lines. This conclusion is important for the thesis' analysis of the factors enabling high modernist development: Rather than Scott's formula of simply labelling high modernist authoritarianism, this analysis demonstrates that the ideology's implementation requires a particular constellation of power within a cohesive state: Implementation is undone by fragmented regimes, even if they constitute powerful authoritarian states. Whilst showing resurrection of a statebuilding mission, influenced by high modernist idea-practices the chapter also demonstrates adoption of particular dam reforms, the rhetoric of free markets and policies of private-sector led growth.

Whilst it is too early to draw definitive conclusions, President Magufuli's tenure does appear to be changing Tanzania's political settlement. He has, at least symbolically, transformed the status-quo tightening government spending[226] and cracking down on perpetrators of corruption scandals, including arresting IPTL's protagonists[227]. Additionally, he has managed to exert authority over CCM's internal governance, removing power from previously-influential factions[228]. Moreover, interviews within[229] and outside government[230] indicated that decision making has become far more centralised and focused on the Presidency, implying an increasingly pyramidal structure and greater government cohesion. Furthermore, the energy sector appears to have a clearer direction, with the commissioning of the long-delayed Kinyerezi II and with proposed projects like Kilwa-Coal and Stiegler's Gorge given government budget allocation in 2018. Whether this takes Tanzania towards Rwanda's level of centralised power, and whether this accelerates energy-generation and dam construction, remains to be seen.

[226] Anyimadu 2016.
[227] Cooksey 2017.
[228] Africa Confidential 2017a; Brankamp 2015; Paget 2017b.
[229] Interview, Former Senior Official, MEM, 2016.
[230] Interviews; Officials, Dam Investment Company; Former Official, Brazilian Embassy; 2016.

The Politics of Dam Resurgence: High Modernist Statebuilding and the Emerging Powers in Africa

Volume 2

Barnaby Joseph Dye

Chapter 5

The Nyabarongo Dam: Rwanda's Statebuilding Mission in Practice





Figure 31 Depicting the dam wall whilst under construction in 2014 (above); and the sign highlighting the project as an India-Rwanda Collaboration (right)

On a sharp bend of the Nyabarongo River, in the mountainous Western ridge of the Rift Valley, Rwanda's largest dam stands. Predominantly subsistence, scattered, smallholder farmers densely populate the surrounding landscape. Nyabarongo river, springing from the upstream Nyungwe Rainforest is technically the source of the Nile. A dam wall, 45m high and over 240m across, now blocks this famous river's passage. It creates a reservoir stretching over 27km, diverting water through a 1.2km long tunnel and forcing it through two turbines to create up to 28megawatts (Figures 31 and 32). Whilst this generation capacity is small for a large dam, it will be significant for Rwanda. When started, the country's total generation capacity was 41MW and today, the dam constitutes Rwanda's largest power plant. Nyabarongo is also significant for its financier, the Indian ExIm bank. As particularly highlighted in their 2014 annual report, it represents the ExIm Bank's first hydropower plant in Africa. The bank provided US$80million of low-interest loans to Rwanda for construction. Indian companies Angelique International and Bharat Heavy Electricals Limited (BHEL) built civil and electro-mechanical components respectively, as depicted in Figure 31's sign. The Rwandan government and its Indian enablers hail Nyabarongo Dam as a success[1]. However, for workers and local residents, Nyabarongo's construction has not been without incident or cost. Two workers died during construction and multiple accidents were reported. Moreover, the project site, access roads, quarries and reservoir cover over 650ha[2], requiring appropriation of land from over 4000 households. Additionally, for the government, the total initial contract for the dam was US$97million, but construction delays and complications caused this to rise to $112million by completion in 2014[3]. Thus, with such socially and geographically distributed trade-offs, Nyabarongo Dam is political.

This chapter is the first of three case studies focusing on individual dams, their political ecology, geography and politics. These chapters analyse the planning behind the distribution of

[1] This is demonstrated by a Rwandan Presidential Letter of Thanks and an Indian CII-ExIm Award (Reported in: Interviews, Senior Officials, Angelique and BHEL, 2016).
[2] This was the estimated figure before the reservoir was enlarged (detailed below).
[3] Aecom 2015.

dam-benefits, the process of impact assessment, specific design decisions and attention to mitigation, compensation and benefit sharing. The three chapters also chart each dam's history and specific drivers for implementation and construction practices. Therefore, these chapters provide detailed empirical case studies addressing the thesis' questions on the *why* and *how* of dam construction.

Through analysis of the Nyabarongo Dam, this chapter furthers the thesis' key arguments about the dam resurgence. It demonstrates the presence of high modernist idea-practices in Nyabarongo's implementation: Decision making was exclusively expert centric (thereby invoking the *technician's realm),* overlooked impacts and much of the Nyabarongo Valley's specificity (*invisiblising)* and was used by the Rwandan government to advance its policy of transforming rural society and agriculture (*enabling social engineering*). However, alongside demonstrating high modernism's presence, the chapter describes limited rhetorical praise for Nyabarongo Dam which was not seen as an icon of development. This contrasts with Chapter 1's historical cases. It also demonstrates the presence of reformist ideas in ambitions to spread benefits locally. In addition, this case study illustrates Chapter 3's conclusions about Rwanda's megawatt mission, the driving ambition to increase generation capacity that defines the country's energy sector. Nyabarongo also furthers Chapter 2's themes, demonstrating a case study of India's dam building in Africa. It shows the leading role of corporation Angelique in negotiating the project and the influence of the Indian ExIm Bank's no-conditions approach.

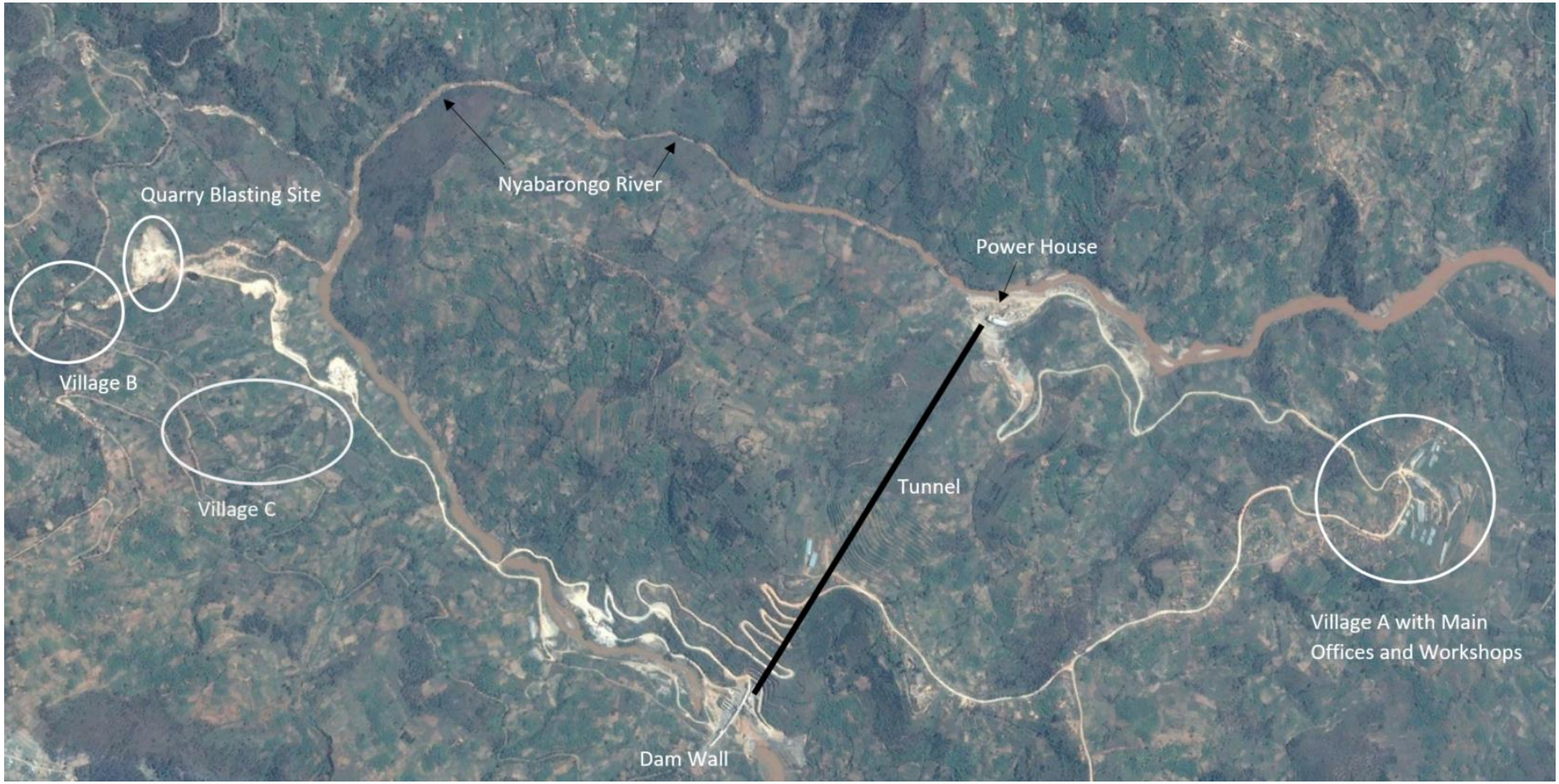


Figure 32 Annotated Google Earth map showing the project's layout and approximate location of the three studied villages

The chapter starts with Nyabarongo's 1990s history. It then situates the dam within Rwanda's megawatt mission and examines the negotiations to secure finance and contractors between 2006-2008. This section thereby analyses the drivers for the dam resurgence and absence of discourse *imbuing dams with development*. The chapter consequently turns to limitations in knowledge production about the valley's physical and human geography that had technical consequences for electricity generation and social consequences for compensation. Lastly, the chapter analyses the influence of reformist, benefit-sharing ideas in limiting Nyabarongo's construction *enclave*, its separation from local society.

Research around Nyabarongo involved extended interviews, participant mapping and field-walks (detailed in the introduction) with over 50 local residents (appendix one) across three villages displayed in Figures 32 and 33. Village A refers to a larger settlement with shops and bars surrounding the construction-site offices and warehouse that seemed to gain more from the dam.



Figure 33 (clockwise) Village A (with the Contractor's Offices and Workshops); the centre of Village B; and more Scattered Village C

Village B is older and affected by its proximity to a quarry. Village C is a more scattered community on a hillside, some of whom protested against delayed compensation. Interviews are anonymised to the village level. Therefore they are signified with a number and village letter, giving 1A, 14B, 5C etcetera. As this label only refers to an interview, it could constitute a household or individual.

History and Planning Process

Planning for Nyabarongo started in the closing phase of the 20th Century's dam boom. Feasibility and design work began in 1992 under French engineering consultant Sogreah[1], with support of European Donors[2]. Civil war and genocide against the Tutsi postponed completion of feasibility[3] and environmental[4] reports to 1999[5]. These reports were considered detailed enough to start tendering for implementation and indeed the dam was recommended in a 2002 energy-sector expansion plan[6]. Therefore, the project was well advanced when the RPF assumed full control of government in the first post-genocide national election in 2003. As Chapter 3 describes, the modernising vision of the RPF and a drought-induced power crisis produced ambitious plans to build electricity generation. Nyabarongo, as the most prepared energy project over 20MW, was a "super high priority"[7]. Consequently, its planning "started as an idea in 2004, 5 or 6 (when energy became more important) … it was (part of the) … long term solutions (being thought of at that time)" [8].

However, a period of contract management of the utility company Electrogaz from 2003 to 2006 delayed progress. Similar to Tanzania's experience[9], Pohl[10] describes how Lahmeyer

[1] The World Bank and UNDP 1991.
[2] Interview, Former Senior Official, Mininfra, 2016. Evidence for KfW and BTC.
[3] Sogreah Consultants 1999a.
[4] Sogreah Consultants 1999b.
[5] Interview, Official, Mininfra, 2014.
[6] Dane Associates Ltd and the Israel Electric Corporation Ltd 2002.
[7] Interview, Former Senior Official, Utility, 2016.
[8] Interview, Former Official, Mininfra, 2016.
[9] Chapter 4.
[10] Pohl 2016.

International focused on capitalising the energy Utility[11] at the expense of spending on infrastructure construction and planning[12]. Thus, progress was delayed to 2006, when the government updated Nyabarongo's plans[13] and aimed to use national budget finance to start construction. However, initial studies indicated the dam would entail prohibitively large costs given Rwanda's financial situation[14]. One official described: "When the project … started (it was planned to) use public funds … but the World Bank and IMF said no, (you should have other priorities and finance is too constrained)"[15]. Therefore, Rwanda required international finance. Approaches reportedly came from KfW, the German Development Bank[16], Infraco, a firm financed by Western donors[17] to enable infrastructure building in developing countries, and Indian company Angelique whose "marketing team got wind" of the plans. As a senior official narrated, "(we were then) approached by an Indian company … (they) wanted to come and fund with an ExIm bank (loan) … they (said they) could handle the ExIm Bank". The ExIm Bank option promised cheap finance on generous terms[18] and was preferred by officials who perceived it as "very quick"[19], with "very low demands"[20] including less bureaucracy[21].

Thus, in 2006, Rwanda submitted a request to India's Ugandan embassy[22] for an ExIm loan. This engagement with Indian finance follows the model described in Chapter 2, with Angelique approaching Rwanda to initiate an ExIm Bank loan and then actively facilitating its

[11] Whose name changed from Electrogaz to RECO to EWSA to REG/EDCL (Chapter 3).
[12] Echoed by other interviewees, e.g. Senior Official, REG, 2016.
[13] As one interviewee stated, "we built on these studies" (Interview, Former Senior Official, Mininfra, 2016).
[14] As one Official stated "commissioned studies … in 2006… that is when they found how much it would cost … owing to our economic strength, it was difficult at that time" (Interview, Former Senior Official, Utility, 2016).
[15] Interview, Senior Official, Utility, 2016.
[16] Minister of State in Charge of Energy and Communications and Government of Rwanda 2007.
[17] UK (DfID), Netherlands (Foreign Ministry) and Switzerland (Economy Ministry).
[18] India's ExIm Bank follows World Bank interest rates and includes long repayment terms.
[19] Interview, Official, Mininfra, 2014.
[20] Interview, Official, Mininfra, 2014.
[21] As on interviewee commented, "paperwork I think faster" (Interview, Former Senior Official, Utility, 2016).
[22] As it covered Rwanda (see Chapter 2).

passage through the Indian government's decision-making process. As a Rwandan official reported, the Indian "companies do the harder part (of the ExIm negotiations) … not a complicated thing as long as the Indian government wants to give the loan"[23]. As Nyabarongo already had a significant level of planning, including feasibility studies, the approval of its detailed project report was allegedly straightforward[24]. The relative ease of this process, its low conditions and speed, led a senior official involved to state "it was a relief to the government (when the Indian company came)"[25]. During the process BHEL joined Angelique, partly as they are the only Indian supplier of large-scale electromechanical equipment, but also because the company wanted to increase their project-management experience. In negotiations, the Rwandan government secured agreement for India to train 10 to 15 technicians to operate and maintain the plant[26] and asked BHEL, as the more reputable company with marginally more experience of project management[27], to lead the construction consortium. As one Rwandan official stated "we obliged them … to make sure that we have a product … (to ensure the contractors had) the technical capacity"[28]. Rwanda also wanted an internationally-recognised engineering consultancy to produce the dam's technical designs, resulting in the appointment of the Australian Snowy Mountain Electrical Corporation (SMEC). The contract with the Angelique-BHEL consortium and ExIm Bank was finalised in 2008[29].

In line with Rwandan law[30], Mininfra then commissioned an environmental, social and compensation assessment. Canadian firm CIMA International undertook these in 2008. Then in 2009, the Rwandan government appointed well-known Canadian firm RSW-Inc as the Owner's Engineer, a role involving the supervision of construction quality and timeliness (Aecom then bought RSW-Inc during Nyabarongo's construction). As part of the studying and updating of

[23] Interview, Former Senior Official, Mininfra, 2016.
[24] Interviews; Senior and Junior Officials, MEA; Senior and Junior Officials, ExIm Bank; 2016.
[25] Interview, Official, Mininfra, 2016.
[26] Interviews, Senior and Junior On-Site Engineers, 2014 2016.
[27] BHEL and Angelique's differences in project management experience are detailed in Chapter 2.
[28] Interview, Former Senior Official, Mininfra, 2016.
[29] Law No. 26 of 2008 25th of July (Announced in Gazette No. 15 on 15th of Sept. 2008).
[30] Organic Law no. 4 of 2005 (Environment).

designs for the dam, the river bed was found to have risen two metres in 20 years. This would have reduced hydropower potential. Consequently, the Rwandan government pushed for a design revision that raised the dam structure, added sluice gates and lengthened the reservoir to keep power production at 28MW[31]. Once agreed, dam construction began in 2010.

Justifications for Nyabarongo Dam

The Indian ExIm Bank played an important role in enabling the construction of Nyabarongo, arguably reducing its cost and the time taken over planning stages. However, the Indian state had a passive role and at no stage seemed to question the need, developmental impact or standards of the dam. Therefore, the Indian Foreign Ministry and ExIm Bank had little direct influence on the project and its planning. Conversely, the most involved Indian organisation initiating engagement and facilitating the ExIm loan was Angelique. BHEL played a lesser role, only seeking direct involvement in construction. Overall then, the Rwandan government is the most important actor in terms of resurrecting Nyabarongo Dam. Their interest lay in the megawatts delivered by the dam and with this primary priority, they pushed a redesign to keep megawatt generation potential, regardless of increased impact. The government also stressed the importance of timely implementation, hence the decision to add an experienced owner's engineer and inclusion of less bureaucratic Indian finance and companies. As analysis below demonstrates, the latter allowed them to conduct limited environmental and social studies. These priorities stem from the political importance and ideological belief in Rwanda's megawatt mission, analysed in Chapter 3, that mandated ministers and ministries to deliver projects to ambitious electricity-generation targets. Many interviewees in Mininfra and the Utility described top-down pressure, with one commenting on President Kagame's personal interest in receiving frequent updates on

[31] Interviews; Senior On-Site Engineers, 2014; Senior Official, Utility, 2016; Aecom 2015.

Nyabarongo: "Sometimes (Nyabarongo's progress) helped by the head of state … (who) took a close interest in energy"[32].

Thus, Nyabarongo played an important role in advancing Rwanda's megawatt mission: Its prior planning facilitated its status as the first post-genocide large commissioned energy project. As Chapter 3 establishes, beyond practical value, successful construction is important as it demonstrates Rwanda's developmental progress to international investors and donors and appeals to a domestic audience that desires an end to power cuts. The dam's decision making, as analysed below, is also a product of this megawatt mission with Rwanda's stringent implementation culture focusing almost exclusively on installing generation rather than wider energy criteria like reliability. Whilst an additional reason for choosing Nyabarongo was its status as having the lowest electricity-production cost, this was not seen as a primary driver[33]. This focus, like Rwanda's other hydro-projects[34], underlines the changed characteristics of the dam resurgence where attention is primarily on producing electricity not the developmental symbolism of the dam infrastructure. In interviews, government officials in Mininfra and the energy Utility saw the dam merely as a practical solution, not an emblem of development. These comparatively understated claims were further underlined by President Kagame's inauguration speech which focused principally on Rwanda's electricity-generation mission. He presented the dam as a contributor to energy-sector aims, imbuing electricity, rather than the dam, with development:

> "We are not developed enough, we do not have enough electricity, there is a link between them. We want to do our best so that our country can have enough electricity which can be used in households, at schools, hospitals, working places and factories"[35]

[32] Interview, Former Senior Official, Mininfra, 2016.
[33] Interview, Consultant, 2016.
[34] Listed in Chapter 3, including Rusumo Dam.
[35] Translated by Valens Rutazihana.

The event was also somewhat understated, with this key speech given in Kinyarwandan. This strongly contrasts with the applied high modernist concept *emphasising the spectacle*, detailed in Chapter 1.

Environmental Knowledge Production

CIMA's environmental assessment (EIA) took place in 2008 but had little impact on Nyabarongo's design or decision making. A civil servant working on the dam stated that they were "not thinking about impacts", that "environmental and social concerns (were) not involved in project planning"[36]. Indeed, officials denied or overlooked a number of potential impacts. Echoing Chapter 3's analysis, engineers[37] involved in Nyabarongo explained that the dam's run-of-river design would mean no downstream changes. Its current operation contradicts this as it reportedly varies flow significantly, often using the dam to meet evening peaks in electricity demand[38]. Similarly, regarding sediment, engineers on-site insisted that "very fine sediment and sluice gates (in the dam wall) so no problem"[39]. There will be "no (sediment) maintenance issue (because of) flushing (through the sluice gates) and fine sediment"[40]. Whilst sluice gates have some ability to clear sediments, especially from the area immediately behind dam walls, their effectiveness depends on singularly operating the dam to this end[41]. In contrast, Nyabarongo is currently geared to meet peak power[42].

These officials' optimism also contrasts with the two-metre rise in Nyabarongo's river bed over twenty years and this river's high sediment load. It also jars with experiences on other Rwandan hydropower projects. For instance, the smaller, 9.5MW Rukarara Dam was built with

[36] Interview, Official, Mininfra, 2016.
[37] Interviews, Senior and Junior On-Site Engineers, 2014.
[38] Chapter 3.
[39] Interview, Junior On-Site Engineers, 2014.
[40] Interview, Senior On-Site Engineers, 2014.
[41] Reportedly, in strongly seasonal hydrological contexts, fully opened gates can produce relatively effective flushing during the peak flow season. This could reduce hydropower potential in the dry season (Correspondence with experienced, dam civil engineer, June 2018).
[42] For an example of discussion on reservoir operation and 'flushing', see Kondolf et al. 2014).

government finance between 2006 and 2009 without a substantive EIA. However, it quickly became unusable, in part because of sedimentation. This initiated a parliamentary investigation that criticised the absence of an EIA and of practices to mitigate sedimentation[43]. Nyabarongo has suffered similar issues since its 2015 completion. A number of officials reported that the reservoir "filled up with sediment"[44], with one admitting that "Nyabarongo (and others like Rukarara) … show that sedimentation is a problem"[45]. The Utility now "intends to use a dredger"[46] to remove sediment and explains the need to reduce upstream erosion[47]. The environment agency REMA manages this. One of its officials described: "you can really see what is happening there … erosion now really happening (in the upstream catchment area and so) … sediments are very high … Just after the commissioning (of Nyabarongo) … spent a whole week in a mining concession … (I managed to) close that, but then illegal mining (carried on)"[48]. Thus, Nyabarongo's subsequent experience, along with those of other Rwandan hydropower plants, demonstrates the significance of overlooking sediment analysis[49].

Topographic and hydrological studies demonstrate similar limited attention to the project's geography. Poor topographic studies were blamed by REMA officials for the reservoir being several kilometres longer than estimated: "When they started (filling the reservoir), the distance flooded (increased. Supposed to be) … 22km but goes up to 25km"[50]; "Topography studies (were) not very accurate ... normally when well done, then very easy to know when the flood[51] will reach"[52]. This resulted in an additional emergency compensation process in 2014-

[43] Tasamba 2011; Karuhanga 2011: Interviews, Officials, Utility, 2015-2016.
[44] Interview, Official, Dam Investor, 2016.
[45] Interview, Senior Official, Utility, 2014.
[46] Interview, Official, Utility, 2016.
[47] There is a "problem with sedimentation ... (but) now doing catchment area management … (because) sediments (are) from a badly managed catchment (particularly from upstream mining)" (Interview, Official, Utility, 2016).
[48] Interview, Official, Governmental Environmental Organisation, 2016.
[49] Water with lower sediment load has higher energy, entailing faster bank erosion.
[50] Interview, Official, Governmental Environmental Organisation, 2016 .
[51] Here the interviewee meant the reservoir.
[52] Interview, Senior Official, Governmental Environmental Organisation, 2016.

2016[53] for those suddenly loosing agricultural land. Hydrology studies appear similarly limited. Presumably, a data set existed for the Sogreah studies in the 1990s, but further recordings were only taken after construction started between 2010 and 2014[54]. Hydrological data is important for dam design and operation, with a run-of-river project expected to maintain the reservoir's level to ensure maximum electricity generation. Thus, it is significant that since Nyabarongo's commissioning, especially in the dry season, the project frequently generates half of its potential power (14MW) or is also only used for the evening demand-peak because of low reservoir levels[55]. Consequently, a REMA official commented, "not sure if hydrological studies done really very very well … water balance not very good in some seasons (so the reservoir gets very low)"[56].

CIMA's environmental study therefore appeared limited in detail and un-influential in Nyabarongo's design. This partly stems from the Indian ExIm Bank's standards, which could have mandated detailed assessment and environmental mitigation practices. Rwandan government practices were also important. A senior official explained that Nyabarongo Dam's "design and procurement (happened) before REMA instituted"[57]. This meant that for the early phase of hydropower projects, although legally required to undertake assessments, the only government organisations assessing studies were Mininfra's energy division and the energy Utility. Thus, contracted companies were "responsible for everything (including the EIA) … the government, (were) only looking at the energy component"[58]. Whilst REMA began in 2006, after the 2005 environmental law, its establishment took time, meaning it had not been involved in the Ministry-commissioned CIMA environmental study. In fact, interviewed officials in REMA claimed Nyabarongo had no assessment, further suggesting the EIA's low status and non-enactment: Planners "did not do an EIA before the start of the project", "the environmental component in the

[53] Interview, Official, Governmental Environmental Organisation, 2016.
[54] Aecom 2015.
[55] Interviews, Former and Current Senior and Junior Officials, Mininfra, Utility, Project Engineer, 2015-2016.
[56] Interview, Senior Official, Governmental Environmental Organisation, 2016.
[57] Interview, Senior Official, Governmental Environmental Organisation, 2016.
[58] Interview, Senior Official, Governmental Environmental Organisation, 2016.

design, not considered"[59]. Projects are normally stopped under such conditions. However, as recognised by REMA officials[60] and project engineers[61], Nyabarongo Dam's importance to the regime meant it went ahead with only an environmental management plan for implementation practices.

This environmental management plan focused on practices of the contractors during construction, particularly potential dumping and of soil and toxic products like petroleum. Whilst enforcing standards was an issue[62], the plan demonstrates the primary focus of REMA on implementation practices, not critical project assessment. As one official stated, "we organised it"[63]. Thus, Nyabarongo's environmental assessments fit the broader "rush to get energy" [64] in Rwanda. The aim to immediately install megawatts had unparalleled status within government, empowering energy officials to overlook consideration of the valley and even REMA's environmental-assessment standards. Thus, attention on the environment primarily concerned soil dumping and oil spills, not the reservoir's size, socio-ecological effects or hydropower's functionality. As well as demonstrating indifference to potential negative impacts caused by river intervention, this lessened the infrastructure's future technical proficiency: Optimum dam operation requires close attention to the environment.

Inexperienced Contractors

Further challenges to environmental management and building quality stemmed from the experience and standards of Angelique and BHEL. As explained in Chapter 2, both companies lacked project management experience with neither firm having supervised a hydropower project

[59] Interview, Official, Governmental Environmental Organisation, 2016: Another also stated: "when we started monitoring the project, realised it didn't have (an EIA)" (Interview, Senior Official, Governmental Environmental Organisation, 2016).
[60] "(Pressure from) infrastructure people (in government) … said it was an urgent project, (so we) … sat together and saw what we can do (Interview, Official, Governmental Environmental Organisation, 2016).
[61] "(REMA) tried to assert authority … (saying that environmental) procedures not respected… but as a priority project allowed to go ahead" (Interview, On-site Engineers, 2014).
[62] Interviews; On-site Engineers; Officials, Governmental Environmental Organisation; 2014-2016.
[63] Interview, Official, Governmental Environmental Organisation, 2016.
[64] Interview, Senior Official, Governmental Environmental Organisation, 2016.

previously. Moreover for Angelique, Nyabarongo represented their first appointment as lead civil-works contractor. As one Angelique official stated, the dam represented a considerable risk, as "hydro projects have a lot of uncertainties … (and Nyabarongo) far bigger than what the company (initially) could handle ... (which) shows the daring nature of management"[65]. Angelique consequently underwent a recruitment drive, a process that did not always proceed smoothly[66]. For instance, the company suffered high staff turnaround, with younger engineers preferring work in India[67]. A project completion report also labelled the first Angelique manager from 2010-2011 incompetent and responsible for project delays[68]. Both firms' inexperience also influenced the quality of construction work. Reportedly, Angelique had not instituted internal independent quality control procedures and many of the managers were unfamiliar with the standards demanded by the Owner's Engineer. This meant that contractors were sometimes ordered to redo sections of work[69]. On-site engineers responsible for ensuring standards remarked that quality enforcement was consistently "a challenge" with the contractors' "lack of experience of any project types"[70].

This inexperience extended to safety procedures. One appraisal report stated that "the consortium's approach to safety has overall been poor … it is clear that unlike Western contractors, safety was well down on their list of priorities"[71]. Officials reported frequent accidents, despite calls for standards and procedures to improve, and two people were killed during construction work[72]. There is a degree of comparison here to the larger historic dams of Cahora Bassa[73] and Kariba[74], whose construction saw more frequent accidents and worker deaths.

[65] Interview, Senior Official, Angelique, 2016.
[66] Interview, Senior Official, Angelique, 2016.
[67] Interview, Senior Official, Angelique, 2016.
[68] Aecom 2015.
[69] For instance, Angelique was directed to re-face part of the dam wall (Interviews, On-site Engineers, 2014).
[70] Interviews, Officials, On-site Engineers, 2014; 2015.
[71] Aecom 2015.
[72] Interviews, Officials, On-site Engineers, 2014;2015.
[73] Isaacman and Isaacman 2013, 83: Approximately 50 Mozambicans died.
[74] Tischler 2013.

A similar pattern was evident in Angelique and BHEL's environmental sustainability procedures: A government official asserted that "the construction companies are not environmentally sensitive". An official from Angelique seemed to acknowledge this, suggesting such environmental procedures were less important: "There was a concern that … if we are so (environmentally) conscious, Nyabarongo would not get built". Therefore, Angelique and BHEL's corporate experience and approach to safety and socio-ecological standards mattered in implementation.

Rwandan officials did however describe how working with these contractors and the experience of Nyabarongo's implementation more widely, "served as a good lesson"[75], teaching them about the need to "spend as much as possible during the design"[76] and further anti-erosion programmes such as afforestation and terracing[77]. However, such lessons follow Chapter 3's argument: Although describing the need for dam planning that does not *invisiblise* the biophysical system, proposed changes do not question dams given Rwanda's environmental situation or given potential development trade-offs with downstream agriculture and with the mining activities curtailed in the name of river-basin management. Moreover, these lessons show continued faith in expertise to solve what are partly political trade-offs and do not change the *technician's realm* seen in Nyabarongo's planning. Analysis of social impact assessments and compensation further demonstrates this.

Social Impact Knowledge Production

Rather than address impacts, CIMA's assessment primarily organised legally-mandated compensation. Conducted in under a year, in contrast to Rusumo's multi-year study (Chapter 6), the consultants relied on government data and close engagement with district authorities to understand Nyabarongo Dam's locale. The planning process also included village meetings

[75] Interview, Senior Official, Governmental Environmental Organisation, 2016.
[76] Interview, Senior Official, Utility, 2016.
[77] Hove, Parry, and Lujara 2011: Also, to preserve soil fertility.

organised by local governments in the early stages of implementation, from 2008 onward. Interviewed government officials cited these when asked about participatory efforts within the project. Although invoking participation and offering the opportunity for consultation, the purpose of village meetings was primarily to sensitise populations, build trust and spread awareness of the compensation process, not gather knowledge to inform decision making. This has similarities to Lilienthal's so-called participation initiative with the TVA. Rather than extending decision making, this initiative involved close communication to assuage affected communities[78]. For Nyabarongo, villagers involved in the meetings spoke of the positive message given by government that assured those affected would get compensation and pledged future electricity access: "Electricity (was described as) a catch-all solution" and the source for "development"[79]. They also described how officials invoked national and even international importance to justify the dam, asserting that electricity would go to neighbouring Burundi and Congo, not just Rwanda. Such grand claims seem implausible given Rwanda's energy needs and Nyabarongo's meagre 28MW capacity. Indeed post-commissioning, Nyabarongo's power has only been used nationally.

CIMA's report postulated a brief list of negative socio-ecological impacts principally pertaining to displacement and excluding consideration of changes to the biophysical system. For instance, the report does not consider effects for fish, despite the visibility of fishermen around the dam site, at least in the wet season (see Figure 34). Nor does it consider effects on water collection, despite fieldwork recording people using Nyabarongo's water. Rather, relying on district and village government officials[80], the report's primary purpose was to collate the numbers and assets of



Figure 34 Depicting a fisherman by the power house

[78] Klingensmith 2007.
[79] Research diary, May 2014.
[80] According to CIMA 2009.

affected people. This list of assets, divided into buildings, cultivated land and forest, was wide ranging. It included garden plants and various house features like windows and doors. Each item or measurement of land was then given a standardised monetary value. Reportedly, this valuation aimed to reflect market prices[81] but did not include local consultation to ascertain the recipient or local community assessment. Thus, the focus of CIMA's report is on the implementation of compensation for direct seizures of land, not on livelihoods or the biophysical system and its economic and environmental services.

"True"[82] Values?: Nyabarongo's Compensation

A number of those interviewed stated positive impressions of the evaluation process. Neighbours or family members of those receiving compensation reported people moving to economically-advantageous locations in larger towns or nearer main roads[83]. One stated that only 20% of those receiving compensation had problems or were worse-off, whilst 80% largely benefited[84]. Many of those interviewed who were directly compensated were also relatively positive. Interviewee 6B lost part of his land, allowing him to continue farming. He then used the money to buy animals, which had increased his wealth, and urwagwa (banana beer), reportedly improving his happiness. Household 5B used compensation to double their amount of land owned. Additionally, household 1A received compensation for their house and a small strip of their land. They used the money, and probably savings made from their small wolframite pit-mine, to create a shop, build a larger house and hire casual farm labour. They also bought a new plot of land which, although over an hour's walk away, approximately doubled their total farmland. Benefits were also expressed by household 14A who lost a third of their land and used the compensation to build and rent three houses, increasing their income. For many involved therefore, the compensation process appeared relatively successful. Significantly however,

[81] Interview, Official, Utility, 2014.
[82] 10C.
[83] E.g. reported in interviews 12B, 13C, 11C, 6C.
[84] 12C.

interviewees expressed this through reference to livelihoods, contrasting with officials' narrower focus on the directly affected physical space.

Other compensated interviewees questioned the evaluation process. In Village C, interviewees considered compensated land at the bottom of the valley more valuable. This is because small streams provided irrigation and the area collects fertile topsoil deposited by the river in flood years and washed down the hill by rain. These two factors enabled year-round production and cultivation of a wide variety of crops, including tomatoes, avocados and aubergines that have a higher market value. Having replaced this land with uphill farms, household 1C now only grows soya rather than cassava and potatoes which reportedly fetch a higher market price. Figure 35, a map drawn by 4C, similarly highlights differences in agricultural potential. Although replacing the physical agricultural space lost, new land up the hill could not support the same crop variety. Thus, 4C's living standards decreased. This was described through reference to having less cash and meat consumption. Stories about households who were worse off after compensation further demonstrate local interviewees' emphasis on agricultural productiveness. Whilst also ascribing decreased living standards to laziness or the mishandling of money (normally related to drinking), it was just as common to attribute this situation to acquisition of unfertile land. This paramount valuing of fertility among the local population was not reflected in CIMA's report or the standardised land evaluation which only measured area.

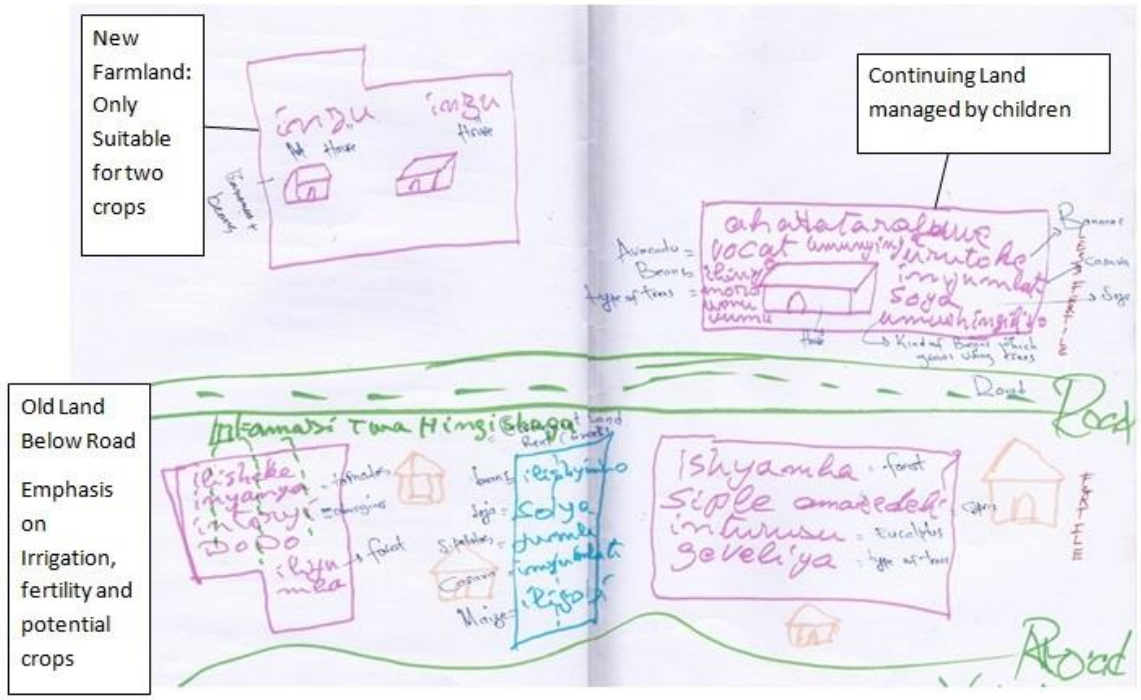


Figure 35 Map drawn with interviewee 4C contrasting old fertile and irrigated land below the road with new land bought through compensation above. The difference is highlighted by listing what crops could be grown

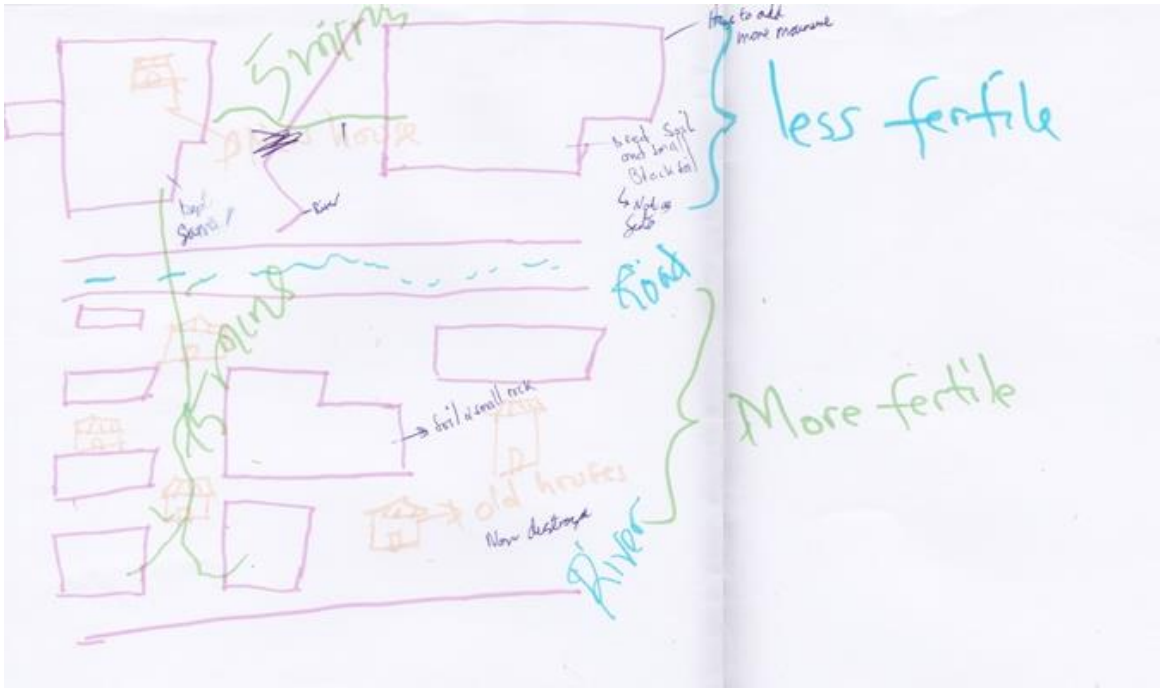


Figure 36 By Household 10C highlighting the fertility of compensated land owned by the river compared to replacement land up the hill



Figure 37 Depicting shrub and forest land

Similarly, 10C emphasises in Figure 36 that she now owned the same amount of land but, like 4C, had a lower living standard post-compensation. Both 4C and 10C lost forest plots and fields that were temporarily fallow when the evaluation happened. Interviewees described forest plots as highly valuable because trees provide construction materials and firewood. Moreover, along with fallow fields, they contain shrubs for animal fodder and plants used to make traditional banana juice and beer, the latter being the most significant income source among interviewees in Villages B and C. Additionally, fallow fields depicted in Figure 37 are a necessary step in the agricultural cycle to replenish fertility. Whilst the CIMA report does include trees in recorded assets, fallow fields and these other shrubs are not given values. Without knowledge of, or input into, the compensation's evaluation process, 4C asserted the injustice of an opaque scheme without market prices and 10C questioned whether the compensators had understood plots' 'true' values, asserting that they had "not been counted".

Underestimated and Missed Impacts

CIMA's assessment, and consequently the compensation process, also underestimated and overlooked key construction impacts despite their presence in project plans. Chief of these was the effect of blasting rocks at the quarry site to make gravel for the dam's cement. CIMA's assessment did not mention this activity and planners seem to have assumed effects would be

limited to a radius of approximately 200m, therefore only expropriating half of Village B's houses and farms. Fieldwork found quarry blasting to be far more significant. Explosions to break up larger rocks for the gravel crusher flung stones, frequently up to one foot long, onto fields and houses. These stones, and the vibration of the explosions, damaged roofs[85] and cracked house walls[86], illustrated in Figure 38. As a precaution, officials told villagers to leave the area when an alarm sounded. Villagers soon realised this was a necessity. 15B described the shock of having a roughly two-foot rock crash into a neighbouring room on the one occasion she decided to stay in her house after hearing the alarm. Additionally, 6B claimed that a child was taken to hospital after being struck by a falling rock.



Figure 38 Showing the impacts of blasting (clockwise): Roof damage; wall cracks; demonstrating the size of one large stone that reportedly fell on the house; stones fallen on fields

[85] Personal experiences reported by 7B, 5B, 11B, 14B, 15B.
[86] 9B, 11B, 13B, 13C.



Figure 39 Demonstrating the streams cut off by a construction road

Moreover, the blasts' ground-shaking damaged roots, particularly cassava and potatoes[87], and their dust affected plants[88] and people's breathing[89]. The severity of lost income is illustrated by family 8C, only affected by ground shaking but still losing 60% of two years' cassava harvest, making their child's secondary school fees unaffordable. These effects were most acute in the centre of Village B but ground shaking problems on crops and houses were felt as far as one side of Village C, demonstrating the considerable size of the damaged area. Despite construction plans including this activity, and reported complaints to local leaders, such quarry impacts were not predicted, fully investigated or included in compensation. Another unconsidered impact included the aforementioned valuable agricultural land on the valley floor (Figure 39). A construction road cut-off streams irrigating this area[90] and the dam's diversion of the river will likely stop deposition of fertile soil. Like the quarry area, the road was included in Nyabarongo's plans but not considered impactful by government planners, contractors or in CIMA's assessment.

[87] 7B, 5C, 8C.
[88] E.g. Reported damage to banana flowers (4B) and soya (8B).
[89] 5B, 7B, 11B.
[90] Causing complaints in interviews 1C and 4C.

This analysis therefore demonstrates the limited knowledge production involved in Nyabarongo's planning. The CIMA report does not consider land's productivity or replaceability. Moreover, impacts on local people's livelihoods, whether from quarry blasting, the river's diversion, fishing or water collection, remain overlooked. Thus, Nyabarongo's compensation involved a *technician's realm* that overlooked many of the dam's impacts and narrowly addressed the minimum legal requirement to reimburse expropriated land. Consequently, knowledge production followed high modernist practices, excluding local values and *invisiblising* dam-induced changes. Whilst government planners and contracted consultants maintained an apolitical concern with the physical space that would be needed, compensated and uncompensated villagers were worried about their ability to continue livelihoods.

Limited Responsiveness to Local Communities?

In contrast to the following Rusumo Dam case, this compensation process did not have a grievance mechanism. Despite this, citizens were able to extract some responses from the state. For example, in Village C[91], before residents had received compensation, workers started destroying a group of houses in 2009[92]. These villagers protested, managing to block trucks and tractors on a road leading to the quarry site. Local government and on-site officials promptly met with this disaffected group and reportedly sped up their compensation. Another instance observed during fieldwork involved a woman writing to the President's Office to complain about unfair compensation. This elicited a swift investigation from officials on-site into her case. Furthermore, the government acted on initially widespread corruption, known locally as the 'technique'. Partly caused by the long delay between assessment in 2008 and payment between 2010-2014, corruption involved richer people in the valley, and from outside, buying land in the compensation area, bribing officials to register family members for extra reimbursement or

[91] This protest has similarities to research on the indirect nature of resistance in Rwanda (Hahirwa, Orjuela, and Vinthagen 2017).
[92] Reported in interviews in Villages C and B and with on-site engineers (2014); Aecom 2015.

overclaiming land owned[93]. One government official described how "some guys trying to cheat the system … to get paid twice"[94]. After complaints from the community to the Presidency and REMA[95], national government conducted a "big investigation"[96] sending its ombudsman. An involved official remembered that "technicians (involved in compensation) put into prison and local leaders … they took money from expropriation"[97]. Convictions of local government officials and some villagers followed[98]. Furthermore, officials changed practices in the last four (of nine) compensation rounds, educating local government officials and using GPS trackers to precisely mark field boundaries.

These actions are significant in demonstrating a degree of local agency and in the government's keenness to ensure perceptions of fairness and control on corruption, the latter in line with a national anti-corruption stance[99]. Arguably, this demonstrates the adoption of reformist policies as the government responded to smallholder farmers rather than dismissing their experiences and livelihoods. Alongside ideational explanations, and following Chapter 3, such instances of appeasement and responsiveness also fulfil a strategic interest in appearing to treat rural populations fairly, based on an understanding of the regime's vulnerabilities[100]. This furthers evidence of the Rwandan state's complexity: The degree of responsiveness and learning rejects labelling Rwanda as simply draconian and inflexible. Rather, it demonstrates a government that is able to learn and insist on non-corrupt standards, thereby contrasting with case studies of past and present dams. Interestingly though, the actions here follow a feudalistic model where

[93] Reported in interviews in Villages C and B and with on-site engineers (2014); Aecom 2015.
[94] Interview, Former Senior Official, Utility, 2016.
[95] "Social complaints about compensation … so intervened" (Interview, Senior Official, Governmental Environmental Organisation, 2016).
[96] Interview, Former Senior Official, Utility, 2016.
[97] Interview, Senior Official, RPF, 2016.
[98] Office of the Ombudsman 2011, 73–76.
[99] E.g. Jones 2012; Kelsall 2013; Chapter 3.
[100] Analysis following Mann and Berry 2016.

the President berates servants for not following his bidding, thereby taking himself above critique and suggesting he has citizens' interests at heart.

Reformist Implementation?: Spreading Nyabarongo's Benefits

Alongside contrasting, albeit limited, responsiveness, national and district government planned a number of benefits for the local community during construction and in the long term.

Reduced *Enclave:* Employment and Local Economic Stimulation

National government pushed for employment of Rwandans in the project by limiting visas for Indian workers[101]. Angelique cooperated with this, increasing the number of Rwandan workers over time partly because of the high turnover of Indian labour. A government official stated that one third of the contractors'[102] workforce was Rwandan. An Angelique Official echoed this, recalling that they had between 140 and 160 Indian workers[103] during the peak period where 200-250 were employed on site[104]. A number of Rwandans received training for these jobs, becoming drivers and mechanics. Fieldwork during the project's latter stages in 2014 observed that the majority of contractor employees appeared to be Rwandan. However, most of this workforce reportedly came from across the country as these jobs were not reserved for local residents. Alongside the contracted workforce, BHEL and Angelique hired casual day labourers from the surrounding villages for manual work. These numbered between 250 and 300 people[105]. In addition, subcontractors responsible for roads, offices and transmission lines were recruited locally[106]. Village interviewees who obtained casual or subcontractor jobs[107] kept them for between three months and three years and most described this as a significant opportunity,

[101] Interviews; On-site Engineers; Officials, Mininfra; 2014-2016: E.g. Rwanda resisted requests for visas for Indian chefs.
[102] These employees were primarily under Angelique.
[103] Interview, Senior Official, Angelique, 2016.
[104] Interviews, On-Site Engineers, 2014.
[105] Interviews, On-Site Engineers, 2014.
[106] Three companies employing 15, 15 and 25 people respectively (Interview, On-Site Engineer, 2014).
[107] 3A, 9A, 10A, 11A, 12A, 21A, 2B, 14B, 1C, 5C, 9C.

increasing their spending power and living standards. For instance, interviewee 2B used his wages to hire farm labour which markedly increased his agricultural production and income. However, dam employment benefits were limited. The physical nature of the casual labourers' 12hour shifts[108], for a daily wage of only 1000 Rwandan-Francs[109] meant that only young and healthy men could participate who did not have farming or caring duties. A decision by the contractors not to provide food compounded this. For instance, interviewee 5C explained that low wages meant that he decided to leave after just a few months. Poor health and family sickness prevented the majority of those interviewed from accessing employment.

The dam also stimulated the local economy. Compensation, dam employment and the influx of Rwandan and Indian workers stimulated significant demand in the valley for goods including meat[110], bananas[111], firewood[112] and especially banana beer[113]. Additionally, interviewee 2C reported that the dam led to increased demand for house construction and extension, supporting his building trade. This increased demand also underpinned the establishment of a row of new shops and bars in Village A and increased profit in two pre-dam bars (see Figure 40). This represented an important change, as before the dam, the nearest market was over an hour's walk; a benefit commented on by a number of interviewees[114]. However, these new enterprises seem to have risen organically, as a product of Rwandans' initiative and the relaxed attitude of Indian contractors. As well as this unintended benefit, the Indian companies made a deliberate decision to locally procure food for the three Indian cafeterias. Whilst they imported specialist Indian food from Kigali, vegetables and meat were often bought from the community[115]. One official asserted: "I said that whatever ladies bring, take it (even if you don't need it) because it is good to spread

[108] Highlighted by Interviews 10A, 10B and 9C.
[109] Highlighted as low by Interviews 9A and 9C (at the time ~US$1.6cents or £1).
[110] 2C.
[111] 15A.
[112] 2C.
[113] 5A, 14A, 16A, 20A, 4B, 1C, 3C, 7C.
[114] 10A, 12A, 13A.
[115] Interviews, Senior Officials, Angelique, 2016.

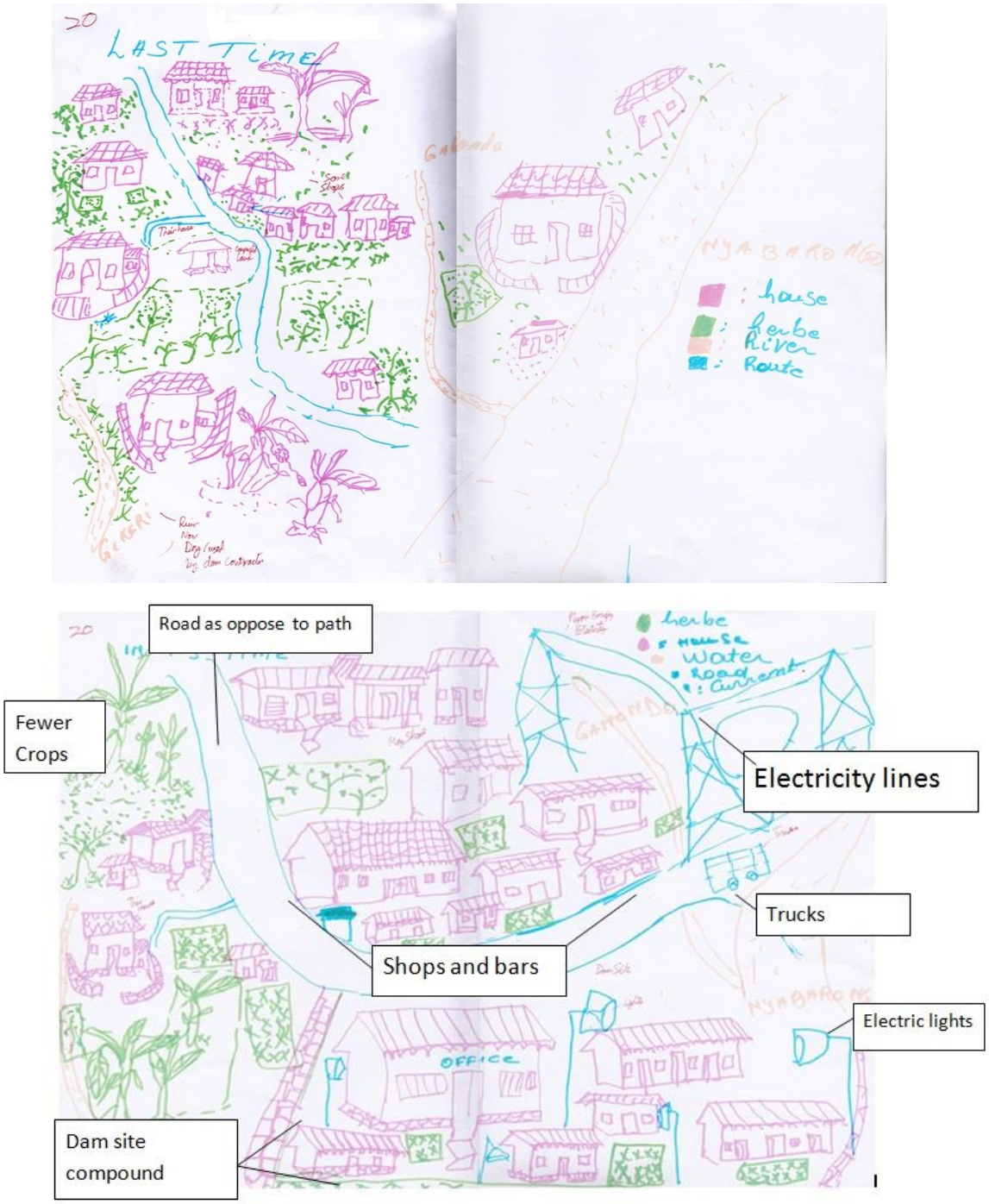


Figure 40 Two maps drawn by 20A, highlighting the pre-(above) and post-(below) dam changes to Village A

the benefits". This attitude seems to contrast with the lack of economic interaction in Mohan's study of the contemporary Bui Dam, where even locally available consumables like cigarettes and food were imported from China for the workers[116]. For almost all those running the shops and bars, or selling to workers and cafeterias, this income was a significant livelihood addition covering

[116] Mohan 2013 (reviewed in Chapter 2).

basic needs such as health insurance charges and school fees. Therefore, government and Indian consortium policies around Rwandan employment, local procurement and the permitting of shops around the project site, along with a decision to allow workers to mingle with the local community, enabled a reduction in Nyabarongo's e*nclave.* Consequently, certain economic opportunities were spread to the valley.

Following this limited engagement with Nyabarongo's geography, interviewed government and engineering-company officials tended to assert that these benefits were spread universally. However, rather than a homogenous community, inequalities between and within the villages produced differentiated outcomes: Economic stimulation and procurement primarily occurred in Village A around the main offices and workshops[117]. Additionally, interviewed older residents largely felt unable to take advantage of these economic opportunities as they were not fit enough to work on the dam or increase agricultural production[118]. The same is true of poorer subsistence farmers who are without the family members or hired labour to leave their fields and have no extra agricultural capacity to grow marketable goods[119]. Significantly then, whilst limited benefits were to some degree generated by the Rwandan state and Indian contractors, these were geographically and socially concentrated, contradicting interviewed officials[120] and CIMA's impact assessment universal presentation.

Enabling Social Engineering

As the project inserted government and access infrastructure like roads, and given its disruption of rural livelihoods, Nyabarongo presented an opportunity to advance the Rwandan state's rural modernisation agenda. This agenda was reflected in CIMA's assessment, which cited one of the dam's benefits being 'local development', detailing programmes primarily based

[117] Noted in interviews 7B and 11B.
[118] Explained in interviews 16A, 18A, 4B, 6B, 8B, 11C, 12C.
[119] 9A 12A, 17A, 5B, 13B, 6C.
[120] Interviews; On-Site Engineers, 2014; Officials, Angelique; 2016.

around the introduction of technology, infrastructure and more 'modern' agricultural methods. For instance, it describes starting an artificial insemination scheme, building terraces, creating hotels and modernising businesses. Additionally, the report describes extending cooperatives as these organise the local community and enable larger scales of production. These proposals suggest the presence of high modernist ideas as they implicitly criticise pre-existing multi-cropping livelihoods (see Figure 41) and understand development as transformation through technology, formalised businesses and infrastructure. Therefore, given the absence of local participation or consultation, CIMA's report arguably captures Chamber's and Scoones critiques of rural development ruled by "professional's realities that are universal, reductionist, standardised and stable"[121], whilst "arguments about local knowledge and priorities ... do not have much traction"[122].



Figure 41 Depicting an 'average' house and multi-cropping around the project site including a mix of cassava, soya and bean plants

[121] Chambers 2003, 173.
[122] Scoones 2009, 175.

The vision in CIMA's assessment strongly reflects national government programmes for rural Rwanda which, as analysed in Chapter 3, include terracing, the introduction of agricultural technology and creation of larger, more intensive, mono-cropped farms[123]. This again evidences the district government's role in Nyabarongo Dam's knowledge production. From 2008, the district government extended a number of national schemes, including the Girinka one cow-per-poor-family programme, health insurance and agricultural support (e.g. fertiliser), the latter particularly aimed at newly formed cooperatives. In Village A, since the start of construction, predominantly women were organised into cooperatives for beekeeping and agriculture. The latter is notable because it follows government-encouraged mono-cropping, a practice contrasting with widespread multi-cropping. Moreover, it obeys government-defined agricultural crop planting zones. Entailed land-use change from the dam also enabled Village A's cooperatives: The area of land expropriated was larger than the area used for offices, warehouses, the quarry, soil dumps and infrastructure, often including a buffer zone. District governments decided to rent out this unused land, typically to larger agricultural units in line with national goals to initiate supposedly more efficient farms. This included Village A's cooperatives and a self-styled 'entrepreneur' who started a banana beer business on project land stretching from Village B past Village C[124].

Another major programme enabled by the dam involved coercive enlargement of Village A through Rwanda's villagisation policy, justified principally along lines of service delivery like Nyerere's historic programme described in Chapter 4[125]. Research found a nuanced discussion of the costs and benefits of villagisation among local people, something discussed by the author elsewhere[126]. What is relevant here is the enabling role of the dam, the way its access roads and increased government presence extended the Rwandan state's rural agenda. Thus, Nyabarongo

[123] Ansoms 2009; Ansoms 2013; Ansoms and Hilhorst 2014; Huggins 2017.
[124] 16B.
[125] Interviewees involved in this villagisation included 9A, 16A, 17A, 18A.
[126] Dye 2016c.

evidences the *enabling social engineering* high modernist concept of dam justification and practice. Rationalised as benefit sharing in CIMA's report and involving policies often focused on welfare or agricultural improvement, the dam nevertheless supported the Rwandan state's top-down efforts to re-order society, premised on modernisation of backward 'peasants'[127].

Electricity Sharing

CIMA's report and project officials[128] also outlined electrification as one of Nyabarongo Dam's local benefits, seeing energy, in line with the wider modernising rural agenda, as capable of generating development along linear high modernist lines. Officials implementing the project decided to electrify only one village directly from Nyabarongo's hydropower. Perhaps unsurprisingly, given its location around the project's offices, Village A was chosen. Government officials, and the President himself in Nyabarongo's commissioning speech, promised the remaining adjacent villages electricity although through the national electrification programme. In 2016, civil servants reported this had been completed, although this has not been independently verified. Importantly however, the planned intention to electrify the surrounding villages, and to give power directly to Village A, demonstrates an interesting case of local benefit sharing. Hydropower dams, as analysed in Chapter 1, have often bypassed their affected and proximate communities to benefit wealthier urban elites and industry. Ostensibly then, Nyabarongo Dam is supposed to contrast with past geographic inequalities in dams' costs and benefits. One official stated that this instruction came from the President directly, who rhetorically asked how a hydropower dam could be constructed without the local community also receiving electricity[129].

[127] Chapter 3.
[128] Interviews, On-site Engineers, 2013-2014.
[129] Interview, Official, Mininfra, 2014.

Significantly, the majority of interviewees across all the villages described electricity as the key benefit of the project[130]. Interviewee 14A, for instance, declared the project's arrival a miracle primarily because it would bring electricity. He asserted that it would change the village's fortunes, creating economic opportunities and an expansion of trade with nearby towns. Interviewee 15B also gave a typical response when he described electricity producing a future of mobile phone charging, local schools and even computers for his children. This positive message came even after she had extensively discussed the issues of corruption, an unfair compensation valuation and the effects of quarry blasting on her fields, crops and roof. Specific benefits were also described by household 20A. They asserted that electricity would bring activities from electronic cassava crushing to wood-tool manufacturing and a school. They saw the advent of electricity as the start of a transformational process changing their village into the status of a regional market town; this development would boost their livelihood opportunities and living standards. Such detailed and sufficiently varied ideas seem to go beyond mere repetition of the state's narrative, suggesting that at least some believed in the transformational capabilities of electricity. This evidence rejects the idea that high modernist discourse in Rwanda is only the product of a coercive state[131]. Rather it follows Ferguson's analysis of the Zambian copper-belt[132] where he demonstrates that processes like urbanisation sparked locally-generated ideas of modernity. This finding in Nyabarongo illustrated that discourses of modernity also come 'from below', thereby highlighting the agency of these communities.

However, the key point of this section is to demonstrate that whilst Nyabarongo involved planned local benefits, these were imagined and implemented by the government and consultants through the *enabling social engineering* high modernist thought-practice. The idea of benefit spreading follows reformist principles analysed in Chapter 1. For instance, Lord[133] describes the

[130] E.g. 15A, 15B, 10C, 11C.
[131] As promulgated by Thomson 2013; Reyntjens 2013.
[132] Ferguson 1999.
[133] Lord 2016.

principle of sharing financial dam proceeds in micro-hydro projects in Nepal. There, benefit-sharing policies were seen as an attempt to resolve past battles over dam development, allowing affected groups to directly gain. Ideationally, benefit-sharing reforms stem from recognition of dam's past geographical inequality where local and affected communities bore the costs from large infrastructure primarily serving wealthier and more urban areas with irrigation, water and electricity. Here, imagining and implementing these ideas followed Rwanda's wider high-modernist, social-engineering ambition whereby the regime directs development solutions which organise society in a more legible way and stress the importance of rational production through modernist-style mono-cropping in larger farming units. Nevertheless, the presence of benefit-spreading ideas concurs with Chapter 3's analysis of the Rwandan elite's perception of their internal vulnerability. Because of this, it is strategic for government to spread the fruits of economic growth. Therefore, alongside ideas about best development practice influencing reformist benefit-sharing policies, their adoption also has a political rationale.

Conclusion

The Nyabarongo case study builds answers to the thesis' questions about the dam resurgence. It demonstrates Chapter 3's analysis of Rwanda's megawatt mission. Here, the state's focus on increasing megawatt generation drove Rwanda's largest power project, specifically shaping a preference for speed over detailed studies and a design revision that increased the reservoir and therefore displacement, whilst maximising hydropower. The chapter also demonstrates short-sightedness: Limited analysis of hydrology, river sediments and topography in Nyabarongo's planning reduced its electricity generation efficacy. In addition, this case study illustrates themes from Chapter 2 about the enabling role of the Indian state and its companies in Africa's hydropower resurgence. Cheap government finance proved significant for Rwanda moving forward with the dam. Furthermore, the Indian government's minimal checks in extending ExIm bank credit, or in vetting companies, allowed for swift agreement on finance. It also made

Rwanda responsible for socio-ecological assessment and technical build quality. Indian companies also had a significant impact on the project: Their inexperience in management and quality control delayed completion and lax safety and environmental policies resulted in accidents and environmental damage like soil dumping. Simultaneously though, Angelique and BHEL reduced Nyabarongo's *enclave.* Their informal approach and local procurement policies supported intended and unintended local benefits. Indian actors therefore had an important role in enabling and shaping the implementation of Nyabarongo Dam. This speaks to some of the themes of Narlikar's[134] Delhi consensus, demonstrating a somewhat locally-engaged company and significant private-sector agency. However, it also demonstrates the negative impacts of inexperienced, low socio-ecological-standard companies.

This chapter's most important contribution however, is to the thesis' argument about the practices and ideology present in the dam resurgence. The Nyabarongo case demonstrates different rationales for dam building, emphasising electricity rather than the infrastructure's transformation potential. In contrast, planning of implementation features past high modernist practices. Despite invoking ideas of participation, throughout the process of knowledge production and construction, a *technician's realm* of decision making operated where Rwanda's President and Ministers exclusively empowered external consultants, contracted engineers, national and local district planners. This influences an apolitical understanding of the dam as largely benign, of its impacts as limited to direct displacement. Planning overlooked the river's biophysical system and the perspectives of local residents. Consequently, this influenced the *invisiblising* of many of Nyabarongo's impacts in assessments and the exclusion of local people's values and knowledge. Subsequently, many local people perceived compensation as partial. However, alongside high modernist implementation, limits to the construction processes' *enclave* supported local livelihoods and governmental and corporate actors attempted deliberate benefit

[134] Narlikar 2010b.

spreading, especially through electrification. Reformist principles rationalise these practices, but their implementation followed Rwanda's wider rural-modernising *social engineering* programme. The Nyabarongo case therefore demonstrates the empirical basis for this thesis' concept of bricolage, elaborated in Chapter 8. Here, past high modernist ideas of *enabling social engineering, the technician's realm* and *invisiblising* co-exist with reformist policies. Moreover, the chapter demonstrates a complex form of authoritarianism, with strongly centralised control existing alongside an ability to learn from experiences and respond to specific citizen concerns, particularly on corruption. Therefore, neither the ideology, nor the Rwandan government, completely resemble Scott's formulation of high modernism that is enabled by a singular, unbending authoritarian state.

Chapter 6

The Rusumo Falls Dam: Pervasive Appraisal Optimism in the Reformed Technicians' Realm

The Rusumo Falls Hydroelectric Power Project, as it is officially known (hereafter Rusumo Dam, Rusumo etcetera), will sit between the two border villages of Rusumo. These settlements (hereon Rwanda-Rusumo/Tanzania-Rusumo) are perched on hilly spurs reaching out from dry upland areas into a flat-bottomed valley. A majestic waterfall separates the villages, thundering the Kagera River's reddish waters over a 40-metre wide drop, creating rainbows and a permanent spray forest inhabited by a troop of monkeys. Behind the falls sits a vast seasonally-covered marshland (see Figure 42). Each village is on a main national road and orientated to the business of border trade and the servicing of long-distance lorries carrying goods from Dar-es-Salaam. Upstream however, agriculture predominates, and a trans-boundary regional culture is evident, with families and a local dialect spanning the international Kagera-River border. The agricultural land in the valley, whilst contesting with wild animals, is rich with seasonally renewed irrigation and fertile sediment. The valley floor's dark soil and dense flora contrast with dry, sparse upland. These apparently contrasting spheres of trade and agriculture are connected, not least by this new infrastructure project.

Rusumo Dam will sit on top of the falls, taking advantage of their height to divert water through a tunnel leading to 80MW-capacity turbines. Three transmission lines will split generated

power, giving Rwanda, Tanzania and Burundi at least 26.6MW each[1]. Once completed, a relatively shallow reservoir will cover 977ha up to 15km upstream, permanently flooding an area of marshland and displacing homes and fields (Figure 43). Construction will require quarries, roads and a large camp with accommodation, offices and workshop equipment. The dam is the largest project undertaken by the Nile Basin Initiative (NBI). Its subsidiary, Nelsap (Nile Basin Equatorial Lakes Subsidiary Action Programme) leads project implementation. This status has produced high profile attention which was furthered by the UN Secretary General Ban Ki Moon and World Bank President Jim Yong Kim announcing the dam's funding in 2013 whilst visiting Kigali.

This chapter particularly analyses the extent of reform in the dam resurgence, taking an apparent "exemplary"[2] project that followed the World Bank's globally-recognised standards. More than Chapter 5 and seven's case studies, Rusumo demonstrates significant policy changes that directly responded to past critiques of dam building. This case demonstrates significant mitigation, attempts at participation and at more complete compensation which aimed to leave the affected better-off. On paper and according to officials, Rusumo appears to be the model for dam building. However, this chapter demonstrates that even in this case, a *technician's realm* dominates. This contributed to a limited understanding of project impacts, unmet participation pledges, incomplete compensation and a somewhat-flawed livelihood restoration programme. Although officially-presented apolitically, efforts to understand the valley and compensate the affected are exposed as inherently political, representing the values and rationales of experts in engineering consultancies, local government and implementing agency Nelsap. Although analysing high-modernist practices, the chapter also explores Nelsap, the World Bank and contracted consultants' materialist rationales.

[1] Flexible dispatch will allow changes in the amount given to each country.
[2] Interview, senior official, Nelsap, 2015: Sentiment echoed by former and present senior officials at Nelsap and Senior World Bank Officials (Interviews, 2015-2016).



Figure 42 Images of Rusumo Falls and the Kagera Valley: (clockwise) Rusumo Falls; The two Rusumo villages; The Kagera river above the falls (also showing water collection points); Upstream marshland

This chapter handles considerable institutional complexity. Analysis weaves together the World Bank, the international multilateral organisation Nelsap, national level ministries, local governments and NGOs. It begins by outlining the history of the dam and its root in the past high modernist river-basin era. This is followed by examination of Nelsap and the resurrection of Rusumo Dam. The chapter then analyses the process of project approval and debates over design, before focusing on knowledge production and the compensation regime. Through the World Bank's central role in Rusumo, the chapter makes a specific and valuable contribution to the literature on the Bank and its dam-building role. Overall, the chapter deepens this thesis' bricolage argument, the blending of contrary reformist idea-policies with high modernist discourse and practice. This chapter also includes local level interviews (listed in appendix one) which are anonymised with a numbering system to the Rwandan (Rw) or Tanzanian (Tz) side. This gives 1Tz, 20Rw, 8Tz etcetera., with these interviews either representing a household or individual interviewee.

Project History

The Kagera Basin Organisation (KBO) and the Imagining of Rusumo Dam

Rusumo Dam has a long history[1]. Appraisals of the Kagera region began in 1964[2] under UNDP as part of a wider initiative to bring development to East Africa through large dam infrastructure projects. UNDP commissioned Norconsult[3] to conduct feasibility studies on a Rusumo Dam specifically between 1971 and 1973[4]. This work led to a Tanzania-Rwanda-Burundi head of state meeting in 1977 to inaugurate the Organisation for the Management and Development of the Kagera River Basin, or KBO. The Presidents symbolically met at Rusumo Falls,

[1] "An idea of the country for so long" (Interview, Official, REG, 2016).
[2] Mbaziira, Senfuma, and McDonnell, 2005 The KBO included Rwanda, Tanzania, Burundi and eventually Uganda.
[3] Norconsult, and these survey's timing, has similarities to the Stiegler's Gorge Dam.
[4] Mbaziira, Senfuma, and McDonnell, 2005.

remembered by one interviewee who described Rwandan President Juvénal Habyarimana laying a foundation stone for the dam[5]. Rusumo Dam was thus always a flagship in the KBO's programme[6]. Often inspired by the Tennessee Valley Authority (TVA)[7], such river basin organisations arguably reached their zenith in East Africa during this period[8]. Like the TVA, the KBO's development mandate, went beyond river infrastructure to include regional development including railways. Contemporary to the KBO was Tanzania's Rubada, created in 1977 (Chapter 7), and Kenya's Tana and Athi Rivers Development Authority (TARDA) formed in 1974[9]. All three invoked the TVA[10].

Initial planning for Rusumo Dam envisioned large-scale transformation. The multipurpose project would generate electricity, bring tourism and underpin a large irrigation scheme[11]. Belgian aid slowly advanced the dam, financing engineering-feasibility (1987-1992) and environmental impact (1993)[12] studies. This long development time is somewhat surprising, given the centrality of Rusumo Dam to the KBO and its earlier presidential backing. However, Mbaziira et.al.[13] categorise various issues hampering the organisation including the Presidential Nyerere-Amin fallout and eventual Tanzania-Uganda war[14,]. The 1994 genocide and destruction of the Rwandan state, along with conflict in Burundi, halted progress and collectively, these factors caused the KBO's dissolution in 2001[15]. This history, and the KBO's demise, suggests that there was nothing

[5] 10Rw.
[6] Rangeley, et al. 1994.
[7] Chapter 1.
[8] This was part of a wider continental trend (Hoag 2013, 148–50).
[9] The Republic of Kenya 1974.
[10] Adams 1992, 117.
[11] Its 1979 plan is recorded by Tvedt and Hovden 2008; Rangeley, et al. 1994.
[12] Revealed by a review of the KBO's studies (Tvedt and Hovden 2008; Lwakabare 1988).
[13] Mbaziira, Senfuma, and McDonnell, 2005.
[14] Factors hampering the KBO included its over-ambitious range of projects, an Anglophone-Francophone country rivalry and the World Bank's insufficient commitment (Interviews; Senior and Junior Officials, Tanesco, REG, 2016).
[15] Interview, Former Senior Official, Nelsap, 2016; Mugalura 2001.

inevitable about Rusumo Dam happening, and indeed with the ending of the KBO, the project could have plausibly died.

The Nile Basin Initiative, Nelsap and the Resurrection of Rusumo

As the KBO slowly expired, 1999 saw the Nile Basin Initiative inaugurated with particular World Bank support [16]. Using the rhetoric of water resources management, the NBI aims to facilitate cooperation in long-running disputes between Egypt and upstream countries over the Nile[17]. Remembering the inauguration, a senior official stated that the "main objective to …protect the Nile … (to) keep it flowing (but an entailed secondary agenda is to) see how to use the Nile for their common development"[18] . The NBI therefore explicitly aims to facilitate negotiations over Nile water to unlock development projects prevented by Egypt's colonial-era water claims. Focusing on this secondary project-implementation aim especially, the NBI created two "technical organisations (to do) … developmental projects in … (different) parts of the Nile" [19], with the *Nile Equatorial Lakes* region grouped into one *Subsidiary Action Programme*, Nelsap, which soon headquartered in Kigali[20].

A senior Nelsap official explained the organisation's "mandate to be a platform … for the identification of projects and (their) preparation"[21]. Although Nelsap's discourse often uses the language of water resources management involving balanced river-basin analysis, interviews indicated that its purpose is to implement cross-border projects. Whilst also organising environmental conservation, the Secretariat primarily identifies infrastructure schemes in national government plans, assesses their technical engineering feasibility and attempts to forge cross-government agreement and to procure funds. Whilst a ministerial-level steering group

[16] The World Bank 2016b.
[17] Cascão 2008.
[18] Interview, Official, Nelsap, 2015.
[19] Interview, Former Senior Official Nelsap, 2016.
[20] This mirrored the KBO headquarters location.
[21] Interview, Senior Official, Nelsap, 2016.

makes final approvals, this practice empowers predominantly engineering priorities, mandating what Hart called 'Big-D' Development[22]. This assessment speaks to Goldman's[23] description of the turn in international development discourse towards environmental management and the way it masks continued practices of capitalist value extraction like dam building. Rather than extraction, here Nelsap's purpose partially-recreates the historic KBO-style development vision, albeit with a new language of sustainable water basins. Consequently, the NBI's assumption of water infrastructure as desirable indicates a depoliticised understanding of development, an assumption rationalised by high modernism.

Nelsap's early years saw a review of Rusumo's past plans[24] by Norplan, mirroring the role of its Norwegian competitor Norconsult in the KBO. By 2005, a Power, Development and Trade Plan was launched through the Nelsap ministerial council that explicitly mentioned the Rusumo project and, in 2005, Nelsap launched a specific Rusumo technical panel made up of nation-state civil servants, called the Project Implementation Committee. A joint project agreement was signed by the national governments in 2006[25]. Nelsap's choice of Rusumo Dam is not surprising. The organisation's mandate is to enable cross-border infrastructure and Rusumo is the only considerably-planned, transboundary electricity-generation project within their geographical remit. Institutional self-interest also figures. The size of Rusumo and its status as a cross-border dam is significant as the author knows of few dams built across national boundaries. Itaipu (Paraguay and Brazil) Amistad and Falcon Dams (USA-Mexico) and nearby Ruzizi II (Rwanda-Burundi-Democratic Republic of the Congo) represent rarities[26]. This context presented the young Nelsap with the opportunity to justify itself by, as one current senior official asserted, showing how the political difficulties of "international boundaries can be overcome" through its successful

[22] Hart 2001 distinguishes transformative Development interventions from incremental capitalist little-d development.
[23] Goldman 2005.
[24] Interview, Former Senior Official, Nelsap, 2016.
[25] The World Bank 2007: Interview, Senior Official, Tanesco, 2016.
[26] Kariba Dam was constructed within a British Colony.

"model"[27]. Thus, there is a desire for Rusumo and Nelsap "being quoted as a transboundary project that works, an example, where more than one country can work together"[28]. A similar description of Rusumo dam in the academic journal *Water Policy*[29] further evidences this potential. Indeed, Nelsap has reportedly advised a Zimbabwe-Zambia project, with "donors now very interested in (its) model"[30]. Consequently, Rusumo has become a "flagship" that is hoped to improve the "visibility of Nelsap" and provide a future funding "springboard" for the institution[31]. Materialist institutional interests therefore factor in the organisation's pursuit of Rusumo.

However, Rusumo Dam needed government approvals. The next section analyses why Rwanda and Tanzania supported Rusumo. A third country, Burundi, is officially part of the project as the reservoir extended into it in the earliest design. Although they are signatory to all project approvals subsequent revisions meant that Burundi receives one third of the electricity, has full grant financing and will receive no impact from the dam. Because of this physical absence, the obvious benefit without cost, and as interviewees reported Burundi's input as minimal in meetings and on the project's decision making more broadly, they are not considered in the analysis below.

Why National Level Support for Rusumo Dam?

The key factor in governmental support for Rusumo Dam is electricity generation. In 2006, Rusumo would have added 50% to Rwanda and Burundi's capacity. Such quantities of megawatt addition are important given Chapter 3's analysis: In the mid-2000s Rwanda was in the middle of an energy crisis that was pushing electricity generation to the top of the regime's agenda. This entailed pursuing all available energy options. Alongside Rusumo, Rwanda hopes for the realisation of another international dam, Ruzizi III. Therefore, Rwanda not only welcomed Rusumo but became its most active lobbyer. A former senior Nelsap officer explained, "Rwanda

[27] Interview, Senior Official, Nelsap 2015.
[28] Interview, Former Senior Official, Nelsap, 2016.
[29] Dombrowsky et al. 2014.
[30] Interview, Senior Official, Nelsap, 2015.
[31] Interviews, Former Senior Official, Official, Nelsap; 2015, 2016.

spearheading (the effort to build the dam)"[32], and another World Bank official stated Rwanda has the "most" interest because of its "'very ambitious targets" for energy and the economy[33].

However, just as Rwanda's enthusiasm gave Rusumo momentum, it seems to have irked Tanzanian officials. Whereas many commentated, that "Rwanda needs the electricity ... Tanzania (was described as) going slow … aware Rwanda was leading and pushing"[34]. This aversion seems rooted in the perception of a pro-Rwandan bias in Nelsap: One official commented that "Tanzania had issues with Nelsap … they say they are not represented"[35] Similarly, a project manager for Rusumo stated that Tanzanian authorities "(don't) like (Nelsap headquarters) being in Kigali"[36], feeling Rwanda benefits from taxes, jobs and policy access. Moreover, 26MW are less significant, "a drop in the ocean"[37,] compared to Tanzania's 10,000MW target. As with the KBO, such country division could have prevented Rusumo[38]. However, objections appear to have merely slowed decision-making, with Tanzania ultimately supportive of construction. Tanzania reportedly had "just a passive role, attending meetings but not (contributing particularly)"[39]. The only definitively preventative action came when Tanzania suspended progress on the compensation scheme in 2014 to help force the appointment of a Tanesco employee as head of Rusumo's operation company[40]. This fits Chapter 4's broader narrative of a relatively passive state approving all opportunities. The Tanzanian government cared about the international political balance, not the dam itself.

[32] Interview, Former Senior Official, Nelsap, 2016.
[33] Also supported by: Interview, Senior Official, REG, 2016.
[34] Interview, Official, REG, 2016: echoed by World Bank Manager stating Tanzania's interest as secondary compared to Rwanda (Interview, 2015).
[35] Interview, Former Senior Official, Nelsap, 2016.
[36] Interview, Senior engineer, Nelsap, 2016.
[37] Interview, Senior engineer, Nelsap, 2016.
[38] Inter-Nelsap conflict was especially at risk after President's Kikwete and Kagame's apparent fall-out in 2013.
[39] Interview, Former Senior Official, Nelsap, 2016.
[40] This incident was also related in: Interviews; Officials, Nelsap; Senior Officials, Tanesco; 2016.

Tanzania's drive for megawatts after Kikwete's 2005 election ensured ultimate support[41]. Reportedly, the Minister of MEM backed Rusumo "for generation capacity, that was the essence … There was a (big pressure for energy generation at the time)" and the dam would have "very reliable (electricity)"[42]. With the driving agency of Nelsap and finance of the World Bank, Rusumo was also an "easy" project[43] enabling progress towards megawatt targets with minimal effort. Another rationale for Rusumo is that it would enable connection of "an isolated part (of the country)"[44] to the national grid[45], thereby furthering Tanzania's politically-popular electrification programme. This also suggests a statebuilding motive, as electrification and more reliable power extends the presence and capacity of the state. Kagera Region (in which the dam sits) is remote and became somewhat lawless from the 1990s after conflicts in, and the arrival of refugees from, Rwanda and Burundi[46].

These national rationales reveal that, for the governments, Rusumo's significance lay in energy and political control, not in any impact on citizens or the valley's agricultural-ecological system. Reflecting this political priority, the resurrected Rusumo contrasts with the project under the KBO. Rather than the primacy of agriculture/irrigation in the 1970s, todays' Rusumo is exclusively electricity generating. This therefore illustrates an important theme of the thesis, namely that megawatt-missions drive Rwandan and Tanzanian dam building. Thus, the high modernist imaginary of the dam as itself transformative through multiple developmental benefits has given way to a more singular focus on the megawatt as agent of development. Nelsap's project portfolio also reflects this. A senior official explained in relation to 'water' (environmental management) schemes that whilst Nelsap's "first focus is on water (projects) ... power is easier to

[41] Interview, Senior Official, Nelsap, 2016.
[42] Interview, Senior Official, MEM, 2016.
[43] Interviews; Senior Officials; MEM, Tanesco; 2016.
[44] Interview, Senior Official, MEM, 2016.
[45] Echoed in two interviews; Senior Officials, Tanesco, 2015, 2016.
[46] Highlighted in discussions with interpreter and Kagera Government Officials. There have been numerous reports of bandits and police crackdowns (Mulisa 2013a; Mulisa 2013b).

market, easier to attract investors"[47]; which for Nelsap are national governments and donors. Moreover, "energy (makes a project) … economically feasible"[48]. For practical economics[49], and because of the interests of national government's then, the 'new' river basin organisation of Nelsap has a narrower focus on electricity, not the KBO's total valley transformation.

Designing Rusumo and Gaining Final Approval

Further planning stages involved a regional power study conducted by SNC-Lavalin[50] from 2003-2007 with Canadian development funds[51]. This was important as, having considered environmental and social impacts, it recommended Rusumo as one of three immediate energy priorities,[52]. The stakeholder panel ranking these projects gave the study further legitimacy as, although coordinated by Nelsap and SNC-Lavalin (a consultancy that has long engaged in dams) the panel included environmental NGOs, faith leaders, government representatives and academics[53]. Whilst contrasting with Rusumo's KBO history, this study arguably falls short of the vision expressed by the World Commission on Dams'[54] and others[55], highlighted in Chapter 1. For instance, the absence of an oppositional dam-NGO or representative from the local community meant that it was not especially participatory[56]. Furthermore, as analysed below, socio-ecological assessments at this stage were speculative and underestimated impacts[57]. Moreover, the studies' ranking highly rated project readiness and low construction costs, factors which Rusumo's planning history improved. This contributed to the panel's relatively uncritical view of dams[58], a

[47] Interview, Former Senior Official, Nelsap, 2016.
[48] Interview, Former Senior Official, Nelsap, 2016.
[49] It is easier to calculate the benefits stemming from electricity than from environmental management.
[50] Founded in 1911, SNC-Lavalin is a Canadian-based, global engineering firm.
[51] Nelsap also reviewed Rusumo's past documents.
[52] SNC-Lavalin 2007.
[53] Interview, Lead Consultant, Nelsap, 2017; Roquet 2016.
[54] World Commission on Dams 2001.
[55] Skinner and Haas 2014; Bosshard 2010.
[56] Reportedly all NGO participants saw dams as broadly positive: Interview, Lead Consultant, Nelsap, 2017.
[57] Roquet 2016.
[58] Reported by participant: Interview, Consultant, 2017.

reportedly common finding among middle-class civil-society groups in Africa[59]. Rather than rejecting or querying projects based on assessment of merits and impacts, the end report merely recommends projects to implement immediately and others for further study.

The most significant episode of the planning process came with debates over whether to pursue a full, intermediate or run-of-river dam design (see Figures 43 and 50). Endorsement from SNC-Lavalin's regional study and the national governments' Joint Project Approval enabled a detailed feasibility study conducted by engineering-consultancy Artelia. Concluding in 2008, Artelia's study recommended an 'intermediate'[60] project size, primarily to reduce negative impacts[61]. However, the governments rejected this idea, wanting the 'full'[62] scheme with 80MW (installed capacity) and 475.4 GWh (gigawatt-hours, i.e. referring to projected average annual generation). The World Bank initially supported this stance[63]. However, more accurate aerial LIDAR surveys demonstrated displacement of roughly 6700 households[64], more than the 3000 initially predicted and including Burundian refugees around Lake Rewru (see Figure 43). This turned the Bank against the 'Full Development Scheme' option, bringing them into conflict with the electricity-seeking governments[65]. The countries eventually agreed to revise designs to an 'intermediate' size in 2011, then officially approved the project with a joint ministerial agreement in 2012. This handed implementation to Nelsap[66]. However, the ESIA's completion caused further downsizing. This is because it again revealed higher displacement figures, showing the full scheme moving 17,450 households, the intermediate design, 7530, and run-of-river, 685[67]. The World Bank pushed for the run-of-river option, arguing it represented a reasonable trade-off given a

[59] Interview, Official, International Rivers, 2016.
[60] Officially called Intermediate Development Scheme.
[61] Interview, Consultant, 2017.
[62] Officially called Full Development Scheme.
[63] Roquet 2016.
[64] Interview, Senior Hydropower Official, World Bank, 2017.
[65] Interview, Senior Hydropower Official, World Bank, 2017.
[66] Artelia 2013a; Interviews, Senior Engineer, Nelsap 2015-2016.
[67] Artelia 2013a.

small annual power reduction: The full scheme was now calculated as 110MW/507GwH and run-of-river, 80MW/446 GwH[68]. It was only after Nelsap and the countries supported this revision in 2013, that the World Bank approved full funding for the dam, with the African Development Bank financing associated transmission lines.

This account reveals the preeminent role of the World Bank in pressuring for size reductions, something that many interviews recognised. One World Bank official described the government ministers resisting[69] and a Rwandan energy planner stated that the "environmental and social aspects were the first requirement of the funding agency" (the World Bank)[70]. Similarly, a senior Nelsap figure asserted that "no donor (would touch, especially with) … all the refugee issues … it was very difficult for donors to support"[71]. As the most likely financier for Nelsap, and for complex inter-governmental projects[72], the World Bank therefore had significant power here. In line with Chen and Landry[73] and Scheumann and Hensengerth[74], this analysis finds that the Bank did have an important influence on the dam building process, pushing impact mitigation more than contracted consultancies and national governments. However, it is unlikely that Rusumo's design reductions would have happened so smoothly without Rwanda's eventual support[75].

[68] Roquet 2016.
[69] Interview, Senior Hydropower Official, World Bank, 2017.
[70] Interview, Senior official, REG, 2016. Similarly, a Nelsap Official described "donors (meaning the World Bank) (say) still too much (displacement at the IDS level) … the length of the reservoir, amount of people displaced … so in a technical forum (the design was decreased)" (Interview, Former Senior Official, Nelsap, 2016).
[71] Interview, Former Senior Official, Nelsap, 2017.
[72] The Bank is the key donor backing the NBI.
[73] Chen and Landry 2018.
[74] Scheumann and Hensengerth 2014b.
[75] Nelsap Officials reported Rwanda arguing for a reduction (former Senior Officials, Nelsap, 2016; 2017). The Natural Resource Minister seems to have been particularly assertive (Senior Official, REG, 2016).

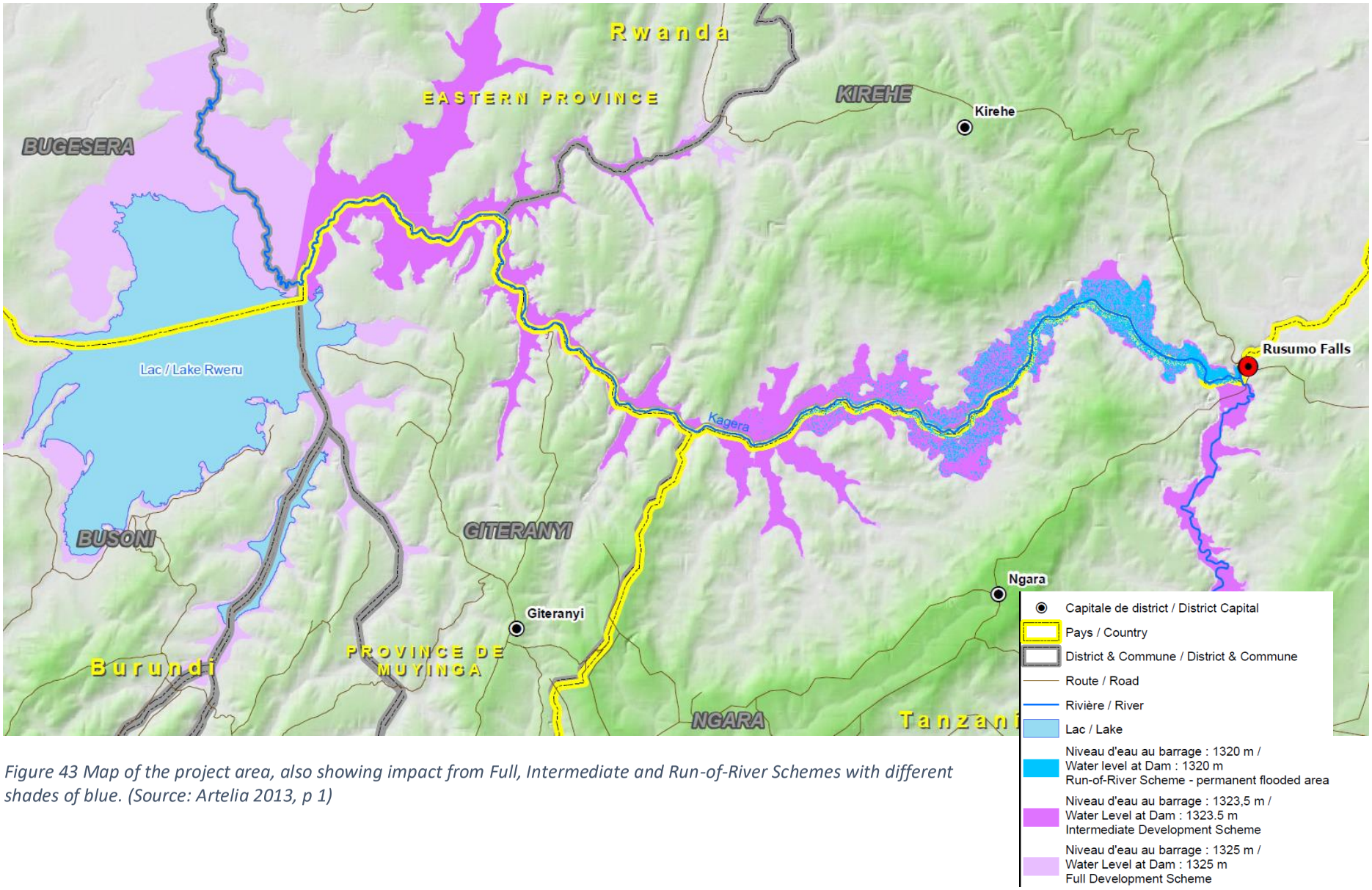


Figure 43 Map of the project area, also showing impact from Full, Intermediate and Run-of-River Schemes with different shades of blue. (Source: Artelia 2013, p 1)

Academics have recorded the Bank's political limitations[76] and indeed contemporary projects like Kandadji Dam in Niger[77], or the Bujagali Dam in neighbouring Uganda, testify to the organisation's limited power in pushing mitigation. In the Bujagali case, Gore[78] describes how an internal investigation by the World Bank found that, under pressure from Uganda's President Yoweri Museveni, its approval of a risk guarantee for the constructing firm overrode due checks and technical-scrutiny protocols. Therefore, it is significant that Rwandan officials[79] indicated support: They asserted that the size reduction was fair because Rwanda has an average population density of approximately 1 household per hectare and, under the Full and Intermediate schemes, Rusumo Dam would have flooded more of Rwanda, despite electricity being shared equally.

Overall though, this episode reinforces analysis that for the governments, electricity was central, but for the Bank, lessening impacts was also crucial. The governments' project sign-off in 2012, before the second design revision, reinforces this point. Rusumo's downward revision demonstrates the different landscape of the dam resurgence where members of the donor community object to projects with significant socio-ecological impacts. However, despite suggesting an understanding of dams as political, planning officials from Nelsap, Rwanda, Tanzania and the World Bank understood the size-debate as technical; a process resulting in the 'right' outcome: A World Bank official described "technical people (who find) a technical solution"[80]; an involved Rwandan civil servant stated that they "finally agreed on optimum size" through rational deliberation[81]; and a Tanzanian equivalent said that "consultants made the decision"[82]. Interviewees involved therefore implied uncontroversial, even scientific discernment. This

[76] Mosley, Harrigan, and Toye 1995.
[77] The Bank compromised by approving a larger dam with a design that allows for future height increases (Interviews, Safeguard Officials, World Bank, 2017).
[78] Gore 2017.
[79] Interviews, Former Senior Officials, Nelsap, 2016; 2017: Interview, Former Senior Official, MEM, 2016 ("Rwanda pushing reduction").
[80] Interview, Senior Official, World Bank, 2015.
[81] Interview, Senior Official, REG, 2016.
[82] Interview, Senior Official, Tanesco, 2016: Echoed in: Interview, Senior Official, Tanesco, 2016.

demonstrates the presence of high modernist ideas about the possibility of scientific knowledge to understand the political world and discern 'right' solutions.

Why World Bank Support?: High Modernist Bricolage and Institutional Rationales

The World Bank's funding justifications further evidence high modernism but also include practical concerns: One document outlined that "acute, periodic power deficits are constraining economic development in the Nile Equatorial Lakes Region of Africa"[83]. Rusumo is then painted as "technically, the best solution" for this "very hydro rich", energy-hungry region. Thus, as one interviewee stated, having a good engineering site and closing an electricity-demand gap means Rusumo "technically makes sense"[84]. Such apolitical language fails to acknowledge the role of electricity in Rwandan and Tanzanian political statebuilding projects. Moreover, it overlooks the way dams' produce losers alongside winners. This is particularly illustrated by the Bank's Vice President Makhtar Diop who states that Rusumo would create cheap electricity that helps the poor and would not entail any negative effects as: "A run-of-the-river project does not require construction of a dam. The Rusumo Falls project will use the powerful currents and cascades of the Kagera River, on the border of Rwanda and Tanzania, to turn turbines that produce electricity"[85]. This statement overlooks Rusumo's dam wall and shallow reservoir that will displace hundreds of households. This language of hydropower's expert-discernment and invisiblising of costs is also evident in broader Bank publications. As reviewed in Chapter 1, these assert that lessons have been learnt from the past and that dams should now be seen as green hydropower[86].

[83] The World Bank 2013a, 1.
[84] Interview, Senior Official, World Bank, 2015.
[85] Diop 2013.
[86] Discussion in Chapter 1. It is also replicated in the dam community more widely: E.g. Bullock and Hülsmann 2015) argue that a 'governance' focus in decision making is capable of solving dams' potential socio- ecological issues.

World Bank appraisals[87] take electricity's agency further, asserting that Rusumo, "by connecting (international) grids, people and environmentally sensitive solutions, … catalyses growth and … encourages peace and stability in the sub-region"[88]. This sentiment of peace building is echoed by international organisations like the World Energy Council: "The region has a history of conflict in addition to low electrification rates and high levels of poverty. The successful implementation of the Rusumo Falls project is expected to contribute greatly towards economic development and political stability"[89]. Given that the countries concerned have never militarily fought each other, that their violence stems from internal conflict and that the generated electricity will be going exclusively to national grids rather than local villages, the ability for the dam itself to create peace and long-term local development, is questionable. Therefore, like the national governments' megawatt missions, rationales presented by World Bank and other international organisations assert a linear understanding of development generated by technology, in this case electricity. This understanding of technology generating development suggests the presence of high modernist rationales, as does the justifying apolitical narratives of beneficent biosphere-intervention. This links to Chapter 1's analysis of dam-justifying and depoliticising discourses of water security and the energy-food-water nexus, which are also supported by certain World Bank officials. Notably, in the policy literature on Rusumo, the word dam is often euphemised to "water infrastructure" and "hydropower".

Whilst these interviews and documents provide an insight to specific rationales for Rusumo, they also hide an internal diversity of opinion within the World Bank. Hydropower policymakers, for instance, asserted that past dam-building practices were "unacceptable", explaining that "we do not approach hydropower projects in the same way"[90]. Moreover, officials

[87] The World Bank 2013a; The World Bank 2013b.
[88] P. R. The World Bank 2013.
[89] World Energy Council 2015, 23.
[90] Interview, Senior Hydropower Official, World Bank, 2017.

asserted the need to "understand what they (the compensated) want"[91], invoking the idea of participation and a close understanding of dam impacts. Another introduced initiative are safeguards[92], policy instruments designed to instigate a 'no harm' approach with extra compensation measures and monitoring for those who are disadvantaged by gender, poverty or indigeneity. Furthermore, some in the Bank's safeguarding department asserted that they attempt to follow the critical World Commission on Dams[93], despite the Bank officially rejecting its recommendations[94]. Additionally, others described debates on the environmental and social dilemma of dam finance[95], particularly citing the Bank's rejection of controversial projects such as Ethiopia's Gibe III[96] and the Stiegler's Gorge. Thus, individuals expressed a bricolage of high modernism and reform: An increasing recognition of socio-ecological impacts and problematic past legacies are incorporated with high modernist beliefs about expertise creating apolitical and linear, technology-delivered development.

Alongside recognising these ideological elements, like Nelsap, the Bank's financing of Rusumo also fulfilled institutional interests. Longstanding academic analysis describes the importance of project loans to the World Bank: Lending increases the Bank's portfolio, justifying its scale of operations[97]. Pulling out of hydropower therefore risks its "revenues its relevance and political clout"[98]. Rusumo also fulfils two specific World Bank commitments. The first is to avert climate change through supporting 'clean', renewable power. As stated by interviewees[99] and reports[100] and in Chapter 1, this climate change rationale is a major driver behind the Bank's

[91] Interview, Senior Safeguards Official, World Bank, 2017.
[92] Interviews, Officials, World Bank, 2017.
[93] Interview, Senior Safeguards Official, World Bank, 2017.
[94] Goodland 2010. Although the Bank did accept the WCD's vaguer strategic priorities.
[95] Interviews, Senior Safeguards and Hydropower Officials, World Bank, 2017. Also see Damania's work on water infrastructure's impact: The World Bank 2016c; Garrick et al. 2017.
[96] Turton 2011; Fantini and Puddu 2016.
[97] Mosley, Harrigan, and Toye 1995; Goldman 2005; Whitfield 2009.
[98] Bosshard 2006, 191.
[99] Interviews, Senior Hydropower Officials, World Bank, 2017; International Hydropower Association Official, 2016 .
[100] Jamal Sighir The World Bank 2009, Foreword.

reengagement in hydropower. Additionally, stemming from pledges to tackle the violence in Central Africa, the Bank created a specific $1billion regional fund[101]. It was announced by the Bank's President, Jim-Kim, and UN Secretary General, Ban Ki-Moon, on the same Central Africa trip that proclaimed Rusumo's funding[102]. This may account for the somewhat-spurious peacebuilding narrative in the dam's justifications. These factors demonstrate that whilst ideological justifications figure in the decision to fund Rusumo, the dam also fulfilled materialist institutional concerns.

Implementing the Rusumo Dam

Knowledge Production about the Kagera Valley

Pre-empting World Bank funding, engineering-consultants Artelia followed World Bank standards in the Environmental and Social Impact Assessment (ESIA) undertaken between 2011-2013[103]. Simultaneously, they prepared a Resettlement Action Programme (RAP), which aimed to go beyond mere compensation, delivering improved livelihoods. Both appear extensive and included fishing, ecology and livelihood research. The consultants held interviews with government officials, primarily at the district level, spoke with businesses and cooperatives and mapped the affected area. However, whilst representing a reformed technician's realm that extended the breadth of consultation, this knowledge production process was primarily constructed by consultants without recourse to situated knowledge and values. Consequently, this analysis suggests a fundamental disconnect between the professed standards of the World Bank and the practices of the implementing authorities.

Whilst detailed and seemingly accurate in discretely understanding households' activities, the ESIA missed many of the flows between biophysical systems and people's livelihoods. As

[101] The World Bank 2013c.
[102] P. R. The World Bank 2013.
[103] This demonstrates the Bank's long-standing engagement in Rusumo and which increases the likelihood of project's funding being approved.

indicated above, the valley has two distinct, but interconnected economies[104]; one based around trade along the main road, and another centred on the river and farmland. Agricultural potential is richest in the fertilised and irrigated valley floor (Figure 44). Many interviewees described the value of this land through the crops they could grow on it, including fruit, yams and tomatoes. In other areas of the valley, this land had particular importance as a revenue source. For instance, in the isolated Kabuye Village, a strip of annually-flooded land was used to grow income-generating tobacco[105]. Fertilising and irrigating floods are key for this land's productivity and crop variety. Whilst the ESIA does not describe this latter cash-livelihood aspect, it does recognise the valuable variety and quantity of crops grown on valley-floor land. Crucially however, it treats this discretely without assessing wider socio-economic consequences or this land's replaceability.

The author's analysis of the ESIA indicates that theoretically, the dam's changing reservoir levels could create a new, narrower land-strip with similar intermittent flooding properties[106]. However, this is not being considered by Nelsap or government officials. Regardless, it would be subject to



Figure 44 Depicting differences between richer valley-floor land compared to drier, uphill land

[104] E.g. 1Tz who on border trade and currency exchange but also owns a farm managed by his brother.
[105] 30-35Tz.
[106] This happens on the Zambian side of lake Kariba (Scudder 2012).



Figure 45 Depicting a dry season, marshland pool

the logics of the Rusumo Power Company who control reservoir levels, thus reducing predictability for farmers and making the current bi-annual flooding/cultivation regime unstable. Additionally, it is unlikely to produce other biophysical services such as the water pools shown in Figure 45 that provide fish-bait[107]. The loss of arable flood land is particularly significant given that the surrounding dry hills provide no equivalent conditions (Figure 44). This affects farming households and those buying food. For instance, interviews with shopkeepers in Tanzanian-Rusumo a year after displacement described shortages in previously abundant fruits grown on the compensated land[108].

Consultants also missed the role of the river beyond cultivation (Figure 46). Water is collected in both villages from the Kagera River. For instance a group of boys supply the majority of Tanzanian-Rusumo residents[109]. For both Rwandans and Tanzanians, the marshland reeds are also an important source of fodder for cows and other animals, particularly in the dry season when pasture is scarce[110]. Additionally, the ESIA consultants dismiss the importance of fishing, stating that only a minority practice it. In contrast, interviews in both countries revealed that, for most households, locally-caught fish are their primary meat source[111]. Interviews also highlighted the importance of seasonal changes in river volume to fishermen[112]. The RAP and ESIA therefore seem

[107] 10Rw.
[108] 4Tz 2Tz.
[109] 8TZ, et. al.
[110] E.g. Households 13Rw, 12Rw, 9Tz.
[111] 8Rw, 10Rw, 8Tz, 9Tz, 15Tz and others.
[112] Fish appear more abundant in the wet season and are also easily caught on land when the water retreats (15Tz; 12Rw; 11Rw; 13Rw).



Figure 46 Depicting drinking-water collection; (right) dry-season cattle grazing; Tanzania-Rusumo

to display a limited understanding of the socio-ecological system, the connections between livelihoods and the river. This is further demonstrated by the ESIA and RAP failing to mention the risk of wild animals. Whilst monkeys remain the main problem, fishermen and residents up-stream of the villages asserted the danger hippos pose. Both sides described scaring hippos with flashlights during their night-time grazing, especially during annual floods. Rwandan farmers even camp in grass huts amongst their fields to protect crops. These up-river residents expressed concern that the reservoir will increase hippos' habitat. The ESIA overlooks such social implications of habitat change.

Consequently, much of the valley's interrelated socio-ecological system is absent in project planning. Documents record discrete facts about the environment and livelihoods, but not of how they connect to the river's future hydrology. Moreover downstream effects on the Nile are dismissed as unimportant[113]. Additionally, by narrowly defining 'project affected people' (PAPs) as those with directly affected assets or jobs, the ESIA overlooks the larger potential indirect impact on the whole valley's socio-ecology. This finding echoes Slootweg et.al.[114] and Mirumachi and Chan[115] who argue for ESIAs to better recognise the connections between the

[113] Potentially significant given the concentration of dams on this river (Lehner et al. 2011).
[114] Slootweg, Vanclay, and van Schooten 2001.
[115] Mirumachi and Chan 2014.

biophysical and the social. The absence of such analysis limits officials' questioning of Rusumo. This speaks to Usher's thesis of *pervasive appraisal optimism* discussed in Chapter 1*,* of consultants adopting a "positivist notion that the methodology (for ESIAs) offers objective, value free information"[116]. Illustrating this, the ESIA's project appraisal only mentions the dam's positives. Besides high modernist rationales, such optimism can be strategic, enabling consultancies to compete for implementation contracts. Indeed here, Artelia won the owners engineer contract after producing the ESIA/RAP. Regardless, this expert-led, largely top-down mode of knowledge production follows the high modernist *technician's realm*, where legitimacy is bestowed on enlightened 'experts' who become the primary creators of knowledge. The valley and its people were not as *invisibilised* as in Chapter 1's historic case studies. However, their knowledge, perspectives and concerns, along with the valley's interconnectedness, are absent in official reporting. This has implications for the design of compensation.

Participation?

The RAP affirms Rusumo's participation aims as: "consultation with and participation of affected communities and individuals are key elements of the RAP development and implementation process"[117]. Early 'participation' attempts involved surveys but also civil-society engagement through the Nile Basin Discourse Forum and discussions with elected community representatives. Demonstrating the Forum's, albeit limited, influence, one of the Tanzanian Rusumo representatives[118] reportedly ensured compensation for fishermen and brickmakers. However, other recommendations, for instance to utilise training and skills[119] or hold educational village meetings, were overlooked. After project approval in 2012, larger local meetings in both Rusumo villages identified 'project affected peoples' (PAPs) and informed these individuals about

[116] Usher 1997a.
[117] Artelia 2013b, r.
[118] 25Tz.
[119] For instance, there were pre-existing stone-crushing, carpentry and HIV/AIDS prevention initiatives.

the dam, compensation process and associated training. Stemming from the absence of systemic thinking about Rusumo Dam's impact, only those with directly affected property were defined as PAPs. Unlike the whole-village approach in Nyabarongo, this left the majority of interviewed 'non-PAPs' to rely on rumour and speculation, at least until the last field trip in 2016. Interviewees who attended the meetings reported that, rather than being utilised as a source for knowledge production, their focus was on informing. Thus, the vast majority of interviewees, including those in Tanzanian village-level government, did not know what the dam's impact would be. Those who attended had different takes on whether they felt able to ask questions, with wealth and potentially gender seeming to affect this perception: For instance, 7Rw[120], a poorer woman, described the meetings as closed and did not feel able to contribute. This contrasted with 11Tz, a richer, older man[121]. Overall, these findings suggest that local-level meetings were not a source for participatory knowledge production or decision making. Rather they were intended to sensitise affected people.

Another officially-asserted participatory method involved elected Rwandan and Tanzanian affected-peoples (PAP) committees. Although a potential vehicle for remonstration and change 'from below' they appeared to largely function as an implementation tool for Nelsap. According to a former committee-chairman, their main activity was to mobilise attendance for official meetings and conduct the grievance mechanism, explained below[122]. Overall, this suggests that participation within the RAP, ESIA and project more generally, amounted only to partial consultation. This analysis therefore reinforces the chapter's finding of simultaneous reform and continuity within the technician's realm. Despite an assertion to make decision making participatory, experiences were mixed. Greater efforts at consultation did occur but the project's local interactions primarily operated to inform. Nelsap officials did not seek information 'from

[120] Also 11Tz.
[121] 16Tz.
[122] 3Rw, 27Tz, 23Tz.

below' or extend decision making. Therefore, affected people's involvement ranks at a mid-level of participation according to the models reviewed by Shipley and Utz. It falls below 'collaboration' or 'partnership', matching a lower-middle level of 'consultation' or 'involvement'[123]. Notably, the main critique of a locally-elected representative to a participatory conference was the project's lack of engagement. A top-down practice of decision making therefore seemed dominant, with power handed to foreign expert consultants, the Nelsap Secretariat and national and district governments. Moreover, by primarily conducting consultation through such representatives and the affected-people committees, officials treated 'the community' as unified, not as socially and economically divided.

These conclusions have parallels with Scott's[124] study of the TVA. Lilienthal[125], the TVA's second chief, rebranded the institution as a model of participatory democracy, not because it involved citizens in decision making, but because of its supposed proximity to the people and delivery of public services. Not questioning the TVA's high modernist rationales about the capability of science-wielding experts to perfect society from above, interaction with the valley's local communities intended to sensitise and persuade. Therefore, Scott argues that here, participation functioned "like a carver knowing his wood"[126], aiding implementation but not changing political power. Rusumo is not equivalent to this case study as it demonstrates structures that do empower selective members of the community. However, their limited influence shows persistence of a top-down, expert-orientated technician's realm.

The Compensation Process

Having established short-sightedness in knowledge production, the following section examines the compensation regime that aimed to support people during relocation and livelihood

[123] The participation ladder descends from Empowerment to Collaboration/Partnership to Consultation/Involve to Placation/Sensitising (Shipley and Utz 2012).
[124] Scott 2006.
[125] Lilienthal 1944.
[126] Scott 2006, 27.

reconstruction. In order to ensure sufficient compensation standards, the Bank made the exceptional step of financing compensation itself[127]. This avoids the recurrent issue of countries and companies not following the ambition, or the letter, of approved ESIAs and RAPs[128]. Rusumo's compensation appears comprehensive on the surface. It not only considers property values, but also pays for all lost plants and three years of generically-calculated crop production. In addition, payments covered household and business transportation costs and, for those businesses and households renting, three months' rent. Moreover, affected fishermen and brickmakers received two months' average income. Again demonstrating a degree of participation, district officials, the Nile Basin Discourse Forum and specially elected local representatives supposedly provided input on valuation. Rusumo's compensation therefore incorporates ideas from prominent dam-reform advocates like Scudder[129] , particularly in its range of considered items and in the ambition to develop, not just compensate.

This generated many successes. Household 16Tz provides perhaps the best example of livelihood rebuilding and even diversification. From being a relatively-wealthy landowner, they managed to rebuild two houses, buy new land in Rusumo, and in a valley further away. Consequently, as a household, they were able to keep farming on the fertile valley floor in a new location. Moreover, they diversified their income with a forest area from which they sell timber and through buying goats, pigs and chickens. On the Tanzanian side, many used the compensation money to build improved houses, with finer concrete plastering, metal roofs and balustrades[130]. This caused jealousy in the centre of Tanzanian Rusumo, which looks onto the newly-built houses (see Figure 47). Other examples include 27Tz who replaced a fruit farm by purchasing similarly-endowed, albeit further away, land. In another example, on the Rwandan side one partially

[127] Interview, Senior Official, World Bank, 2017.
[128] Interview, Senior Safeguards Official, World Bank, 2017.
[129] Scudder 2012.
[130] 22Tz, 16Tz, 14Tz, 33Tz all reported that their houses were improved.



Figure 47 Image of new houses in Tanzania-Rusumo village

compensated farmer had bought a pump to water his uphill land[131] and another had diversified his income source, adding a forest for timber, a cow for milk and a rented-out building[132]. Additionally, Rwandan interviewees described larger asset owners of houses and shops receiving large compensation sums and moving to Kigali to set up businesses in the capital's larger economy[133]. Most stated a degree of satisfaction with the process, feeling they had experienced no overall living-standard drop. This was reflected by interviewee 1Rw reporting that 13 of 15 compensated shop owners/farmers were happy with the process.

However, other cases compromise this picture of success. As described above, a valley-system view highlights the irreplaceability of valley-floor land because of its moisture and fertility. Consequently, many interviewees explained the difficulty of replacing it[134], describing their inability to grow papaya[135], banana trees[136] or tomatoes[137] on new upland plots. For instance, Household 14Tz, although now owning a larger house, felt that their livelihood had suffered because of the lower quality of their dry, uphill replacement land. Additionally, 26Tz related a

[131] 10Rw.
[132] 12Rw.
[133] 2Rw.
[134] 16Tz, 18Tz.
[135] 22Tz.
[136] 11Tz.
[137] 12Rw.

story of people in Tanzanian-Rusumo laughing at those who'd received the compensation windfall as their apparent wealth disguised poorer agricultural livelihoods. Some blamed this outcome on insufficient land valuations. One local resident involved in compensation evaluation described a "small team from district government" appraising houses and land in what he saw as a superficial way; only "(looking) at the outside (of a property)"[138]. Moreover, the process calculated yields from statistics provided by local authorities, based on generalised land-types, thus excluding each farm's particular conditions and the farmers' knowledge[139]. Therefore, asset-calculation did not capture 'metis'[140], meaning situated local knowledge. Indeed, the majority of compensated interviewees professed ignorance of what they saw as an opaque asset-calculation process. Another reported issue related to field boundaries. Those involved in the Tanzanian resettlement committee described problems stemming from people claiming extra land when their neighbours weren't present[141]. Perhaps the worst affected by this was a prisoner interned during the calculation process[142].

The compensation process thus appears unequal and incomplete. This is most clearly demonstrated by the number of households who should have received compensation but were left out. The RAP states that brickmakers and fishermen should be enrolled. The ESIA's census records 14 fishermen[143] which disagreed with fieldwork indicating a far larger number: just one Tanzanian cooperative was 25 strong. This discrepancy could stem from predominantly dry-season surveys missing the complementary cycle of wet-season fishing and dry-season brickmaking. Nevertheless, brickmaker employees from one large Tanzanian-Rusumo business were not paid. Furthermore, individuals practising both seasonal activities were sometimes

[138] Tz26.
[139] Artelia 2013a.
[140] Scott 1998.
[141] 27Tz, 26Tz.
[142] 26Tz.
[143] Artelia 2013a.

registered under only one label[144]. Thus, a potential misunderstanding of local livelihoods, lack of rigor or, as some suggested, corruption in enlisting people, has meant a large number of interviewed fishermen did not receive compensation and were not enrolled as project affected people.

Other instances of *invisiblising* stemmed from bureaucratic inflexibility. For instance, one household[145] missed the deadline to register a family grave on their land, and now face the distress of it flooding. Another frequently overlooked group were residential renters and tenant farmers (Figure 48). The latter were supposed to receive compensation for planted crops and any improvements they had made to the land along with the value of five years yield[146]. One typical household example had rented valley-floor farmland and a house but had received no direct communication from project officials. Rather their landlord, who was paid, informed them. One year on, this left them with a smaller, lower quality rented home and no farmland[147]. This also occurred on the Rwandan side[148], as illustrated by household 14Rw who had been tenant farmers on compensated farmland. A key reason for this omission relates to a lack of formal contracts,



Figure 48 Images of tenant-farmed, valley floor land where tenants are not enrolled in compensation (Rwanda-Rusumo)

[144] 5Tz.
[145] 14Tz.
[146] Artelia 2013b.
[147] 34Tz.
[148] 4Rw; 5Rw; 7Rw; 8Rw; 9Rw; 13Rw; 14Rw.

understandable in this rural area with limited literacy. This reinforces a pattern of the more socially and economically marginalised being most likely to lose from the compensation process.

Legal ambiguity also created an issue around marshland. In both Rwanda and Tanzania, the area covered by the river at its peak is supposedly designated as government land. However, given such land's high agricultural value, and the annual variation of the flood, much of the recession land is farmed. Despite this, official government ownership means the Bank isn't able to compensate this land and treats users as tenants for compensation purposes (see above). In densely-populated Rwanda, this discriminates against the landless, who tend to be poorer and younger. Illustrating this, four landless/land-poor interviewees admitted to using known government land but were not enrolled in the compensation scheme. There were also cases of pieces of land being contested where Nelsap officials asserted government ownership of land that interviewees conversely claimed under certificates[149]. Similarly, in Tanzania, large stretches of regularly-flooded land are legally or customarily owned[150] (see Figure 49). The RAP's application of this static law to a dynamic environment in thus complex and contradictory. The decision not to compensate might contradict, or at least show poor implementation rigour of, the World Bank's statute OP 4.12. It states that all project-affected people should receive compensation for land



Figure 49 Images depicting owned and cultivated farmland: Annual flooding creates dark, damp fertility. Tanzania-Rusumo)

[149] E.g. 10Rw reported this concerned 59m^2 of his 110m^2 plot.

[150] E.g. 19Tz (a large floodplain landowner). Reported by 20Tz, 21Tz.

held under formal, customary or traditional rights, or if such ownership is established during the project's census.

Furthermore, as of September 2018, the Bank and Nelsap staff seem to have overlooked roughly two thirds of the 685 households cited in the RAP[151]. After completing payment to 183 households, officials at Nelsap and the Bank stated publicly and in interviews that the compensation was complete[152]. However, this ignores a further two rounds described in the RAP involving communities upstream (see Figure 50). Unlike in the Rusumo villages, these people have not had a programme of meetings or been organised into resettlement committees. Along with the absence of wet-season fishermen and brickmakers, this apparent omission of less accessible, poorer, rural upstream communities affirms long-made critiques of development. As argued by Chambers[153], officials often have a bias towards dry-season research and accessible areas. Finding undercounting and omission in dam projects also has a long history, not least in the nearby World-Bank financed Ruzizi II. This 1980s dam initially estimated and budgeted for 200 displaced people[154]. However, the actual number of affected was 13,000, over 60 times the initial figure. Whilst involving far more rigorous preparation than past-era projects like Ruzizi II, distance from the affected community meant that Rusumo Dam produced similar outcomes.

On paper, a grievance mechanism was intended to resolve such issues. It involved three tiers: the project-affected peoples (PAP) committees; Nelsap; and national courts, supported by legal aid[155]. However, the only dispute resolution completed by 2016 involved the first tier where the PAP committees attempted, sometimes successfully, to settle land-border disputes.

[151] The authors efforts during 2017 and 2018 may see this changed.
[152] Senior Official, Safeguarding Officials, World Bank, 2017; Engineer, Nelsap, 2017.
[153] Chambers 1984.
[154] Hildyard and Willks 1994.
[155] Interviews; Safeguarding Officials, World Bank; Official, Nelsap; 2015, 2017.

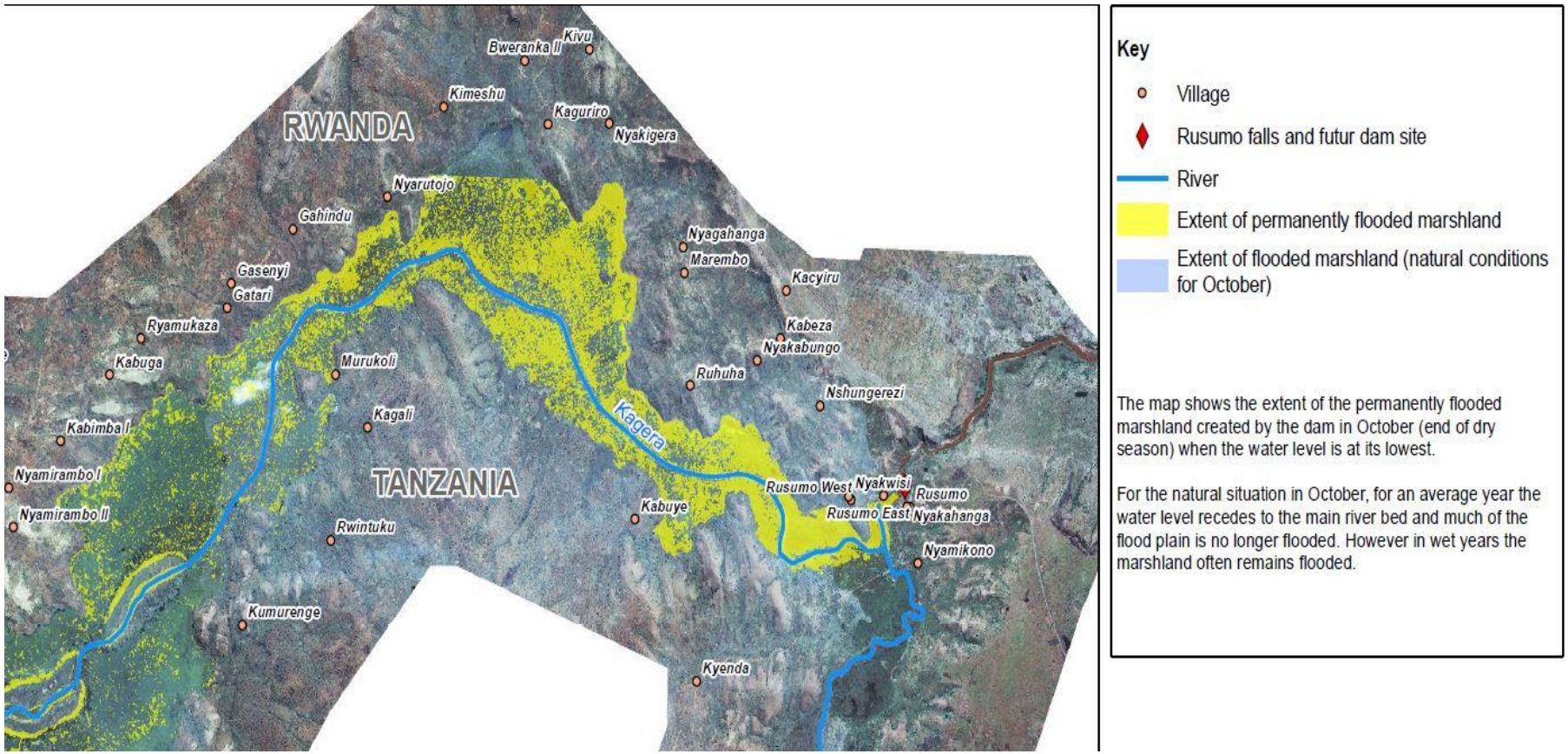


Figure 50 Depicting the extent of upstream flooding (Source: Artelia, 2013a, p3)

With no allocated money, those making other complaints stated that Nelsap simply referred them to the third tier of courts[156]. One family seeking redress was unaware of legal aid and, influenced by their illiteracy and limited confidence, viewed legal action as untenable[157]. PAP committees also felt frustrated as they have no financial means to act. Therefore, as with Dao's[158] study of improvements in dam building in Vietnam, reformist compensation policies are adopted here. However, recipients have a limited ability to address perceived injustices or assert alternative appraisals of their assets that include local-level knowledge. This policy bricolage produces Rusumo Dam's complex outcomes with a pattern of beneficiaries and losers following inequalities in social and economic power.

Livelihood Restoration

The second major compensation component was a Livelihood Restoration Scheme (LRS). Its presence again demonstrates changed standards and the increased comprehensiveness of compensation. The scheme goes beyond anything attempted in Nyabarongo, speaking to the World Bank principle to leave affected people better off. Additionally, the LRS served as an alternative to full asset compensation for renters, tenants, employees and those using the legally-ambiguous seasonally-flooded marshland[159]. However, using the scheme as compensation rests on the assumption that it is possible to 'Do Development', a certainty that the scheme will create new maintainable livelihoods. From the critical development studies school, such an assumption ignores the long history of failed rural development attempts that are documented by numerous seminal works[160].

[156] 14Tz, 26Tz, 27Tz.
[157] 14Tz.
[158] Dao 2010.
[159] Artelia 2013b. Also echoed in: Interviews; Officials, Nelsap, 2015-16.
[160] Scoones and Thompson 2000; Chambers 1984; Chambers 1984; Cleaver 2012.

Officials stated that the restoration scheme was locally driven through community participation[161] and the RAP asserts that the restoration scheme will build on pre-existing programmes and be locally-relevant, for instance by using indigenous breeds. However, based only on discussions with district government, the RAP dictates the scheme's key programmes as agricultural extension, livestock, micro-credit and business support[162]. Talks, primarily between Nelsap, the district government and regionally-operating NGOs, added detail. In Tanzanian-Rusumo, one leader in the first affected-people's committee stated that they had no impact on the LRS[163] but members of the subsequent committee described involvement in choosing between different LRS options[164]. Elected committee members therefore had some input, but the restoration scheme was principally decided by consultants, Nelsap and district officials. Alternative, locally-generated ideas were presented at the Nile Basin Forum, including utilising a women's stone crushing cooperative for aggregate, reviving a HIV/AIDS prevention group[165] and employing people from a local carpenter training scheme[166]. However, Nelsap has not taken these on, illustrating the frequent marginalization of participatory dam-reform initiatives.

Moreover, as well as questioning the extent of participatory practice, interviewees directly critiqued the LRS' content. One household, for example, rejected the LRS' use of non-local cow breeds[167] as recipients had poor husbandry knowledge of these animals and because these cows were unsuited to the dry season's poor-quality grass and lack of water. They described one such cow dying within a year. Another recipient received support to start a second-hand clothing shop[168] but suffered as there was little local demand[169]. Such evidence points to an expert-driven

[161] Interviews; Senior and Junior Officials, Nelsap, 2015-2017.
[162] Artelia 2013b, 109.
[163] 26Tz.
[164] 27Tz.
[165] This is particularly significant given the likelihood of prostitution during dams' construction (Öhman 2007).
[166] 25Tz.
[167] This also contradicts the RAP.
[168] 7Tz.
[169] Neither Rwandan or Tanzanian Rusumo had a market in 2016.

process with limited participation or attention to the valley's specificity. The sense of powerlessness among affected people was captured by one family's elder. He was especially angry with the rabbit programme, which he felt he had no choice over, exclaiming "why do we have these fucking rabbits?!"[170]. Fundamentally, whilst gaining a better house, this household cared about the land they had been unable to replace: rabbits would not bring a livelihood foundation, or even useful diversification. Additionally, various interviewees alleged that bribery occurred in the process of enrolling affected people, especially in the popular fishermen and brickmakers schemes. Furthermore, a number of interviewees receiving compensation professed to be unaware or excluded from the LRS[171]. The restoration scheme's planning, and some of its programmes, therefore seem to illustrate classic 'Development' critiques[172] where technicians pay limited attention to the locale and treat the community as homogenous. Consequently, they attempt inappropriate change.

Benefit Sharing?: The Local Area Plan and Construction Phase

The final element of Rusumo's compensation effort is the Local Area Plan, a $15million fund divided between the three countries' district governments[173]. This component also stems from ambitions to develop, not merely compensate. However, the vast majority of residents under both Rwandan and Tanzanian district governments will not be affected by Rusumo Dam at all. Directing the fund through these larger geographic units therefore distances it from the affected people. On the Tanzanian side, it also disempowered the more accountable Rusumo village and sector-government levels. There was considerable anger about this in Tanzanian-Rusumo. Potentially given the holding of recent local meetings, all those interviewed here asserted that the most meaningful development programme would involve construction a drinking water system, a

[170] Interview with 14Tz.
[171] E.g. Fishermen 12Tz; 13Tz; Landowner 22Tz.
[172] E.g. Crush 1995; Chambers 1984; Hickey and Mohan 2004.
[173] Artelia 2013b; Artelia 2013a.

clinic and a market building. However, the district government reportedly did not follow such priorities[174]. The livelihood restoration scheme and local area plan therefore appear to operate to some extent along the lines of the *enabling social engineering* applied high modernist idea-practice. They design future livelihood transformation from above, based on district and national government agendas. This is particularly true in Rwanda, which as Chapters 3 and 5 describe, has a strong agenda of rural transformation premised on the introduction of more industrial farming practices and the aesthetics of modern citizens. Furthermore, the benefit-sharing plan increases the district governments' capabilities, giving them finance and a mandate for social interventions.

However, the construction phase may change existing frustrations. Contracted firms have strict guidelines about preferential employment for affected people and local residents. High skilled jobs may even be accessible with a degree of training for local residents promised. Additionally, construction firms are supposed to, where possible, procure goods such as food or building materials locally. The previous chapter demonstrates that such practices can have significant benefits and Rusumo's rules in this area are far more stringent than Nyabarongo Dam. Additionally, key issues in Nyabarongo, like those stemming from blasting might be avoided as each phase of construction requires a World Bank-approved, site-specific plan with impacts assessed and compensation measures outlined.

Conclusion

On paper, many aspects of this dam appear exemplary: The ambition for impact assessment and compensation follows some of the principles of the World Commission on Dams; a regional assessment recommended the project given its comparatively low social and environmental impact; and a design revision reduced affected households 25-fold. Moreover, a relatively complete compensation scheme was informed by multi-year studies and, albeit limited,

[174] Interviews, Officials, Local Government, 2016.

involvement from committees of affected-people. This meant that the majority will be able to stay in their communities and keep at least part of their land, something recommended by academic authorities on dam resettlement like Scudder[175]. Additionally, many displaced households have been able to re-establish livelihoods through a compensation regime that intended to leave communities better off. This demonstrates adherence to reforms called for by activists and academics in the resurgence era, but also shows the important role of the World Bank in pushing these policies' implementation. That reformist idea-practices were also espoused by Nelsap and integrated in the engineering-consultancy Artelia's work, demonstrates the degree to which these norms have spread through the 'dam regime' of international planners, builders and financiers. Consequently, Rusumo Dam compares favourably with Nyabarongo, particularly if the approximately 400 originally-counted remaining affected people are compensated.

However, this case demonstrates an energy project's complex dynamic; that even with apparently well-intentioned technocrats and their extensive compensation schemes, officials have failed to meet the World Bank and Nelsap's stated intentions. The socio-ecological system in the valley and complexity of biosphere-livelihood connections remained incompletely understood. Consequently, consultants seem to have underestimated the impact on livelihoods and indeed many of those directly affected completely missed compensation. This was most acute for vulnerable groups; the renters, tenant farmers, brickmaking employees, landless and those living in remote areas. Partly, this demonstrates the World Bank's limitations in enforcing standards, a factor also highlighted in some of the literature on the organisation's relations with sovereign states[176] and contractors[177]. This is further complicated here as the Bank works with the Nelsap Secretariat whilst also handling contractors and two sets of national and local governments[178]. This assertion of complexity contrasts with many others who present the Bank as

[175] Scudder 2012.
[176] Mosley, Harrigan, and Toye 1995.
[177] Chen and Landry 2018.
[178] Burundi being less involved.

all-powerful. For instance, Goldman[179] critiques the organisation as a hegemonic force and dismisses socio-ecological reforms in dam building like that in the Nam Theun II.

This chapter also asserts that high modernist ideology influences Rusumo's justifications and practices, although it also evidences Nelsap and the Bank's institutional self-interest. Discourse from Rwanda, Tanzania and the World Bank imbued Rusumo Dam's megawatts with linearly delivered development, showing a modernisation theory rationale. Mirroring aspects of the KBO's history, Rusumo's implementation involved a *technician's realm*, dominated by consultants, a river basin authority (the Nelsap Secretariat) and district-government experts. Whilst consultation and sustained interaction with the communities punctuated this 'realm' and differentiates Rusumo's dam-resurgence era from its KBO past, decision making remained with outside technicians. Through their expertise, the dam and its impacts are supposedly rendered knowable, compensation possible and costs made negligible. Thus, underpinned by high modernist rationales, officials de-politicised the dam as the technically best solution and justified the handing of decision-making to officials.

The limited inclusion of smallholder farmers and of the concerns of valley residents, ensured the ESIA took a discreet understanding of impacts that missed potential effects and overlooked connections between the biosphere and livelihoods. Moreover, the participation and compensation process appeared to assume a homogenous community rather than seeing differences in power and agency between residents. Thus, official descriptions of successful compensation contrasted with differentiated local realities where many saw the process as incomplete or unjust and others were entirely missed. Additionally, attempts at livelihood restoration missed opportunities and pursued questionably-appropriate schemes. Rather than Scudder's[180] view of displacement as messy and exceedingly hard to overcome, for Rusumo's

[179] Goldman 2005.
[180] Scudder 2012; Scudder 2005.

planners' livelihood restoration appears solvable and linear. High modernist ideas rationalise such belief in the sufficiency of expertise, such optimism in externally planned development. This depoliticised understanding assumes local people constitute a unified group, not one segmented by power that disables the asset poor whilst enabling asset rich to seize opportunities stemming from dam construction[181]. Additionally, the structural barriers to achieving development in an isolated and poor region with limited market potential do not figure.

Overall, this chapter demonstrates the thesis' core argument. It highlights inclusion of important reforms, most demonstrated by the substantive dam design revision. Such decisions clearly counter the high modernist practice of *emphasising spectacle,* as does the shift from a multipurpose dam and totalising development vision to singular hydropower purpose. However, high modernism also features prominently in justifications and practices. Analysis therefore asserts that Rusumo is the product of an ideological bricolage where reform mixes with persistent high modernism. Such bricolage is encapsulated in the diversity of opinion within the Bank, but also in implementation practices that constitute an, albeit reformed, *technician's realm*.

[181] Assets can be defined multi-dimensionally to include social standing, education and economic assets.

Chapter 7

The Stiegler's Gorge Dam: Resurrected Grand Ambitions and Invisibilised Impacts

Lying in a remote part of Tanzania, the Selous Game Reserve stretches South from the foothills of the Udzungwa Mountains into a vast, undulating plain. The Rufiji River carves through this landscape of savannah and scrubby Miombo forest. Its marked seasonal pulse periodically shifts the river's path leaving a rich habitat of oxbow-lakes and tropical vegetation (Figure 51). This area of wetland and marshy channels forms the biodiverse centre of the Selous' fauna and flora. Europeans have celebrated the Selous, calling it the "Heart of Africa"[1], a pristine land, "untouched by human hands" and "as God made it"[2]. However, as with much of Africa's supposed 'wilderness', human activity has long shaped what is now the Selous. Historically, this area was a route for ivory





Figure 51 Images of the varied Selous environment: (clockwise) Rufiji Valley marshland; drier savannah; the Beho-Beho Hills and miombo woodland

[1] Baldus, Atanas, and Meier 2009.
[2] Nicholson 2009.



Figure 52 Photography of the Stiegler's Gorge

and slavery caravans and German and British armies fought East Africa's major First World War[3] battle on its planes. In addition, the Selous was depopulated by successive colonial government's hunting-conservation agendas, starting under the German Kaiser[4] (1885-1918) and continued with the British model of fortress conservation(1918-1961)[5]. Both forced the constellation of Warufiji communities to move downriver[6]. Today, this group continues to practice recession agriculture downstream of the reserve, using seasonally-flooded land along the Rufiji. Gradual expansion of the Selous Reserve makes it one of the World's largest protected areas, roughly the size of Switzerland. As of 1982 it became a UNESCO World Heritage Site, principally because of the uniqueness of its large Miombo woodland and the level of biodiversity in the Rufiji wetland area. Downstream, the Rufiji River's delta is a designated RAMSAR site because it constitutes a globally-significant habitat including the largest mangrove stand in East Africa and a number of indigenous flora and fauna[7].

[3] In this battle British Captain Frederick Selous died, lending his name to the reserve.
[4] Baldus 2009a.
[5] Neumann 2001.
[6] Nicholson 2009.
[7] Brown, Mwansasu, and Westerberg 2016; Mwalyosi 1991.

Above the Selous's biodiverse heartland, the river cuts through the Beho-Beho Hills, creating the Stiegler's Gorge. This 100-metre-deep ravine (see Figure 52) is the site for a proposed dam. Early colonial expeditions[8] explored the Rufiji, mapping its geography and analysing potential development projects. A German 1907 expedition appears to have been the first considering a dam at the Gorge. Whilst surveying the site for a bridge and dam, an elephant attacked engineer Stiegler who fell into the ravine, leading to colonists naming it after him[9]. Increasingly detailed and ambitious studies followed, continuing through British colonialism into President Nyerere's regime, only to be shelved in the 1980s. As part of a wider revival analysed in Chapter 4, President Kikwete's government took-on the Stiegler's Gorge Dam project (hereafter, Stiegler's Gorge, Stiegler's Dam etcetera), planning a 126m high and 700m wide, dam wall diverting water to generators with a 2096MW capacity (see Figure 53)[10].



Figure 53 Engineering plan for the dam (Source: Odebrecht 2013b)

[8] In 1904, 1907, 1909 and 1911 (Baldus 2009a; Havnevik 1993).
[9] Baldus 2009a.
[10] Odebrecht 2013a.

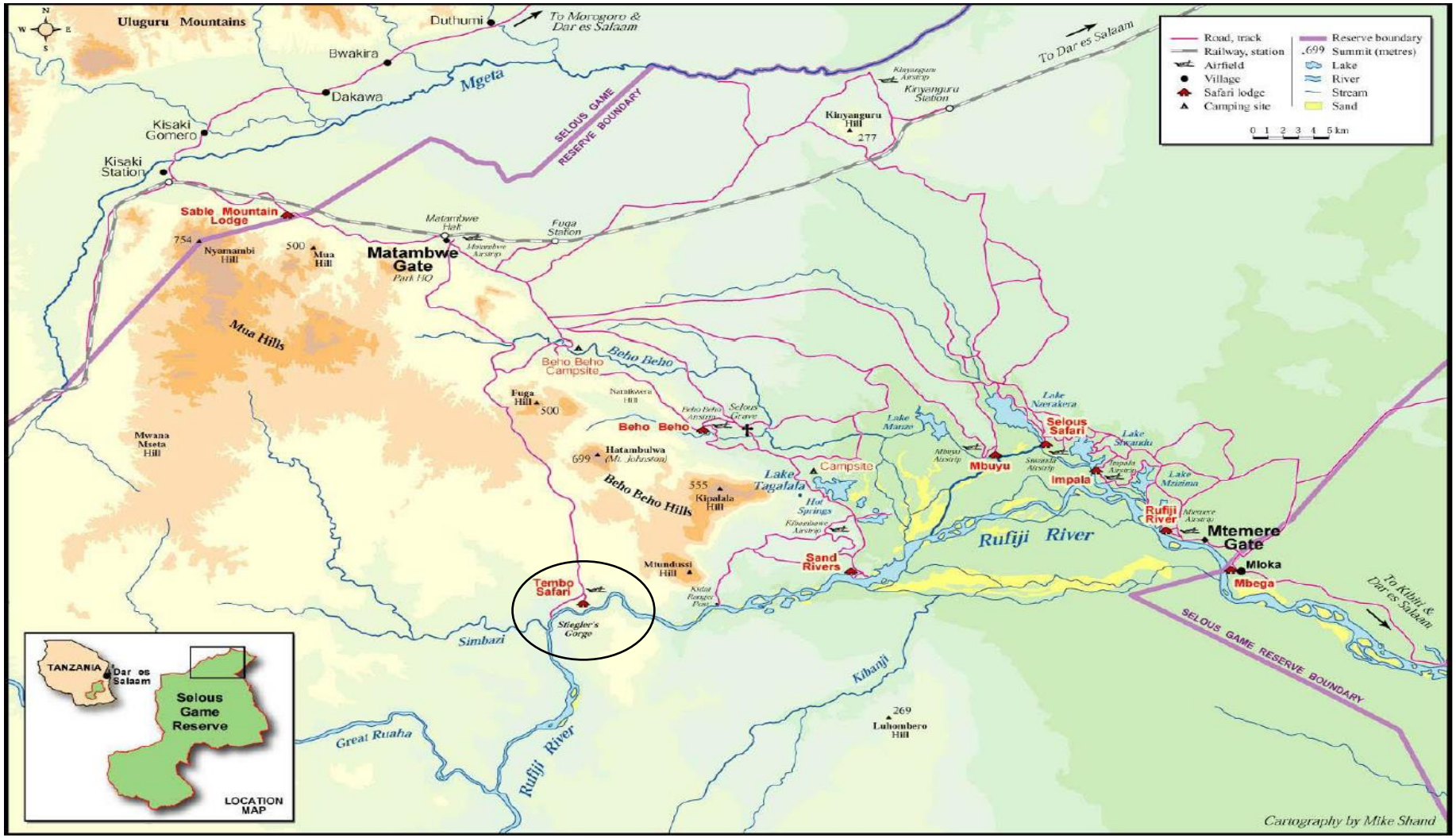


Figure 54 Map of the Stiegler's Gorge and immediate area. with added emphasis on the dam site (Source: Hartmann, 2017; original cartography by Dr Mike Shand)

This would make it the 6th largest reservoir on the continent[1] and Africa's largest dam by installed hydropower alongside Egypt's Aswan High Dam (2100MW), marginally outstripping Mozambique's Cahora Bassa Dam (2075MW) and Angola's Lauca Dam (2069.5MW) (that is, until completion of Ethiopia's 6,450MW Grand Renaissance Dam). The Stiegler's Gorge project is a historic and present-day flagship, not only for Tanzania but also for the regional Eastern Africa Power Pool[2].

This chapter furthers analysis on why the dam resurgence has happened and what its planning practices involve, focusing on the decisions about design, mitigation and impact assessment. More than the Nyabarongo and Rusumo Dams, Stiegler's justifying discourse appears to imbue the dam itself with developmental potential, albeit through the prism of Tanzania's megawatt mission. The case study also furthers conclusions made in Chapter 2. The dam project demonstrates the Brazilian state's important role in forging engagements in Africa but also highlights the matching agency of infrastructure-corporation Odebrecht, and Tanzanian officials. Moreover, the chapter illustrates the practices of Tanzania's megawatt mission and its short-sightedness. However, as physical construction is yet to begin, the Stiegler's case study also makes an important contribution to the thesis in demonstrating the limitations of the dam resurgence. Whilst the latest efforts under President Magufuli indicate potentially imminent implementation, the case is instructive for demonstrating the unresolved debate over the infrastructure. Overall, this case study furthers the thesis' argument that the resurgence of dams involves high modernist justifications and practice alongside instances of reform, seen here particularly in the acknowledgment of downstream impacts among some planners, explicit policies to share benefits and initiatives that could remove *enclave* during construction.

[1] Dye and Hartmann 2017; Hartmann 2017.
[2] SNC-Lavalin 2011.

The chapter proceeds by analysing the history of the Stiegler's Gorge project. This historical grounding highlights the thesis' inclusion of path dependency as a causal factor explaining present-day dam resurrections and the degree of continuity in their implementation practices. It then examines Stiegler's 2006 resurrection, consequent planning stages and engagement with Brazil. Analysis turns to the decision-making actors designing the dam and their consideration of impact and mitigation. This is contrasted with academic literature that uses more participatory methods to consider the Stiegler's Dam's likely impacts, thereby revealing the depoliticised planning of the officials resurrecting the dam that *invisiblise* effects and adopt *pervasive appraisal optimism*.

History of the Stiegler's Gorge Dam

The Stiegler's Gorge project originates in the colonial period. Alexander Telford[3] conducted the first systematic[4] development surveys of the Rufiji in 1928-1929, with engineer C. Gilman undertaking further studies in 1938-1940[5]. Both focused on increasing agricultural productivity by investigating potential irrigation schemes. Plans included a small dam at Stiegler's Gorge that would enable a degree of flood control, electricity generation and irrigation, but also maintain much of the Rufiji's seasonality. This contrasted with the Food and Agriculture Organisation's (FAO) surveys from 1954[6]. Regarding the FAO period Hoag and Öhman assert: "with the ascendency of scientific development in the late 1940s, new ideals came into play: by the mid-1950s, Western and non-Western planners alike agreed that an efficiently developed river could catalyse national economic development"[7]. With 'efficiency' defined through river control, the FAO's final 1961 report presented the first totalising vision of development transformation through a dam at Stiegler's Gorge. The FAO studied the dam in detail for the first time, outlining

[3] Hoag 2013, 117.
[4] This survey contrasts with earlier piecemeal expeditions.
[5] Havnevik 1993.
[6] Hoag and Öhman 2008.
[7] Hoag and Öhman 2008, 631.

its capability to generate megawatts, enable irrigation of 200,000ha and remove the supposed "plague" of seasonal flooding that otherwise prevents such agricultural infrastructure[8]. This grand vision of development "turned the valley into an abstract entity"[9], premised on the backwardness of existing livelihoods, the wastefulness of untamed floods and the progressiveness of technology[10]. Thus, Hoag and Öhman contrast these two phases: "Where colonial surveyors plodded through muddy fields … the FAO experts viewed the region from above, conceptualising the basin's snaking waterways as potential megawatts of electricity"[11]. This conclusion parallels Tischler's[12] finding of contrasts in the Kariba Dam between Northern Rhodesian local colonial officers who attempted to safeguard the Tonga tribe and the infrastructure's engineering planners.

The Stiegler's Gorge Dam survived then-Tanganyika's independence, as "officials embraced the belief that technological modernisation was necessary for economic development"[13]. However, the new government's focus turned to electricity: "The Tanganyikan government and a group of international development agencies pursued the planning of Stiegler's Gorge, which they envisioned to become the giant leap forward for power generation and electricity-induced industrialisation"[14]. The dam became increasingly central, as demonstrated by the 1969-1974 Five-Year Development Plan[15]. The 1960s saw three international enablers engaging in Stiegler's, the first was the Japanese External Trade Organization who funded studies proposing a 620MW plant, but concurrently, Tanzania built ties with the US Federal government and the TVA[16]. This involved a USAID-sponsored study applying America's model of river-basin transformation to Tanzania. Thus, in 1966, two senior Tanzanian planning officials, Iddi Simba and

[8] Havnevik 1993; Hoag 2013; Duvail and Hamerlynck 2007.
[9] Hamerlynck et al. 2010, 323.
[10] van der Straeten 2017.
[11] Hoag and Öhman 2008, 626.
[12] Tischler 2013.
[13] Hoag 2006, 250.
[14] van der Straeten 2017, 286–89.
[15] Hoag 2013.
[16] Havnevik 1993; Hoag 2013.

J.S. Kasambala, visited the Tennessee Valley Authority, the Central Valley Project and the Grand Coulee Dam[17], all cornerstones of the USA's dam-underpinned hydraulic statebuilding[18]. USAID's final report advocated pursuing the Stiegler's Gorge Dam as a priority and centralising decision making over infrastructure and natural resources in the Rufiji Basin in one authority[19]: In the cover letter, notable dam advocate Floyd Dominy of the US Bureau of Reclamation stated: "This study reveals that a properly planned resource development programme can lift the present extractive, subsistence-level economy of the Rufiji Basin into a major self-liquidating contributor to the economy of Tanzania"[20]. The report focused on Stiegler's significant 2100MW potential, setting a precedent for the dam's scale and for planner's emphasis on hydropower. Tanzania then participated in a conference on "The Tennessee Valley Authority Experience" in 1974[21] and Nyerere furthered this link by visiting the TVA in 1977[22].

The 1968 USAID report thus laid the groundwork for the creation of the Rufiji River Basin Development Authority (Rubada) in 1974. Interviewees today remember the TVA's inspiring influence[23] and newspapers at the time also invoked Tanzania's emulation of Ghana's Volta River Authority, which was also inspired by this model[24]. Additionally, Chapter 6 explains how Rubada was part of a broader regional trend that saw the creation of powerful river basin bureaucracies to implement dams, including the KBO and Kenyan organisations. The Stiegler's Gorge Dam was, from the start, the centrepiece of Rubada's programme, the infrastructure capable of delivering basin transformation. Rubada's logo and a mural in its head office (see Figure 55) illustrate this. Indeed, the Stiegler's centrality is written into Rubada's founding law handing it considerable power, including the right to distribute electricity despite Tanesco's de-facto monopoly[25]. The

[17] Hoag 2006, 248.
[18] Chapter 1.
[19] Agency for International Development and Bureau of Reclamation 1967.
[20] Dominy 1967, Cover Letter.
[21] Knop 1974.
[22] Trescott 1977.
[23] "initiated … following Tennessee Valley Authority Visit" (Interview, former Rubada chairman, 2015)
[24] Hoag 2013; van der Straeten 2017.
[25] Parliament Act No. 5 of 1975 (United Republic of Tanzania).



Figure 55 Depicting the Rubada logo that emphases the dam and electricity (left) and a mural of the dam in the Rubada head office that notably contrasts with the geography of the Stiegler's Gorge (right)

importance of the Stiegler's to Rubada persists: Interviewees described "(Rubada's) key objective about the Stiegler's Gorge"; "(Stiegler's Dam) its main activity"[26]; or "(generating hydropower from the Stiegler's is) Rubada's … first assignment"[27]. Thus, the creation of Rubada institutionalised the project and a US-inspired, exclusively-expert development model.

Norway, seeking to advance its dam industry[28] then became Stiegler's third international enabler. Consultancy Norconsult and engineering firm A/s Hafslund led feasibility and design work, producing reports in 1971 and 1977. However, Stiegler's construction required a large loan that was beyond Norway's financial capability. Given Tanzania's economic position, the World Bank was the primary dam-funding option[29]. The Bank regarded a multipurpose design as the only viable possibility, partly based on questions about Tanzania's energy demand: Tanzania's first Power System Master plan in 1978 rejected the dam on the grounds that only 225MW needed to be added by 1995. Rubada, disregarding this recommendation, solicited further energy forecasts which would endorse Stiegler's

[26] Interview, Senior Official, Rubada, 2015.
[27] Interview, Senior Official, Rubada, 2015.
[28] Havnevik 1993.
[29] Havnevik 1993.

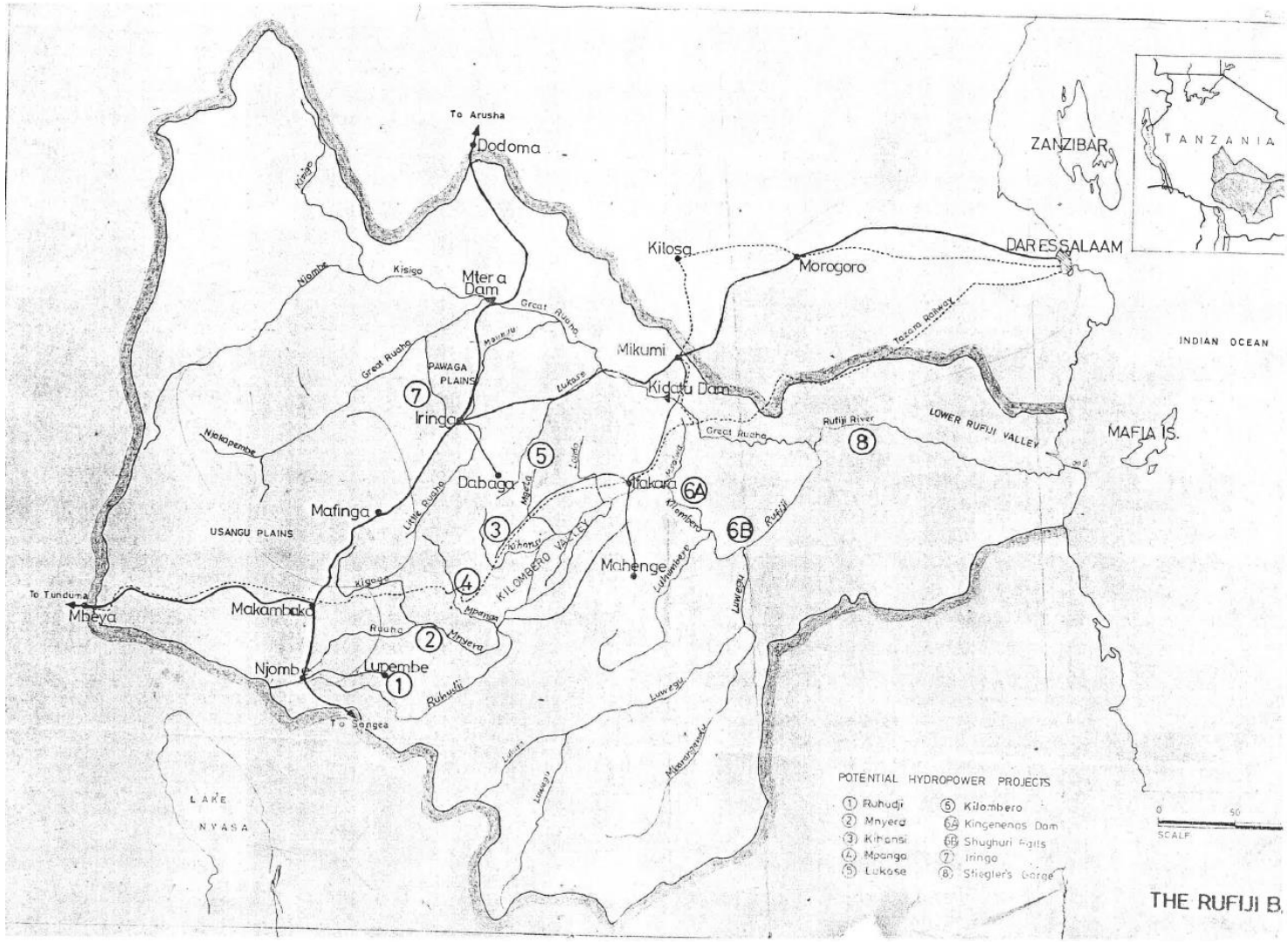


Figure 56 Map of identified dam sites in the Rufiji Basin including Stiegler's Gorge (No. 8) and Mnyera (No. 2)

The first predicted a similar demand but the second justified the dam by forecasting a demand rise of over 600MW by 2000[30]. Additionally, to address the World Bank's concerns, a final report on the dam in 1984 detailed a multi-purpose scheme that included water supply to Dar-es-Salaam, reservoir fishing and irrigation schemes. The report also outlined further dam sites (see Figure 56), thereby initiating dam planning at Ruhudji, Kihansi and Kilombero (see Chapter 4) and for the Rubada-pursued Mnyera, Mpanga and Iringa Dams (discussed below). Additionally, Kaiser, the firm involved in Ghana's Akosombo Dam, created an industrialisation strategy for the Rufiji[31].

Throughout these planning stages, the Tanzanian government, American engineers, Norwegian consultants and other international development experts appeared to share a high modernist ideology about the potential of Stiegler's Dam, its benign impact and the exclusive legitimacy of their expert knowledge. This development consensus renders the dam apolitical, ignoring trade-offs and reducing the complexity of the Rufiji's socio-ecological system to potential megawatts and irrigated hectares: Potential for modernisation trumps "consideration either of the people and ecological environment affected, or wider economic implications"[32]. A central example of this is the strong narrative of the Rufiji's seasonal flood as a plague, a wasteful inhibitor of development rather than bringer of fertility, agricultural productivity and ecological services from fisheries to construction materials[33]. This narrative was given credence by the unusually strong and long-lasting flood of 1968. It initiated the first Ujamaa villagisation, forcing floodplain Warufiji communities away from the river[34]. A handful of individuals did conduct environmental impact analysis for the Stiegler's Gorge, but in isolation from A/s Hafslund's design and feasibility studies[35]. Those involved remembered that their report "used politically (sensitive) language to narrow down or minimise (the described impacts), not to overdramatise what would be very

[30] Havnevik 1993: This episode has parallels to Perkins' (2006) somewhat sensationalist account of development consultancies inflating electricity demand forecasts to justify large energy infrastructure.
[31] Hoag 2006.
[32] Havnevik 1993, 283.
[33] Hoag 2013; Duvail and Hamerlynck 2007.
[34] Havnevik 1993.
[35] van der Straeten 2017.

significant (effects)". They "had to write (it in such a way) so it (the EIA) wouldn't stop the project", as Tanzania "would need to attract partners like the World Bank"[36].

However, by 1986 World Bank officials rejected funding the Stiegler's suggesting Tanzania pursue smaller upstream projects[37]. Globally, this was a time where the Bank decreased large infrastructure financing, focusing on Structural Adjustment reform[38] and turning to a "basic needs"[39] development approach entailing less focus on large national infrastructure[40]. Moreover, Havnevik[41] and Hoag[42] suggest the Bank's withdrawal was affected by the emerging economic and environmentalist critique of dams. This context increased the potency of research by international and University of Dar-es-Salaam academics that highlighted the dam's likely social and environmental impacts. Furthermore, as Chapter 4 describes, Tanzania's economy stagnated because of an international market downturn, the costs of villagization and war with Uganda. Collectively, these circumstances shelved the project. Without its key purpose, Rubada drifted from the powerful Ministry of Planning to the less important Ministry of Agriculture[43].

This history of the Stiegler's Gorge project demonstrates the important role of an international set of actors whose finance and development models influenced and enabled the imagining of Stiegler's Dam. Exemplified by the role of the USA's key dam-building institutions, the Stiegler's reveals a regime of international dam builders attempting to transform post-colonial Tanzania. However, drive from international actors equalled that of the Tanzanian state: For instance, Havnevik writes that "Norwegian eagerness to employ domestic competence in hydropower development was matched by the appetite from Tanzanian bureaucracy for large-

[36] Interview, ecologist employed 1980s EIA, 2015.
[37] Havnevik 1993.
[38] Mosley, Harrigan, and Toye 1995.
[39] Hoag 2013, 196: This period also saw the rise of "small is beautiful" celebrating the economic benefits of smaller projects, operations and companies (van der Straeten 2017, 276).
[40] Hoag 2013.
[41] Havnevik 1993.
[42] Hoag 2013; Hoag and Öhman 2008.
[43] Interviews, Official, Rubada, 2015-2016.

scale development projects"[44]. This history consequently reveals the importance of the dam to Tanzania's ruling CCM party, its status as a flagship for President Nyerere and its institutionalised centrality for Rubada. Moreover, Hoag[45] and van der Straeten[46], echoing conclusions by Havnevik[47], argue that from the 1950s, the Stiegler's planning conformed to high modernist development[48]. Depoliticising justifications representing the dam as the benign solution to Tanzania's development drew on a normative binary pitting progressive modern technology against the existing 'backward' Warufiji and untamed river. Similarly, in the style of the TVA, Rubada centralised power in one institution, handing decision-making to experts. Interest in modernisation comes at the expense of the pre-existing: As Hamerlynck et.al. conclude, "the planning of the Stiegler's Gorge project illustrates a case where the state and external donors intervened … without taking consideration either of the people and ecological environment affected or wider economic indicators"[49].



Figure 57 Demonstrating how Rubada rents its property

The Project's Resurrection

The 2005 election changed the Stiegler's project's fortunes. President Kikwete's manifesto involved a commitment to build the dam, leading to a parliamentary speech in 2006 that included Stiegler's in the new government's energy-sector programme[50]. Additionally, a public petition started at this time calling for Stiegler's Dam's construction[51]. Kikwete then appointed a new chairman to Rubada in 2006, reportedly encouraging him to pursue the project by finding a willing

[44] Havnevik 1993, 21.
[45] Hoag 2006; Hoag 2013.
[46] van der Straeten 2017.
[47] Havnevik 1993.
[48] Following Scott 1998; Scott 2006.
[49] Havnevik 1993, 283.
[50] Minister of Energy and Minerals 2006.
[51] The petition aimed for 1 million signatures but only reached 146 (GoPetition 2006).

private sector partner[52]. This entailed the formation of a public-private partnership to make an independent power producer (IPP) in a build-own-operate model where profit is made through selling electricity. Thus, the Stiegler's was regularly promoted by the Rubada chairman and, from 2008 by a new Director General, in newspapers[53] and through radio interviews[54]. However, Rubada's weakened institutional position hampered its planning capacity. As one official explained, "energy is energy and we are under the Ministry of Agriculture. Normally a hydropower (preparation) budget is not involved (i.e. given by this Ministry) so we are using our own sources to finance (the planning of energy projects)"[55], which included updating plans and forging deals with investors. Rubada's attempts to raise finance appeared to include renting out land and several floors of its office building (Figure 57). Revenue reportedly increased, for instance from 483million TSH in 2010/2011 to 3.1billion TSH in 2013/14[56].

South Africa's Infrastructure Development Finance (IDF) made the first expression of interest and signed a deal with Energem Resources, a Canadian company who offered a $1.2million loan for a 40% stake in a proposed 900MW version of the dam in 2008[57]. However, given the dam's construction costs of billions of dollars, and given the inexperience of this investor[58], this deal raised questions, leading to authorities blocking the signed MoU with Rubada on suspicion of corruption[59]. The project was however included in the new Power System Master Plan in 2009 as a medium-term priority, to begin producing power by 2020[60]. Sinohydro, the world's largest hydropower construction firm[61], also reportedly expressed interest between 2008-

[52] Interview, Senior Official, Rubada, 2015; It was also announced on a dam-industry website (HydroWorld 2006).
[53] Evidenced by the author's searches through English-language newspapers in Tanzania, particularly between 2009 and 2012.
[54] Activity reported in: Interviews, Senior Official and Official, Rubada, 2015-2016.
[55] Interview, Official, Rubada, 2015.
[56] Mubiru 2012.
[57] Africa Intelligence 2008; Hill 2008: Splitting ownership 40% Energem, 30% Rubada and 20% IDF.
[58] This has interesting temporal parallels, although a different outcome, to the Richmond Dowans corruption scandal (Chapter 4).
[59] Mande 2008; ESI Africa 2008.
[60] Ministry of Energy and Minerals 2009.
[61] Chapter 1.

2011[62]: "Sinohydro … were interested in the project and signed an MoU for the review of the (dam's) studies"[63]. However, they appeared to fall foul of Tanzania's complex bureaucracy: "Their report (came) very late so MoU ended", an official explained. Whilst they "could have come here (to Rubada), we could have negotiated an extension, but decided to go to the Planning Ministry (to negotiate)"[64]. This episode, echoing a theme in Chapter 4, evidences Tanzania's decentralised power that allows semi-independent bureaucratic organisations to undertake dam-project negotiations, but makes implementation difficult. Regardless, from 2009, Brazilian diplomacy started pushing Odebrecht's involvement in Stiegler's Dam.

Brazil and the Stiegler's Gorge Dam

The second Brazilian Ambassador to Tanzania since the embassy's 2007 re-opening, Francisco Carlos Soares Luz, arrived in September 2009. Following Chapter 2's analysis of Brazil's broad aims in Africa to push all "options where we (Brazil) have started (and are proven competent)"[65], the Ambassador reportedly sought "to take advantage of Brazil's soft power advantage, especially in infrastructure"[66] and thus when he "looked for infrastructure projects for the big Brazilian companies, the most obvious one was the Stiegler's Gorge"[67]. Lula's trip to Tanzania in 2010 (Figure 59) added urgency as investment announcements are important features of such presidential visits. Odebrecht was the largest infrastructure and hydropower company in Brazil and has been building the similarly-sized Lauca Dam in Angola. Moreover, as Chapter 2 examines, the firm was entwined with Brazil's Africa and dam-building agendas. Thus, with diplomatic initiation, it engaged in the Stiegler's project, expressing interest officially on a reported visit to Rubada in 2009[68]. Lula's arrival then accelerated the Stiegler's Gorge project's

[62] Interviews; Former Senior Official, CCM; Official, Rubada; Senior Official, Itamaraty; 2016.
[63] Interview, Official, Rubada, 2015.
[64] Interview, Official, Rubada, 2015: Sinohydro have had similar experiences elsewhere, see Hwang, Bräutigam, and Wang 2015.
[65] Interview, Senior Official, Itamaraty, 2016.
[66] Interview, Senior Official, Itamaraty, 2016; Reiterated publicly Muramira 2010.
[67] Interview, Senior Official, Itamaraty, 2016.
[68] Interview, Official, Odebrecht, 2016.

resurrection, as he brought a large government and trade delegation including senior Odebrecht representatives: As one official asserted the "Presidents agreed to do this project"[69]. According to reports, the Tanzanian Minister of Energy and Minerals met their Brazilian equivalent to discuss the dam among other proposals[70], and BNDES was present to explain financing possibilities[71]. Lula also pledged to waive Tanzania's debt during this trip[72]. At the time Tanzania was the third biggest African debtor to Brazil owing to a line-of-credit that financed construction of the Dodoma-Morogoro highway[73]. This blocked further Brazilian government finance[74]. Odebrecht followed up on this visit in 2011, supposedly meeting with Kikwete and signing an MoU with Rubada to update the design and feasibility study for the dam[75].

This demonstrates the importance of the Brazilian state in initiating corporate engagement with the Stiegler's Gorge dam. As a company official explained "expansion always a motivator … but Lula's support (brought) to new level". Similarly, another stated that "we came on board … (with the) visit of Lula to Tanzania with a big agenda"[76]. Brazilian diplomats justify this active role because "in Tanzania specifically, if the ambassador doesn't introduce you to the minister, you will have a very hard time"; "at the first high level meeting (you would not have) been received (without diplomatic support)"[77]. Thus from 2009, the embassy provided close assistance, facilitating meetings and, through their official presence, lending legitimacy to the companies involved[78] (see Figure 58). The embassy also lobbied for Brazilian projects' progress, for instance following-up on decisions[79] and meeting ministers to advocate for their

[69] Interview, Official, Itamaraty, 2016.
[70] Interview, Senior Official, CCM, 2016.
[71] Interview, Senior Official, Itamaraty, 2016; Reuters Staff 2010 (This reports signed agreements). Lula made a point of advertising accompanying companies on this trip (Ioris 2014; Uchôa 2010).
[72] Reuters Staff 2010.
[73] Interviews, Senior Officials, Itamaraty, 2016.
[74] Oluoch 2010.
[75] Interviews; Official, Odebrecht; Official, Rubada; 2015-2016; The East African 2011.
[76] Interviews; Official, Odebrecht, 2016; Official, Queiroz Galvão, 2015.
[77] Interview, Senior Official, Itamaraty, 2016.
[78] Interview, Official, Itamaraty, 2015.
[79] E.g. Itamaraty officials called on the NEMC (governmental environmental organisation): Interview, Senior Official, Itamaraty, 2016.

prioritisation[80]: "If you (as an ambassador) don't talk to the government, they don't open doors (for the companies)"[81]. Alongside this Brazilian-state agency, these events demonstrate the importance of Odebrecht in resurrecting the Stiegler's. They pursued meetings and spent money on planning without a guaranteed contract[82]. As analysed in Chapter 2, this fits Odebrecht's profile as a capable internationalised infrastructure firm involved in the majority of Brazil's large dams and hydropower in Africa. In July 2012, these efforts produced an official MoU with Rubada to build Stiegler's Gorge Dam (Figures 58). Updated feasibility and design studies were finalised in January 2013[83]. As per the agreement, Rubada was then supposed to finance an EIA but, with insufficient funds, Odebrecht bankrolled an initial scoping EIA, which was completed in 2015[84].



Figure 58 Photograph of the signing of MoU between Odebrecht and Rubada; Rubada Offices, July 2012. Brazilian Ambassador Luiz present (Source: Odebrecht 2013)

[80] E.g. Brazil's Ambassador Carlos met with Minister Muhongo (MEM), ensuring a public statement of support for Stiegler's in 2016 (The Guardian Reporter 2016).
[81] Interview, Senior Official, Itamaraty, 2015.
[82] As evidenced by cited reports.
[83] Odebrecht 2013a; Odebrecht 2013b; Heuwel 2012; Daily News 2012d.
[84] Interviews; Official, Rubada; Official, Odebrecht; 2016.

Matching Tanzanian Agency

However, as with Stiegler's Dam's history, Tanzanian agency matched that of the Brazilian state and Odebrecht. Within three months of Lula's July 2010 trip, Foreign Minister Bernard Membe visited Brazil to demonstrate good will and follow-up specifically on deals including the Stiegler's Gorge Dam[85] (Figure 59). The Brazilian ambassador in Tanzania helped arrange this, including a visit to Brazil's mega-dam Itaipu[86]. Prime Minister Mizengo Pinda built further ties in 2011 on a six-day trip to Brazil including the Minister of MEM and head of Rubada[87]. One participant remembered engagement from "both sides (at) … top levels … (and that the Stiegler's) … was one of the issues …. (with the Brazilian) Minister of Energy that project was discussed"[88]. This is supported by official accounts[89]. Interviewees also report that Prime Minister Pinda became personally supportive of the project[90] and created a taskforce to aid its implementation, led by Rubada and including Tanesco, MEM, the Ministry of Water and Ministry of Natural Resources and Tourism. The 2007-2012 Minister of MEM, Williams Ngeleja also appears to have been supportive of the Stiegler's project,

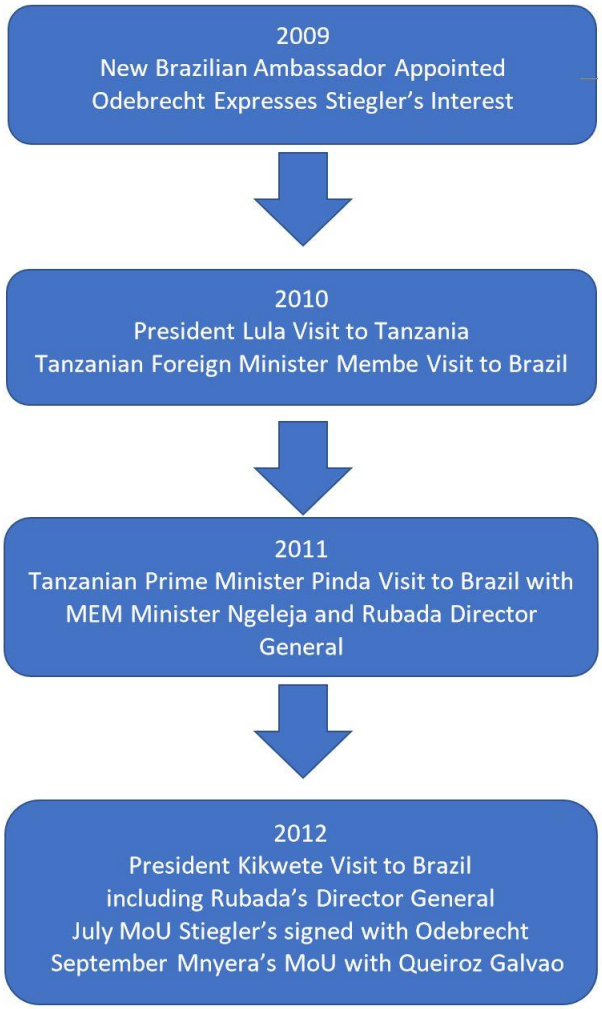


Figure 59 A timeline of Stiegler's Gorge Dam project meetings

[85] Ng'wanakilala 2010.
[86] Interview, Senior Official, Itamaraty, 2016.
[87] Ministry of Foreign Affairs 2011; Mushi 2013.
[88] Interview, Former Senior Official, CCM, 2016.
[89] M. of F. A. and E. A. C. United Republic of Tanzania 2012, Paragraph 38.
[90] Interview, Senior Official, Rubada, 2015. Stakeholder meeting reported in: Daily News 2013.

including it in the 2009 and 2012 Power System Master Plans as a medium-term priority to be implemented over a 10-year horizon. This was endorsed by parliament in 2012[91]. Interviews and news reports stated that the day before being fired for involvement in energy corruption scandals, Minister Ngeleja approved finance for implementation plans, including a large-scale ESIA[92].

President Kikwete's interest also appears to have been significant. His 2006 manifesto included the dam and his appointments and Presidential diplomacy pushed Rubada forward. This led to a perception that Kikwete supported "getting (Rubada) off the ground"[93], something further demonstrated by Kikwete's visit to Brazil in April 2012. Kikwete brought Rubada's director in his entourage and reportedly, the Stiegler's featured in discussions with the Brazilian government and at a visit to Odebrecht's offices[94]. Interviewees also reported his personal interest in the Stiegler's Gorge Dam. "For Kikwete, always a priority"[95] a senior Rubada official asserted and another that "it was spearheaded by the President himself". A senior figure in MEM exclaimed "Kikwete probably over 100%, 180% (behind the Stiegler's)"[96] and another official described his support in meetings with the hydro-sceptic MEM Minister Muhongo: "President asked, if you are interested in gas and coal just support them (Rubada) to do hydropower". Kikwete's important role in the project's resurrection echoes Chapter 4's analysis of his support for dams. However, Kikwete's fragmented, government hampered any translation into concrete infrastructure.

As well as particular politicians' agency, this timeline demonstrates the assertiveness of Rubada in pushing forward planning. This comes from the infrastructure's centrality to Rubada's mandate, but also from the organisation's materialist motive in the dam's implementation. The latter stemmed from the government's decision to structure the Stiegler's Gorge project as a

[91] United Republic of Tanzania and Minister of Energy and Minerals 2012.
[92] "(Ngeleja) very positive and ready to set aside funds for pushing the dam " (Interview, Official, Rubada, 2015); Robi 2012; Thome 2012.
[93] Interview, Official, Rubada, 2016.
[94] Further evidenced official statements about Mnyera Dam from this trip (Daily News 2012a).
[95] Interview, Senior Official, Rubada, 2015.
[96] Interviews, Former Senior Official, CCM, 2016.

privately-owned plant. As an Independent Power Producer, the Stiegler's Dam "will raise funds from selling electricity". This revenue would need to pay off loan finance but should also generate profit, which Rubada, perhaps optimistically, thought would be split "40/60 or 30/70" (Rubada/Odebrecht)[97]. Thus, Rubada officials hope Stiegler's will bring revenue to the organisation and with that, clout within government: "we do believe Stiegler's will change Rubada"[98]; "if we let the project go away, we don't know how we will survive"[99].

Notably Stiegler's was not the only dam pursued by Rubada under Kikwete. The organisation signed another MoU with large Brazilian infrastructure company Queiroz Galvão. This firm did not accompany Lula on his original 2010 trip, rather being invited by Prime Minister Pinda and President Kikwete[100] on later visits to Brazil, further demonstrating the important role of Tanzanian agency in its dam resurgence and Brazil-Africa relations. Queiroz Galvão chose a hydro-project on one of the Rufiji's tributaries, the Mnyera River[101]. As envisioned by Queiroz Galvão, the Mnyera project will involve constructing one large reservoir-storage dam and 6 run-of-river dams downstream, collectively generating 670MW at a cost of approximately US$1billion[102]. In 2012, an MoU was signed after delivery of feasibility and design reports[103]. Following this, the company completed an EIA in 2014 which has been submitted to the environmental authority NEMC[104] and reportedly approved. They also paid Rubada to collect hydrological data, all of which has reportedly cost Queiroz Galvão ~$20million[105]. The project therefore represents a useful parallel to Odebrecht, further demonstrating Brazil-Tanzania's hydropower ties. Additionally, Korea's K-Power signed an MoU with Rubada to develop the Iringa hydropower project,

[97] Interview, Official, Rubada, 2016.
[98] Interview, Senior Official, Rubada, 2015.
[99] Interview, Official, Rubada, 2016.
[100] Daily News 2012b; Daily News 2012a.
[101] Interviews, Senior Official, Dam Construction Company, 2015-2016.
[102] Construtora Queiroz Galvão 2012.
[103] Daily News 2012c: Interviews, Senior Official, Dam Construction Company, 2015-2016.
[104] Arms on Environment 2014.
[105] Interviews, Senior Official, Dam Construction Company, 2015-2016.

completing a pre-feasibility study in 2014[106], following which K-power withdrew interest[107]. Sinohydro also signed an MoU for the Mpanga Dam. The firm invested in the project, collecting data between 2009-2010 that produced a feasibility study for a 55m dam, designed to produce 160MW[108]. The firm also produced an EIA which NEMC has reportedly approved[109]. The fact Rubada advertised and negotiated investment agreements for four significant dams, overseeing advances in their planning, reinforces the evidence of its significant activity between 2006-2014 and the degree of wider government support for hydropower projects.

Why did the Stiegler's Gorge Dam Return?

Analysis thus far demonstrates the key role of Brazil's Africa policy, which led to its Tanzanian embassy's assertive steps to seek infrastructure projects, support corporate negotiations and lobby for implementation. The chapter also shows Odebrecht's importance in pushing forward project negotiations and planning studies. The third significant actor is the Tanzanian government. Their interest in Stiegler's stems chiefly from a wider megawatt mission. As analysed by Chapter 4, the government sees electricity as a key deliverer of development, the bringer of industrial transformation. This ensures inclusion of all historically-identified energy-generation projects, thereby illustrating the significance of dams' historic planning[110]. The Stiegler's Gorge project was resurrected as part of this electricity-generation agenda, justified through energy demand forecasts: Because of a planning process predicting electricity demand of over 3000MW by 2020, the dam appeared feasible. This allowed Rubada's plans for the dam to be included in the national 2009 Power Sector Master Plan[111]. In addition and as with the wider energy sector, another driver came from the public pressure following frequently experienced

[106] K-Power 2014.
[107] Interview, Official, Rubada, 2016-2015.
[108] Sinohydro Corporation Ltd and United Republic of Tanzania 2010.
[109] Interviews, Official, Rubada, 2015, 2016.
[110] Referencing the path-dependent mechanisms of increasing returns and sunk costs (Introduction Chapter).
[111] Paraphrased Interview, Former Senior Official, MEM, 2016.

blackouts. This is exemplified by the aforementioned Stiegler's Gorge Dam petition. Given this context, and as with the Rusumo Dam, the planning emphasis in Tanesco and MEM for the Stiegler's Gorge project focus on electricity generation[112] not the ancillary benefits outlined in the 1984 Norwegian report. These are still recounted by officials in Rubada who see potential fishing, downstream irrigation and Dar-es-Salaam drinking water services as important[113] ("you can't avoid the benefits"[114]). However, presentations[115] by Odebrecht, and interviewees in Tanesco and MEM[116], merely acknowledged such services' theoretical potential without advancing detailed thinking. Thus the feasibility and infrastructure design for multi-purpose benefits remain under-studied.

However, whilst Tanzania's renewed megawatt mission ensured justifications focused on electricity, such discourse verged towards presenting Stiegler's Dam itself as transformative. This markedly differs from Tanzania's wider energy sector where projects are subordinate to the electricity-generation aim. Government officials heralded the dam: "(If Stiegler's had been built) in the 1980s it would solve all demand issues"[117], meaning no black-out crises. Another exclaimed "(Tanzania) could have flown to the moon and back"[118] and a senior Rubada official asserted "it is obvious we (Tanzania) would take the project (if finance was available)"[119]. Such rationales echo the dams elevated historic status and discourse under Nyerere. Thus, a senior official, when asked if the project has wider cabinet support, claimed this was beyond question: "(it had wider support as) it is for the country's betterment. Even today (you find this support exists)". He then asserted Stiegler's has the same unquestioned status within CCM as other Nyerere-era totems such as the ambition to make Dodoma Tanzania's capital. These claims could stem from the dam's size. At

[112] Interview, Officials, MEM, 2016: Odebrecht 2013b; Odebrecht 2013a.
[113] Interviews, Official, Rubada, 2015, 2016.
[114] Interview, Senior Official, Rubada, 2015.
[115] Odebrecht 2013b.
[116] Interviews, 2016.
[117] Interview, Senior Official, Tanesco, 2015.
[118] Interview, Former Senior Official, MEM, 2016.
[119] Interview, Former Senior Official, Rubada, 2015.

2,100MW, Stiegler's was double Tanzania's total generation capacity in 2010 (1000MW) and would still over double Tanzania's on-grid power if added in 2018 (which stands at approximately 1700MW). Another suggested the Stiegler's necessity in emulating China and Brazil's economic development: "Brazil has gone far (in hydropower) …. and China has the Three Gorges"[120].,

The discourse rationalising Stiegler's Dam thus echoes the high modernist practice of *imbuing* dams themselves with development, the generators of industrialisation and progress. A consensus is apparent amongst Utility, Energy Ministry and Rubada civil servants who express regret for Stiegler's Dam's absence, asserting it would have solved Tanzania's power crisis and propelled industrialisation. This sentiment is arguably surprising given the underperformance and critique[121] of other dams in the Rufiji River Basin. Additionally, like the wider megawatt mission, there is an assumption of Say's Law; that Tanzanian electricity demand will grow to meet the over-doubling of electricity generation entailed by the dam, even when considered alongside the raft of other planned gas, coal and hydropower projects. For many Tanzanian and Brazilian actors then, experiences of hydropower failure and persistent questions over the need for electricity do not appear to shift the Stiegler's Gorge Dam's developmental status. This meant that contestations over the dam under MEM Minister Muhongo, analysed below, focused on prioritisation, not whether or not to construct.

Planning Practices for the Stiegler's Gorge Project

Maximising Hydropower

Odebrecht were mandated to design Stiegler's Dam for hydropower[122]. This orientation was also incentivised by their status as future power-plant owners. Thus, to achieve 600GW/h of annual firm energy in the context of Rufiji River's strongly seasonal cycle (its discharge increases

[120] Interview, Senior Official, CCM, 2016.
[121] Chapter 4.
[122] Paralleling the emphasis of USAID's report and the initial Norad designs.

over 2.5 times within a regular season[123]), the dam design included a large reservoir capable of significant water retention. For Odebrecht, Stiegler's represents a comparable project to the Lauca Dam, completed in 2017 in Angola and in which the company operated as the lead contractor of a consortium[124]. As a privately-owned plant, the Stiegler's project will also need such a consortium of financiers as well as contractors. Practices from Lauca Dam and infrastructure construction in Mozambique were also relevant for envisioned benefit sharing.

Planning Benefits

Odebrecht officials in interviews[125], presentations[126] and reports[127] stressed the importance of spreading Stiegler's benefits. Such efforts include local employment, with 3000-4000 workers[128] supposedly required. Additionally, Odebrecht officials described implementing training programmes based on a scheme run at the Madeira Dam in Brazil, to ensure Tanzanians could take-on skilled and not just manual work[129]. In interviews, officials also suggested that the construction-site's accommodation should be built to high standards to ensure it can continue as a settlement if the government wants[130]. An official[131] also suggested adopting livelihood training programmes used in the Lauca Dam[132] for affected people. Furthermore, plans mentioned using local procurement where possible. Odebrecht adopted this in a Mozambique infrastructure project, sourcing canteen food locally alongside instituting apprenticeship and literacy schemes[133].

[123] Odebrecht 2013a, 60.
[124] Interviews, Odebrecht, 2016.
[125] In 2016.
[126] Odebrecht 2013b.
[127] Odebrecht 2013a.
[128] Interviews, Official, Odebrecht, 2016.
[129] Odebrecht 2013a, 125.
[130] Interviews, Official, Odebrecht, 2016.
[131] Interviews, Official, Odebrecht, 2016.
[132] Interview, Rio de Janeiro, 2016; Capi and Viana 2016.
[133] Interviews, Official, Odebrecht, 2016; The Business Year 2016. Synergy Global Consulting (2007) lists other Odebrecht CSR projects.

These efforts support Chapter 2's discussion of increasing corporate social responsibility norms among companies from the emerging powers. This is also evidenced elsewhere. For instance, the Belo Monte Dam, involving an Odebrecht-led consortium, built local schools, hospitals and community centres[134]. Moreover, a presentation suggested that the company's approach is to "avoid, mitigate, compensate"[135], demonstrating an awareness of dam-industry reformist efforts by also referencing the Hydropower Sustainability Assessment tool[136] described in Chapter 1. Such efforts could break models of *enclave* in construction, spreading part of the large project's construction budget to adjacent communities. On paper, these concerns and policy ideas at least contrast with the Stiegler's past planning and with Rossi's case of controversial and divisive compensation by Vale in Mozambique[137]. Arguably though, the dams' remote location in an environmentally-protected area in which human habitation is currently banned contradict such programmes of training and local employment. It is unclear how creating a construction site and bringing large numbers of people into the reserve is compatible with preserving its ecological richness and efforts to decrease poaching[138].

However, Odebrecht suggested their Stiegler's Gorge project plans will benefit the Selous. Their feasibility report calculated an electricity tariff of 0.045kw/h, far cheaper than the Tanzanian or regional average[139]. Consequently, they proposed a levy on power sales that would directly support the Selous' income, supposedly enhancing conservation and preventing poaching[140]. Again, these plans demonstrate adoption of reformist ideas, framing the dam as a producer for future conservation. This has some parallels with other off-set schemes, such as for Bujagali Dam. There, developers proposed to protect Kalugala Falls in recompense for destroying Bujagali

[134] Burrier 2016.
[135] Odebrecht 2013a, 122.
[136] Odebrecht 2013b.
[137] Rossi 2015.
[138] Poaching continues to be a major issue for Selous and was the key factor behind its inclusion on UNESCO WHC's red-list in 2014.
[139] Odebrecht 2013a, 144.
[140] Odebrecht 2013b: Interviews, Odebrecht, Itamaraty, 2016.

Falls[141]. However, Odebrecht's proposal overlooked the political factors constraining Selous' conservation. Reports and interviewed conservationists highlight that the majority of the Selous' revenue has been diverted to the national Wildlife Division[142] and that government officials have been involved in poaching[143]. This suggests that the Selous reserve's income is not the primary cause for poaching or inhibitor of conservation[144].

Alongside the presence of these newer dam-building norms, Stiegler's latest planners recycled the narrative of benefits stemming from the dam's water and sediment control. An Odebrecht official[145] asserted that "most of the sediments are retained in the dam, so you will have cleaner water flowing through". Moreover, because there is a "dry and wet season (you) … need a big reservoir to generate (power but also that will create) safety for people downstream of the reservoir (because it is) going to control the flood in the rainy season"[146]. A Rubada official echoed this idea of flooding being "a problem"[147]. The dam, by enabling such "control on the water (also means you can) … have it all year round"[148]. This will supposedly free people from only being able to practice "agriculture in the drought years"[149]. Older narratives thus coexisted with new reformist ideas about the dam's benefits.

[141] Gore 2017, 136–37.
[142] Interviews; Donor Official, Conservationist; 2016. Diversion of revenue has been a long running problem (Baldus 2009b).
[143] Interviews, Conservationist; Ecologist, 2016; IUCN 2017.
[144] Further analysed by Postar 2018.
[145] Interviews, Official, Odebrecht, 2016.
[146] Interviews, Official, Odebrecht, 2016.
[147] Interview, Senior Official, Rubada, 2015.
[148] Interviews, Official, Odebrecht, 2016.
[149] Interview, Senior Official, Itamaraty, 2016.

Considering Dam Impacts

Claims that Stiegler's will benefit the Selous rely on either denial of the dam's impacts or claims of their solvability. Demonstrating denial, Odebrecht and the Tanzanian government argue that the reservoir will only cover 2.2% of the Selous Reserve (see Figure 60, note this is disputed[150]) and that given this small percentage, the dam represents an insignificant impact that can be mitigated by adding the same area to the Selous[151]. Interviewees in Tanesco[152] and MEM[153] posited this solution citing a similar agreement that was informally made with UNESCO with regards to Uranium mining on the Selous' Southern edge[154]. An Odebrecht official suggested the replacement land could be in the Niassa wildlife corridor that stretches from the Selous to a national park in Mozambique[155]. This demonstrates a focus on discrete land, not a biophysical system, something further illustrated by refutations of compensation premised on the idea that



Figure 60 An Odebrecht-produced picture of reservoir size in comparison to the Selous reserve (Source: Odebrecht 2013b)

[150] E.g. Dye and Hartmann 2017.
[151] Interview, Former Senior Official, Rubada, 2015.
[152] Interview, Senior Official, Tanesco, 2015.
[153] Interview, Officials, MEM, 2016.
[154] Yet to be implemented.
[155] Problematically, there isn't evidence for this being a migratory corridor or an important elephant habitat (Mpanduji and Ngomello 2007).

wild animals in the future reservoir area are the only affected inhabitants[156]. For instance, Rubada officials stated that there would be no compensation as "the affected (area contains animals only"[157] and another in Odebrecht that the dam will "not have a social impact … don't have to affect (people) but fauna and flora"[158]. Rubada's other dams follow a similar pattern in understanding impact. For instance, despite being upstream of the Selous and involving a large water-retention dam to reduce hydrological seasonality, Mnyera's Environmental Impact Assessment[159] and engaged officials did not mention potential downstream impacts on the Selous[160]. These could include changes to water's chemical properties, a lower level of fertile sediment transport and reduced seasonal flooding. The process of knowledge production for both dams therefore follows a practice of *invisiblising,* involving a limited interaction with the river's geography and an undervaluing of smallholder livelihoods. The focus is on discrete impacts rather than the biophysical system and its social and ecological importance.

Another discourse in Stiegler's decision making made more complex claims, acknowledging the possibility of damaging impacts but seeing all such changes as solvable. This was expressed in the Stiegler's initial EIA, conducted by Arms on Environment. It detailed the Rufiji's ecology and downstream-communities' livelihoods but did not analyse the dams' potential impact on them. Such thinking was further exemplified by a former Rubada leader who stated that "the technology exists on how to deal with the problem, it wouldn't be easy, but a strategic assessment could deal with it … it shouldn't be a problem (it is) just about managing the reservoir, surely there will be some sort of formula in the very dry period (that could work)"[161]. Another summarised the same argument, stating "a figure is key"[162]. This assumes that scientific

[156] E.g. a slide in a MEM presentation stated that Lions are the only current resident (Masanja and Ministry of Energy and Minerals 2012).
[157] Interview, Official, Rubada, 2015.
[158] Interviews, Official, Odebrecht, 2016.
[159] Arms on Environment 2014.
[160] Interviews, Senior Official, Dam Construction Company, 2015-2016.
[161] Interview, Former Senior Official, Rubada, 2015.
[162] Interview, Senior Official, Rubada, 2015.

assessments and expertise can solve political trade-offs between producing power, providing irrigation and supporting recession agriculture, fisheries and an ecology system. Similarly, Mnyera's EIA concluded that significant "beneficial impacts of the proposed project far outweigh any negative impacts, all of which can be eliminated or mitigated by best practice engineering and construction methods". Although mentioning existing smallholder river users in the EIA, this dismisses any potential trade-offs with them. Both project's latest EIAs therefore measure details of each dam's surrounding biophysical system but with a conviction of the solvability of any impacts. These arguments contrast with the academic literature on the Stiegler's likely impact.

The Socio-Ecology Downstream of Stiegler's Gorge

> "The floods, essential for the sustenance of floodplain fertility, and therefore the farming system, and vital to the productivity of most of the natural resources on which local communities depend, are perceived as a blessing, whilst droughts and the absence of regular flooding are perceived as the main threat"[163]
>
> "As this volatility suggests, water was more than a substance in the Rufiji. It was a force that defined and regulated life"[164]
>
> "Hydrology plays a fundamental role in determining the quality and quantity of natural resources in both floodplain and the delta"[165]

This selection of quotes by Duvail and Hamerlynck, Hoag and Ochieng, highlight that seasonal flooding is the key dynamic to ecology and livelihoods around the Rufiji. These authors, alongside others[166], assert the fundamental role of Rufiji River's hydraulic fluidity to the geography of the area downstream of the Stiegler's Gorge. The river's seasonal pulse generates a changing pattern of marshland, lakes and dried river beds; connects water bodies cut-off in the dry season, thereby enabling biotic exchange; and creates fertile and irrigated soils that underpin flora,

[163] Duvail and Hamerlynck 2007, 33.
[164] Hoag 2013, 33.
[165] Ochieng 2002, 19.
[166] Hoag and Öhman 2008; Hamerlynck et al. 2010; Hamerlynck et al. 2011; Duvail et al. 2014; Havnevik 1993.

recession agriculture and sea life in the delta. The Stiegler's Dam, particularly if constructed according to its current design focused on maximising year-round electricity generation with a large reservoir, will markedly intervene in this biophysical system, reducing seasonal fluctuations, changing water quality and chemistry[167] and retaining an estimated 25 million tonnes of sediment annually[168].

One simple effect from the dam's biophysical intervention is on downstream floodplains and lakes. Cyclical flooding creates a strip of irrigated and fertile land that contrasts with surrounding dry savannah, depicted in Figure 61. Ecological hotspots in the Selous such as Lakes Tagalala, Manze and Nzerakese, vary with the Rufiji and can drain entirely in drought years[169].



Figure 61 Series of photos demonstrating contrasting land types (clockwise): arid savannah land; two images of the vegetated and seasonally-flooded strip of land alongside water bodies; semi-permanent wetland

[167] Dye 2017.
[168] Mwalyosi 1988.
[169] Interviews; Conservationist; Ecologist, 2016.

Downstream of the game reserve, recession floodplains constitute key farmland for the Warufiji. Hamerlynck et.al.[170] report that yields on farms drop by half if the land is not flooded in three years. This finding contradicts assertions of flood reductions as beneficial. Therefore, Havnevik argues that for the Warufiji "a natural disaster like an excessive flood, does not represent a breakdown of the ecological system but rather its regeneration in the long run"[171]. Additionally, reduced river flows challenge the sustainability of downstream oxbow lakes that constitute a key livelihood resource (see Figure 62). Using a participatory science methodology that contrasts with Stiegler's planners, Duvail et.al.[172] model the likely impact of a mitigating 2500m^3/sec annual flood. Their sample of six lakes all suffer: Two dry up, salinity ends most biotic life in another and a further two are sustained by streams but with reduced diversity and quantity of fauna. Impacts on the delta (the Rufiji-Mafia-Kilwa Marine RAMSAR site, Figure 62) are also significant. The Rufiji's pulse produces a wet-season phytoplankton bloom that brings whale sharks and supports prawn

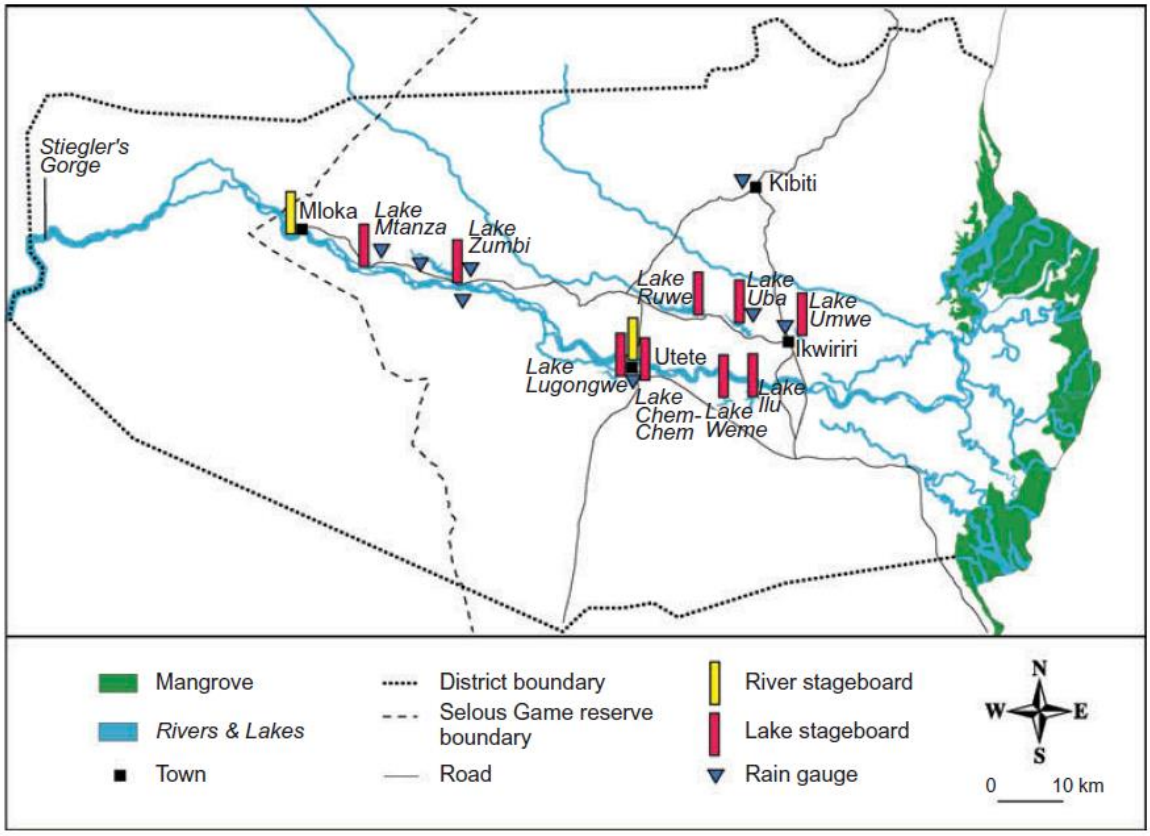


Figure 62 Depicting the downstream lakes and delta (Source: Duvail et. al. 2014, 716)

[170] Hamerlynck et al. 2010.
[171] Havnevik 1993, 110.
[172] Duvail et al. 2014.

spawning[173], significant because this prawn harvest constitutes Tanzania's main fishery[174]. Given these numerous impacts, once learning of Stiegler's Gorge Dam's development in 2011, UNESCO's World Heritage Committee (WHC)[175] issued warnings against construction between 2012-2016. A typical example, taken from 2013: "Recommends that the World Heritage Committee requests a clear commitment from the State Party not to develop the Stiegler's Gorge Dam project given that it is incompatible with the World Heritage status of the property"[176]. Moreover, the return of Stiegler's planning[177] contributed to UNESCO's WHC placing the Selous on its endangered red-list in 2014.

High Modernism in the Planning Process

The disconnect between Stiegler's Gorge Dam's planners and the WHC statements, or the conclusions of the above academics, demonstrates the presence of high modernist idea-practices analysed in Chapter 1. Claims by Odebrecht, Rubada and MEM asserting floods as plagues that waste water and destroy farms and habitat *invisiblise* the socio-ecological system of the river[178]. Moreover, planning activities followed a *technician's realm* where central government empowered Rubada, and in-turn Odebrecht and consultants, to take an exclusive role in the formulation of dam designs and the initial EIA[179], excluding affected communities and other stakeholders. For Rubada, this mode of decision making is rooted in the influence of the TVA and US dam experience. However, alongside apparent continuity in the Stiegler's project's decision-making process, Odebrecht asserted specific policies that intend to support the Selous' long-term conservation and break an *enclave* during construction by spreading benefits. Even if proposed

[173] Duvail and Hamerlynck 2007; Havnevik 1993.
[174] Mwalyosi 1988.
[175] Part of UNESCO.
[176] World Heritage Committee 2013.
[177] Inscription based on report primarily highlighting poaching but also citing proposed dam developments (Jaeger, Debonnet, and Guma 2014, 43–44).
[178] Duvail and Hamerlynck 2007.
[179] A strategic environmental and social assessment may follow a somewhat different methodology, but official documents and interviews with Rubada, Odebrecht and MEM indicated the likelihood of further planning continuing a *technician's realm.*

cynically to secure finance and achieve WHC approval, this does demonstrate changed planning practices. Additionally, officials[180] called for impact assessments which are more far reaching than those funded by Norad, considering the wider basin. Despite incorporation of these reformist practices, officials demonstrated a high modernist idea of science's ability to reconcile the infrastructure's power-production purpose with the dam's prevention of biotic and sediment flows and the presence of UNESCO and RAMSAR conservation sites. The Stiegler's planning therefore exemplifies a more extreme form of *pervasive appraisal optimism* with parallels to the historic Great Ruaha Dams[181]. Rather than depoliticising dams by not recognising impacts, this approach acknowledges significant effects but insists on their solvability. Consequently, Stiegler's planning predominantly exemplifies high modernist practices but also includes reformist ideas about benefit sharing and the need for stringent impact assessments.

Project Stagnation: The limits to Dam Resurgence

At the highpoint of the dam's resurrection in 2012 and 2013, political factors in Tanzania and Brazil began to undermine the Stiegler's progress. As Chapter 4 analyses, the arrival of Sospeter Muhongo as Minister of Energy and Minerals in May 2012 marked a setback for all hydropower projects in the country because of his prioritisation of gas, and to some extent, coal: "This guy (meaning Minister Muhongo) would not work on our (Stiegler's) project … he preferred natural gas"[182]. Officials in Rubada suggested this specifically affected Stiegler's Dam's funding[183]: One official reported him as saying Stiegler's Gorge Dam was "not even in my top five"[184]. A former Ministry official echoed this, stating that under Muhongo, Stiegler's was "deliberately" dropped as a spending priority[185]. As analysed in Chapter 4, this experience of stagnation is not unique as

[180] E.g. Odebrecht officials saw a comprehensive assessment as the crucial next stage.
[181] See Öhman 2007's research.
[182] Interview, Former Senior Official, Rubada, 2015.
[183] Interview, Official, Rubada, 2016.
[184] Interview, Senior Official, Rubada, 2015.
[185] Interview, 2016.

government fragmentation hampered decision making and often-corrupt, privately-owned power plants indebted the energy sector. Additionally, in 2011-2012 Tanzania suffered another significant drought. Because of the energy-system's dependence on the Mtera reservoir and Dam (upstream of Stiegler's Gorge), this entailed widespread power cuts. Moreover, in 2012, Tanzania's major off-shore gas discoveries were announced, suggesting the possibility of an alternative weather-independent electricity source. As explained in Chapter 4 these events generated a discourse of hydropower critique, or at least of energy-generation diversification. Furthermore, Kikwete's flagship Big Results Now programme, starting in 2012, deliberately excluded Stiegler's Gorge Dam as a priority project because of its high up-front costs[186] and long build-time[187]. Support and action from the Tanzanian state as a whole, thus appeared to stall. Odebrecht covered costs for an initial EIA and no substantive progress was made in negotiations on the dam's potential corporate structure, financing or Power Purchase Agreement.

However, the Tanzanian government is not the only significant factor here. The project also faces opposition from the international conservation community. This includes IUCN, the official advisor to UNESCO's WHC, and the World Wildlife Fund, which has actively campaigned against the dam's resurrection[188]. This has contributed to the World Heritage Committee's pronouncements against the Stiegler's Dam's construction. The committee's approval is important, as without it, it is hard to raise international funds. Financial institutions are increasingly members of global initiatives on environmental and social standards[189] that set firms against contravening UNESCO. For instance, the World Bank reportedly turned down a financing request from Odebrecht, ruling out any support for a project in a World Heritage Site with likely extensive environmental issues[190]. Indeed, the Bank has publicly questioned the dam[191]. This

[186] Interview, Senior Official, Tanesco, 2015.
[187] United Republic of Tanzania 2014.
[188] Dye and Hartmann 2017.
[189] The Equator Principals are one example.
[190] Interview, Senior Official, World Bank 2017.
[191] Kabendera 2017.

contrasts with the World Bank's backing of privately-financed Bujagali in neighbouring Uganda[192]. Another concern is the dam's financial viability. Given it will over-double Tanzania's power production and because of the limited development of regional East or Southern African Power Pools that could transport electricity internationally[193], the demand for Stiegler's power is uncertain. Similar to the dam's first incarnation then, Stiegler's faces a somewhat hostile financing context because of environmental and economic-viability concerns, particularly from 'traditional' European, American and multilateral sources.

Brazil's economic and political crisis compounds this situation. As Chapter 2 describes, the successor to Lula, President Dilma, had less interest in pursuing foreign policy relations. More importantly, Brazil became engulfed in an economic downturn and a spiralling corruption scandal, Lavo Jato, which has particularly tainted Odebrecht and government lending to infrastructure companies. This includes BNDES' Africa financing[194]. Chapter 2 also demonstrates how Brazil's lending to Odebrecht, was particularly brought into disrepute. This affected the dam's progress. Firstly, the political crisis stalled parliamentary sanctioning of President Lula's and Dilma's promised debt relief, which would have unlocked Brazilian government lending to Tanzania. Secondly, the crisis has caused a general fall in BNDES' Africa lending, particularly to Odebrecht[195]. Moreover, the crisis has imprisoned a number of senior Odebrecht staff and brought significant fines[196], harming the firm's reputation, capacity and financial position.

Replicating an experience of stalled implementation seen across Tanzania's energy sector (Chapter 4), events post-2012 prevented Stiegler's keeping to the 2009 or 2012 PSMP's timelines, which outlined its construction starting in the mid-2010s and generation beginning from 2020. This period of stalled dam development makes an important contribution to the thesis,

[192] Gore 2017.
[193] Dye 2017: South Africa and Egypt have the largest power demand.
[194] E.g. Carvalho 2016.
[195] Interviews; Senior Official, Itamaraty; Senior and Junior Officials, BNDES; 2016.
[196] B. Pierson 2017.

demonstrating continued limitations to the resurgence. The prominent proclamations of dam-buildings' return by Zarfl et.al.[197] are partly based on the return of dam planning, of projects like Stiegler's Gorge Dam taking meaningful steps to implementation. This analysis therefore highlights continuing challenges in dam implementation, some of which are idiosyncratic to each project, but which are also shaped by the unresolved tensions behind dams' 1980s-1990s stagnation: Despite attempts to overcome dams' social, environmental and economic critiques with reforms, projects like the Stiegler's Gorge Dam are still controversial for international financiers. Moreover, in the contemporary resurgence, many dam sites, or areas which a project might affect, fall under more established and stringent environmental protection organisations. Stiegler's therefore demonstrates that despite government attempts to resurrect hydropower projects, and in-spite of support by willing international enablers, dams in the resurgence continue to face questions over their environmental and social impacts that can stall construction.

Postscript: President Magufuli's Latest Steps

However, events under President Magufuli suggest Stiegler's Dam's construction may soon start. Magufuli built his reputation as 'the bulldozer', an effective Minister of Infrastructure. He reportedly took a favourable opinion of the dam early in his presidency, with one official commenting that after mentioning Stiegler's, "Magufuli said 'it is a very important project. If you want to be industrialising … won't go ahead if you don't have electricity'"[198]. Magufuli now states this publicly: He announced Stiegler's Gorge Dam as a priority in June 2017, after firing Minister Muhongo in May[199] and meeting the Ethiopian Prime Minister for advice[200]. Contravening the 2016 PSMP's timeline for Stiegler's construction to start in the 2020s, the Ministry of Energy announced a tendering process in August 2017[201] and shut down Rubada, taking the project's

[197] Zarfl et al. 2015.
[198] Interview, Dar-es-Salaam, 2016.
[199] Ng'wanakilala 2017.
[200] Luhwago 2017b; Lugongo 2017: This initiated a visitation from civil servants connected to Ethiopia's dam-building programme to advise MEM.
[201] Mirondo 2017.

planning directly under Tanesco and a new Ministry of Energy[202]. This dramatic series of events simplifies the implementation process by bringing the dam under government budget expenditure, circumventing the need for a private-sector developer to raise international finance, win approval from UNESCO or face questions from international financiers over the viability of demand for Stiegler's electricity. Whilst the ability for Tanzania to pay for the dam is questionable, given the estimated cost is US$2.3billion and given the energy-sector's debt issues highlighted in Chapter 4, the 2018/2019 government budget reportedly allocated implementation money[203] and site preparation work is underway[204]. These steps further demonstrate the dam's ingrained position within Tanzania's energy planning and the persistent high modernist imaginaries held by CCM about the Stiegler's ability to develop Tanzania.

Conclusion: Legacies and the Persistence of High Modernism

Why then was Stiegler's Gorge project resurrected under Kikwete and how was it planned? This chapter does not provide a single answer, rather demonstrating the importance of historical legacies of dam planning, the agency of Brazilian and Tanzanian actors and presence of a bricolage of high modernist practices. The dam's history involved a discourse asserting its developmental potential. This discourse became associated with Nyerere who is held in continuing high regard, as the Baba wa Taifa (Father of the Nation). This generated path dependency, as did its initial plans which reduced future implementation costs whilst firmly establishing its significant megawatt potential. Moreover, the past attempt at implementation produced Rubada, an institution mandated to pursue the dam. Collectively, the history of the Stiegler's Dam therefore increases the likelihood of its future resurrection and created a high modernist, exclusively technical, planning precedent.

[202] Mwakyusa 2017.
[203] Citizen Reporter 2018: The 2017/18 budget total for national development projects (including a standard gauge railway to central Africa, a Uganda-Tanzania oil pipeline, Kinyerezi II and III Gas Plants, roads, electrification and the Stiegler's Gorge project) is 11.582trillion TSH (US$5billion).
[204] This includes clearing the site and building access roads (BBC 2018).

Brazil's assertive diplomacy and corporate support, in tandem with Odebrecht's spending and capacity, also played a key role in Stiegler's return. Brazilian actors enabled planning updates, initiated attempts to raise finance and efforts to gain UNESCO clearance. However, Tanzanian civil servants and CCM politicians arguably played the most important role, advertising the project and actively pushing forward negotiations through Presidential diplomacy. Their interest ostensibly stems from energy targets and the megawatt mission outlined in Chapter 4, but analysis here also asserts that the historic ideational rationale *imbuing* Stiegler's Gorge Dam with development persisted. Together they justified the present-day resurrection of a project that would over-double Tanzania's total generation capacity: Demand and industrialisation were believed to follow electricity. Therefore, whilst following the megawatt mission's rationales, greater agency is ascribed to the dam itself.

High modernist practice is also therefore evident in Stiegler's re-design and this latest phases' assessment of mitigation and compensation. Many planners, working in a *technician's realm* that included Rubada, Odebrecht, Tanesco and MEM, demonstrated little engagement with the socio-ecological system of the Rufiji River. They pursued a design that would maximise reliable electricity generation. For many planners the river's role in underpinning productive agricultural and fishing economies, and globally-significant ecologies, was *invisibilised*. Conversely, other dam planners explicitly recognised this geography, presenting potential impacts as solvable through expertise. Simultaneously planning officials expressed intentions to reduce the *enclave* of construction, with some also postulating a legal mechanism to share the dam's revenue benefits. Overall then, this chapter further demonstrates patterns of continuity and reform in the planning of dams, although here high modernist discourse and practice appear stronger than in Nyabarongo or Rusumo. Analysis also strengthens Chapter 4, illustrating Tanzania's pursuit of dam implementation and its failure in delivery. The Stiegler's case therefore deepens understanding of the dam resurgence, showing the stronger presence of high modernism in justifying rationales

and practices but also demonstrating limitations and contestation in the return of long-imagined dams.

Chapter 8

Ideological Bricolage: High Modernism and Reforms in the Dam Resurgence

This chapter ties the thesis' three conceptual levels together, synthesising an analysis of the dam resurgence phenomenon. It therefore explicitly details the thesis' advancements to the literature on dams and the politics and geography of development in Africa. The central original contribution is to analyse the drivers (the *why)* and processes (the *how)* of the dam resurgence. Addressing a literature bias towards materialist explanations[1], this analysis asserts the importance of ideas, and particularly high modernism, in understanding the dam resurgence. This ideology, albeit alongside path dependent factors and 'iron triangle' rationales, justifies the return to large dam building in Africa and explains the phenomenon's planning and implementing processes. The dam resurgence therefore marks the reappearance of a depoliticising, modernist development ideology that attempts to leapfrog countries into imagined futures. Moreover, the thesis features increasingly authoritarian and economically rising states like Rwanda and Tanzania. Together, this could suggest a return to the politics and experiences of the 1950s-1970s, the period of high modernism's zenith which also saw the establishment of many authoritarian regimes. This finding is significant, not least because such illiberal states, influenced by high-modernism, built dams that have records of weak benefit delivery and sizeable negative impacts for upstream, downstream and proximate communities and ecologies.

[1] E.g. Ahlers, Zwarteveen, and Bakker 2017; who also assert continuity in dams' justifications.

However, rather than finding simple repetition this analysis of the dam resurgence demonstrates new discursive justifications[2] and practices. Rwanda and Tanzania build dams for wider energy generation targets not the infrastructure's symbolism. Additionally, analysis of the three case-study dams shows greater incorporation of reformist idea-practices into processes of knowledge production and decision making. Moreover, the resurgence's cast of actors is different: Traditional international enablers now sit alongside financiers and builders from the (re)emerging-powers. Here, the thesis' key theoretical advancement involves synthesising this era's ideas and practices in the concept of ideological bricolage. This term captures the moulding of critical reformist policies with high modernist idea-practices that were often seen in the 20th century's dam-building era. It therefore theoretically describes this combination of opposing understandings of knowledge, technology and dam infrastructure and helps partially explain the resurgence era's complexity. This theorisation, and the thesis' ideational focus, advances the academic literature on dam building but also the study of reformist policies in development. It addresses questions about what such reforms mean for decision-making and about why, given their growing presence, research continues to show similar patterns of decision-making and knowledge production in dams. Moreover, interwoven in the thesis' explanation and description of the resurgence era's high modernist bricolage is an appreciation of the nuances in illiberal statebuilding regimes. Whilst following authoritarian, government-led development missions, these states can appear more reactive to citizens and embracing of international policy norms. Consequently, this chapter concludes that the formula for the thesis' cases of resurgence-era dam building contrasts with Scott's one for high modernist 20th century development projects[3]: Rather than unbending authoritarians and a prostrate civil society, the contemporary experience shows

[2] New justifications include water security, climate change and a narrow interpretation of the energy-water-food nexus.

[3] Noting Chapter 1's assertion that the 20th century dam era was not simply defined by high modernism and that its implementation was often imperfect (Bähre and Lecocq 2007).

more reactive authoritarian states, and a somewhat influential global level of civil society, which produce an ideological bricolage that mixes high modernist idea-practices with dam reforms.

This chapter begins by synthesising the thesis' analysis on how the dam resurgence has happened, assessing trends in the case studies' adoption of reformist and high modernist idea-policies. This section also assesses how the motivations driving dams influence implementation practices. The chapter then asserts explanations for these findings, including ideational and materialist factors. Following that, the concept of bricolage is applied to the thesis' analysis of high modernism and the dam resurgence.

Why Is There a Dam Resurgence?

National Government

This thesis' analysis of the drivers for dam resurgence stresses that national regimes, their governing elite, ministries and subsidiary organisations, are key agents. They are primarily responsible for resurrecting older dam plans as part of broader energy-generation ambitions that are in turn central to development programmes. In the cases discussed here, national governments and their agencies financed or facilitated project planning and solicited investment, whether in subsidised loans or through agreements with private-sector firms. The thesis, contrasting with academic studies focusing on dams' international actors[4], emphasises the importance of national governments and their developmentally-ambitious statebuilding programmes[5]. However, the chief rationale for Rwandan and Tanzanian actors differs from contemporary and historic comparisons. Rather than a belief in dams themselves, and an accompanying emphasis on their symbolism, analysis here stresses the importance of the megawatt to national regimes, the primacy of a mission to increase electricity generation as part

[4] Goldman 2005; K. McDonald, Bosshard, and Brewer 2009; Bosshard 2009; Usher 1997b.
[5] Thereby this thesis agrees with Hensengerth 2013a; Yankson et al. 2018; Mohan 2013 (Ghana);Cuesta-Fernández 2015; Kraak 2012 (Ethiopia); Verhoeven 2015a (Sudan).

of wider economic development goals. Thus, dam designs tend towards single hydropower production, not multipurpose infrastructure capable of underpinning total valley transformation. Beyond the case studies here, this singular purpose is exemplified by the majority of Africa's contemporary dams, from Angola's Lauca to Ethiopia's Grand Renaissance[6], Sudan's Merowe[7] and Ghana's Bui[8]. The Ugandan colonial Owen Falls Dam also demonstrates a degree of precedent for this[9].

However, governments in these contemporary and historic examples tended to emphasise dam infrastructure, its symbolic modernising spectacle and potential to transform society. Whilst the Stiegler's Gorge project follows this mould to some extent, with a greater rhetorical focus on the infrastructure's potential, this thesis' contrasts with these cases. Moreover, unlike Ethiopia[10] or Uganda[11], where hydropower is the only turned-to technology, in Rwanda and Tanzania, dams are merely one of a number of technologies in electricity-generation drives. This does not dismiss the significance of dam building in Rwanda or Tanzania, or hydropower's importance to each regime. Rather, it underlines the shift to imbuing the megawatt, rather than the dam itself, with development and statebuilding potential. Thus, electricity-generation targets are a key driver in the return of dams.

Despite this shift from *imbuing dams with development* and *emphasising spectacle,* high modernist ideology is present in Rwandan and Tanzanian dam justifications. This is because analysis in both countries demonstrates that the key rationalising assumption was that electricity linearly generates development. Additionally, the cases evidence *pervasive appraisal optimism*, an applied high-modernist concept that sees dams as fundamentally apolitical objects without significant consequences. This idea-practice aids justification, sanitising dams by dismissing an

[6] Cuesta-Fernández 2015.
[7] Verhoeven 2011.
[8] Miescher and Tsikata 2009.
[9] van der Straeten 2017; Gore 2017.
[10] Cuesta-Fernández 2015.
[11] Gore 2017.

idea of the infrastructure involving political trade-offs. Overall then, high modernism in Rwanda and Tanzania has an important, but more indirect, role. Alongside the ideological, these national actors were motivated by a practical desire to end damaging and politically-unpopular power crises. Furthermore, path dependency figures significantly. Dams' long-standing prominence in both countries' energy sectors, and the prior planning of many dam projects, made hydropower potentials known, dam technology familiar and planning costs lower[12]. Thus, materialist and path-dependent factors also explain Rwanda and Tanzania's important interest in dams. It was these state actors' decision to pursue energy missions that was the key factor behind both countries' dam resurgence.

Dam-Building Enablers

However, this return to construction would not have happened without international enablers. This is partly because many developing countries, particularly those in Africa, are less able to self-finance multiple large infrastructure projects with only government bonds or taxes. Thus, the return of international dam finance is significant. The (re)emerging powers are the most important here. Their arrival in Africa, and to other parts of the developing world such as South Asia, has created an important new funding stream that increases the volume of finance for development projects. Moreover, finance from the (re)emerging powers' ExIm Banks, including those of Brazil, India and China, is often given at below-market interest rates[13]. India's ExIm Bank for instance, follows the World Bank's subsidising policies. Significantly, analysis here found these state financiers have relatively few impact assessment or construction standards, although these are increasing. This is important as overlooking dam impacts renders approval institutionally easier, allowing the Indian and Brazilian actors studied here to embrace dams even if projects are controversial. Contrasts therefore continue to exist between these (re)emerging power's finance

[12] Evidencing the path dependent factors of sunk costs, a learning dividend and potential increasing returns (Introduction Chapter).
[13] However, this is not always the case, as evidenced by Chinese ExIm finance in the Memve'ele Cameroonian Dam (Chen and Landry 2018).

and the broadly more conditional, and somewhat socio-ecological sensitive, traditional donors. Importantly, this means that the emerging powers open political space for recipient governments, potentially enabling long-held infrastructure ambitions. Corporations are a key part of these (re)emerging countries push to Africa, with engineering companies having actively advanced projects, financed studies and solicited finance to enable construction[14]. This makes such companies key actors in explaining the dam resurgence, thereby contrasting with the past dam era where research records the predominance of states and multilateral banks[15]. However, continuities also exist: Key financiers from the past, not least the World Bank, remain important. Additionally, Western engineering companies typically design, assess and act as owner's engineers in resurgence-era dam projects.

This thesis adds to the literature by examining the drivers and practices for the case studies' enablers. High modernism appears a lesser driving force than materialist political and economic rationales. Emerging power governments' dominant motivation is to broadly increase commercial and political ties with Africa, with dam financing a tool to achieve closer diplomatic ties and boost domestic companies internationally. Additionally, the Indian and Brazilian engineering firms researched here saw Africa as offering growing business opportunities and a place to build international experience[16]. In the case of Brazil, this profit-seeking drive came with a close political alliance to the PT (Worker's Party) government, best illustrated by ties between the state and Odebrecht. The emerging power's dam building in Africa thereby evokes the so-called iron triangle of mutually supporting corporate and government actors, examined in Chapter 1. In contrast to this absence of high-modernism, the ideology does feature more strongly among individuals in the World Bank. Chapter six demonstrates Bank officials invoking a linear relationship between hydropower technology and local and national development to justify their

[14] Demonstrated here by Nyabarongo and Stiegler's Gorge Dams.
[15] Chapter 1.
[16] Although noting that Odebrecht does not seek international experience, being significantly internationalised.

engagement in dams. Alongside this, Chapter Six records strong institutional and financial motivations in World Bank lending for infrastructure. Chapter 1 also makes an important contribution in synthesising new discursive justifications for dams. Most prominent is one highlighting hydropower's green credentials in the face of climate change[17], an argument that tends to overlook dams' increasing climatic vulnerability[18]. Additionally, the post-2000s' 'Africa Rising' narrative helped justify lending[19]. Thus, a new set of discourses rationalised the pursuit of dams by traditional and emerging power actors.

River basin organisations constitute a further set of enablers. Such institutions rose in the past dam-building era, premised on high modernist ideas of total societal transformation through dam infrastructure. Here Rubada demonstrates the continued role these organisations can play in pushing the resurrection of dam projects. In addition, Chapter Six analyses the arrival of a new river-basin agency, Nelsap. With a premise to implement projects and capability to forge international agreements, it played an important role in unlocking dams. Nelsap is also significant in this analysis as its techno-centric decision making depoliticised dams, echoing practices of the Tennessee and Kagera basin organisations. These enabling river-basin institutions also have materialist interests in dam implementation, for instance because successful projects can lead to future funding. Thus, in their ability to unlock agreements and maintain dams' prominent position in energy-generation policies, the persistence and creation of river-basin agencies constitutes another part of this thesis' explanation for dam resurgence.

The Boundaries of the Dam Resurgence

However, whilst emphasising the significance of the increase in dam planning and building, this thesis also points to limitations in the resurgence phenomenon. As demonstrated by

[17] This is based on hydropower's low-emission status, a fact complicated by reservoirs' varying methane emissions.
[18] Conway et al. 2017.
[19] Taylor 2014.

Tanzania and the Stiegler's Gorge case, the return to dam planning is notable but not always followed by success. Whilst analysis here explains this primarily through Tanzania's fragmented authoritarianism, experiences of hydropower's climatic vulnerability and of the temporal and financial costs entailed by dam building reforms (e.g. increased impact assessment or mitigation through relocation and design change), also played a role. These factors contributed to the lower status of dams within Rwandan and Tanzanian government discourse where they are seen as part of an energy-generation mission, not the goal in themselves. Therefore, it is important to recognise boundaries to the physical implementation of the dam resurgence. Rather than asserting a universally successful process of financing and construction, research here evidences complexities, hurdles and occasional opposition. Such limitations are not new, as demonstrated by the fact that Nyabarongo, Rusumo and Stiegler's Gorge Dams were planned but uncompleted in the 20th century. However, such challenges are arguably more significant today[20], given the incorporation of dam-building reforms (analysed below). Consequently, although stating the significance of the dam resurgence, this thesis' empirical analysis also shows challenges to this phenomenon. Having established drivers for the dam resurgence, the chapter now turns to the phenomenon's practices.

How Are Dams Planned and Constructed?

The Role of International Enablers and National Actors

There is considerable debate in the dam building literature about the importance of international against national actors in driving standards of assessment, planning and construction[21]. Research here suggests that the emerging powers' lower or absent standards influenced projects: Indian and Brazilian governments aimed to increase ties with Africa and

[20] For instance, even in authoritarian China anti-dam environmental activism has influence (Tilt 2015).
[21] Notable articles stressing international actors role include: Goldman 2005; K. McDonald, Bosshard, and Brewer 2009; Bosshard 2010; Öhman 2005; Usher 1997b.

support their domestic industries but did not consider the content or outcomes of projects engaged in. Thus, loan approval concentrated primarily on minimal financial and technical feasibility standards rather than planning and construction practices or development outcomes. This contributed to a depoliticised understanding of dams without political trade-offs, with downstream impacts particularly overlooked or dismissed. Moreover, in Nyabarongo Dam, when combined with the Indian construction firm's (Angelique) inexperience, this led to minimal socio-ecological studies and low engineering construction standards[22]. This also demonstrates that beyond financiers, construction companies influence projects. Angelique contrasts with Odebrecht's apparent technical experience and more conventional adoption of corporate social responsibility in Stiegler's Dam plans. However, agreeing with a theme in nuanced analyses of Chinese dam building in Africa[23], the thesis finds that India and Brazil's lower standards bring African states' laws and policies to the fore. Thus, as with drivers of the resurgence, nation states are the key actors dictating practices of socio- ecological assessment, compensation and construction.

Then again, the Rusumo Falls Dam demonstrates that international enablers can have a strong influence as Chapter Six analyses the directions given by the World Bank and Nelsap in practices of mitigation, knowledge production and compensation. However, even in this case, national and local government played key roles in implementation, stemming from the way they can order the decision-making environment in a project. Both Rwandan and Tanzanian states involve geographically centralised decision making. This shapes treatment of participation as merely a veneer without influence over assessments, designs and implementation practices. Similarly, both states shape the degree to which protests have influence. This means that when the political decision to prioritise hydropower was made, both governments primarily empowered technicians in ministries and agencies, including Nelsap, to build dams as quickly as possible. This

[22] This required close monitoring and improvement by Nyabarongo's owner's engineer.
[23] Chen and Landry 2018; Mohan 2013; Felix et al. 2017; Yankson et al. 2018; Hensengerth 2013a.

influenced all three cases limited response to their local physical and human geographies. Thus, this thesis contends that analysis of project practices needs to consider host states centrally, although the precise influence of financiers, construction companies and national and local government vary by project. But what were the practices adopted by these actors in the dam resurgence? The following section synthesises trends across the cases.

Reform or Continuity in Practices?

Knowledge Production

Whilst acknowledging variation in the past-era's practices of knowledge production[24], the dam resurgence appears to demonstrate a norm of having increasingly detailed impact assessments and studies that examine a dam-site's baseline social and physical geography. Research here, supported by others[25], suggests that the World Bank's socio- ecological safeguards and impact-assessment standards are often a reference point, although new tools include the industry-created Hydropower Sustainability Assessment Framework examined in Chapter 1. Rusumo Dam demonstrates what the Bank's practices entail, including a multi-year social and environmental impact assessment involving an inter-disciplinary team and, at least nominal, assertion of community involvement. As demonstrated by wider literature and case studies here, these broad ideas at least appear well ingrained in a range of traditional[26] and emerging power finance[27], and international conglomerate engineering consultancies[28] including Artelia, SNC-Lavalin, SMEC, Aecom and CIMA. Impact assessments themselves are not new[29], but these more detailed studies respond to a technocratic recognition of dams' past under-performance in

[24] E.g. contrast between minimal assessments in Kariba (Tischler 2013) and Cahora Bassa (Isaacman and Isaacman 2013) with greater studies of Akosombo (Miescher 2014a).
[25] Edegilign Hailu 2017.
[26] See Rusumo Chapter 6 but also Cameroon Dams (Chen and Landry 2018).
[27] Also demonstrated by Hänsch 2012 (Merowe Dam , Sudan); Edegilign Hailu 2017 (Gibe III Dam, Ethiopia); Hensengerth 2013 (Bui Dam, Ghana); Hwang, Bräutigam, and Wang 2015 (African Chinese Dams).
[28] These companies have undergone numerous merges and acquisitions.
[29] From the 1960s, EIAs were increasingly common (Chapter 1).

relation to a river's climate, hydrology and sedimentation risks. Additionally, their increasing norm stems from global discussions, particularly the 1997-2000 World Commission on Dams, pushed by resistance from international and national civil society[30].

Although not explicitly referencing such specific initiatives as the World Commission on Dams or HSAF, Rwanda and Tanzania are no exception to this global trend[31]. Both have agencies to assess environmental and social impacts and legally mandate such studies. Notably, all officials planning Stiegler's Gorge envisaged an extensive, basin-level ESIA as necessary and Nyabarongo Dam, whose Indian ExIm Bank finance did not mandate impact studies, did include an ESIA by Canadian-firm CIMA. However, the cases studied here demonstrate that such exercises *invisibilised* the local socio-ecology, particularly interconnections between local livelihoods and biophysical services provided by the river. Moreover, continuing a notable past-era practice, all three case studies overlooked downstream impacts. This emphasises that knowledge production in these cases is often intended to improve rather than challenge projects, a conclusion also drawn in Hailu's study of Ethiopia's Gibe III Dam[32] and Hänsch's research on Sudan's Merowe Dam[33]. This thesis therefore asserts that although there is a trend towards studying and even acknowledging direct dam impacts in the resurgence era, assessments tend to be more surface-level: They do not challenge dams' development efficacy and tend to overlook the socio-ecology of a river, the connections between hydrology, ecology and livelihoods, especially downstream of a dam site.

Decision Making

Rwanda and Tanzania also evidence contrasts between the rhetoric and practices of decision making. For instance, Rusumo Dam demonstrates greater degrees of mitigation and other examples include Chapter 4's Malagarasi Dam in Tanzania: With pressure from its

[30] Civil Society has been especially prominent in India and Brazil (Khagram 2004).
[31] As indicated by case studies (Dao 2010; da Costa 2014) and larger reviews (Skinner and Haas 2014; Scheumann and Hensengerth 2014b).
[32] Edegilign Hailu 2017.
[33] Hänsch 2012.

international financier[34] it relocated to decrease ecological impacts[35]. However, mitigation efforts are not universal. This is demonstrated by national-level bureaucrats and politicians who, expressing an energy-centric understanding of development, pushed for the maximum level of power generation capacity in dam designs. A similar pattern is found in compensation. On the one hand, a higher standard is apparent: assessment and compensation of assets directly lost from construction and flooding is the norm. Consequently, despite important differences, in the cases of Rusumo and Nyabarongo a similar process of asset calculation supposedly based on market rates and covering crops, land and properties, did occur. Thus, the majority of those losing land and interviewed in both projects had received money and been able to purchase new land, build new properties and diversify income sources. Some even appeared to have experienced improved livelihoods. According to Scudder's[36] extensive database, 20th-century dams contrast with this evidence. Of his 50 cases, only three affected groups moved beyond dealing with the socio-economic impacts of displacement to a stage of community formation where households build sustainable diversified livelihoods. However, this positive contrast only extends so far. Research found inequality in the compensation process where many poorer households were entirely missed or were less able to rebuild livelihoods. Moreover, the section above points to officials' incomplete understanding of impacts, particularly in their focus on discreet effects rather than understandings of fertility or attention to systemic livelihood interactions with rivers. This entailed compensation schemes that left some with insufficient means to rebuild livelihoods.

A cross-cutting theme in decision making and knowledge production is the invocation of participation. That officials involved in all three projects made claims about including local communities in project planning and implementation is itself a change from the past dam era. However, frequently such statements seemed more tokenistic, particularly in Nyabarongo Dam

[34] Millennium Challenge Corporation.
[35] The dam was moved downstream to a site of lower ecological impact.
[36] Scudder 2005; Scudder 2012.

where officials primarily intended to educate proximate communities. Rusumo Dam exemplified greater change. Here civil society consultations occurred before the project, contracted engineers organised consultative meetings and surveys to inform impact assessment and Nelsap initiated committees of affected people to officially represent these communities' views. Whilst reforming processes of dam building, chapter six explains that limitations on local input to key assessments and decisions, and on the PAP committees' power, meant that Rusumo's planning only ranked as 'consultative' in participatory ladder models (below 'partnership' or 'empowerment')[37]. Moreover, officials' engagement treated 'the community' as a unified object, thereby overlooking the socially and geographically unequal experiences of compensation and livelihood resettlement. Consequently, in these cases of dam resurgence, political masters primarily empower international consultants and bureaucrats in ministries, national energy utilities and river-basin organisations to plan, implement and produce knowledge: With a different veneer, a *technician's realm* continues to exist.

This pattern is again demonstrated with local benefit sharing, a concept rarely present in the past dam era. On the one hand, the policy of sharing benefits locally addresses a significant critique of past dams' geographical and social inequality where typically wealthier, more urban elites captured irrigation, water and electricity services resulting from damage wielded to ecological systems and geographically-marginalised smallholder farming communities. In contrast, all three case-study projects here included schemes meant to directly benefit their local area. Nyabarongo Dam included electricity sharing, Rusumo Dam, a local area development fund and Stiegler's Gorge Dam, a tariff to support anti-poaching[38]. Additionally, all three case studies demonstrated deliberate attempts to prevent formation of an *enclave* in construction. Plans involved, to varying degrees[39], local employment and local procurement. This contrasts with case

[37] Shipley and Utz 2012.
[38] Although supporting wildlife in the dam's locale this overlooks downstream Warufiji communities.
[39] E.g. benefit sharing schemes were mandated in Rusumo's contracts and included in Nyabarongo.

studies analysed in Chapter 1 including the Cahora Bassa, Kariba and Akosombo Dams where 'national' benefits were planned for cities and colonial agriculture economies (in Mozambique and Rhodesia) or extractive industries (in Ghana[40]). These historic projects involved a hard *enclave* entailing limited employment of the pre-existing community and primary procurement of goods internationally. Where local benefits were included[41], these tended to be designed through the *enabling social engineering* concept involving an expert-led, top-down and techno-centric social transformation programme. For instance, in Ghana's Akosombo Dam[42] and Tanzania's Mtera[43], this involved geographic relocation into concentrated villages with livelihoods based around more industrial, larger-scale farms. As Chapters 5 and 6 analyse respectively, this applied high modernist practice of *social engineering* is present in the benefit sharing schemes of Nyabarongo[44] and, to a lesser extent, in Rusumo Dam. Reformist ideas are therefore gaining traction but are appropriated through ideas of expert-led transformation to supposedly modern livelihoods. Dam reforms are thus interpreted through high modernist practices and ideas. As chapter six especially demonstrates, this misses opportunities to build on existing livelihoods, skills and local knowledge. However, what explains this pattern of reform and continuity in the dam resurgence?

Explaining Patterns of the Dam Resurgence

The Presence of High Modernism

The empirical evidence here shows high modernism's varying presence. Justifications by international and national actors do not tend to *imbue dams with development* or em*phasise their spectacle*. Rather they assert the megawatt's role in producing linear progress. This suggests an altered, more indirect role for high modernism. However, with the importance of electricity in

[40] In addition, Akosombo's power was exported regionally and underpinned a degree of electrification.
[41] See review by Adams 1992.
[42] Miescher 2014a.
[43] Öhman 2007.
[44] Chapter 5.

development plans, the national governments here made a political decision to empower ministries and agencies with dam delivery, thereby creating a *technician's realm* in each case study. Moreover, the three dams evidenced knowledge production processes that *invisibilised* elements of each project's human and physical geography. Additionally, research found the presence of *social engineering* in Nyabarongo and Rusumo Dams, where the dam was imagined as enabling the re-design of backward rural livelihoods. This reveals the presence of a high modernist conception of depoliticised dam development that overlooks trade-offs and displays a consensus between national and international actors[45] on the empowering of experts in planning and construction: Universal science is sufficient and affected populations' knowledge and livelihoods, illegitimate. The presence of such high modernist discourse and practice is significant. The ideology justifies national government's pursuit of dams as energy-generation solutions and the adoption of certain planning and construction practices by public and private implementing organisations. This is particularly important given that all projects, at least rhetorically, aim for comprehensive compensation, impact assessments and a degree of participation; ambitions which contrast with the past dam era. Conscious and unconscious high modernism helps explain why these actors approached such contrasting ambitions in this depoliticised, techno-centric and predominantly-expert way; why they overlooked each sites' socio-ecology including the values and knowledges of those living along the dammed rivers.

However, this analysis does not simply argue that the drivers for dams and their practices are ideational. The desire to achieve rapid development and appease popular critiques of frequent power cuts influences both countries' singular focus on energy generation and their opposition to time consuming assessments and participation processes. Moreover, In Rwanda, the regime partly maintains its power through a tight, centralised grip on decision making that entails top-down systems of implementation. These factors contribute to rationalising a *technician's realm*. At an

[45] Research highlighted exceptions in organisations like the World Bank and among individuals more embracing of dam reforms.

international level, South-South Cooperation ambitions and iron-triangle support for domestic firms also plays an important role in driving dam finance in Africa. Additionally, institutional and corporate self-interest figures, not only in directing dam building, but in motivating certain high modernist practices. For instance, project officials at Nyabarongo alleged that Angelique's apparent inaction on ameliorating the impacts from construction partly stemmed from the company's desire to reduce costs[46]. Another incentive stems from the way that understating a dam's impact lowers construction hurdles. Consequently, assessing consultants might want to downplay a dam's impacts in order to win construction-supervision contracts, or to secure jobs assessing future dams proposed by the same developer. Therefore, materialist factors also figure in rationalising applied high-modernist dam-building practices.

The thesis also highlights the role of historical legacies. These figure prominently because of the case studies' planning history: All began life, and had planning conducted, in the past 20th century dam-building era. Moreover institutions, represented here by Rubada, have persisted from the height of the 20th century's dam boom, constituting a vested interest group furthering path dependency. Furthermore, the major Western consultancies designing, supervising and assessing dams in the resurgence generally, and in the thesis' case studies specifically, were key actors in the 1950-1970s dam boom. There is also the fact that many individuals' careers span the decade-long near-cessation in dam construction. This is particularly true of staff in the owner's engineer for Rusumo and Nyabarongo, in the longer-standing Tanzanian government[47] and among the officials in Angelique, BHEL and Odebrecht. It is thus unsurprising to find degrees of continuity in particular processes of dam building, especially among such organisations and individuals. Therefore, this thesis contends that, alongside high modernist ideological beliefs, such materialist rationales and historical factors also have a role in explaining the *how* of the dam resurgence.

[46] Chapter 5.
[47] Rwanda's context of post-genocide rebuilding creates a younger workforce.

Ideational and Materialist Drivers for Adopting Dam Reforms

Besides applied high modernist concepts, the other key feature of the dam resurgence is reformist thinking and policy. An important influence here is ideational. Rwanda, Tanzania and international enablers sit within global debates about sustainable development and many attend international policy conferences that advocate the adoption of so-called best practices. For instance, research recorded a number of Tanzanian, World Bank and Nelsap officials attending World Water Week 2015. Moreover, during fieldwork in Tanzania, the Water Ministry hosted Africa Water Week 2016 and similarly, the India Water Week 2016 took place in Delhi during interviews there. Such events provide a platform for academics and practitioners to share ideas and often specifically address hydropower's social and environmental sustainability[48]. Consequently, taking the premise that officials are, to some extent, interested in adopting best practices, such forums are significant. Thus, when discussing Tanzania's impact assessment process, one senior figure explained "(dam) projects are not working in a vacuum. (There are) standards, international standards you have to meet … if you want to develop a project, you have to think about (social and environmental areas)"[49]. This echoes work done in other fields about the adoption of reformist policy ideas by political elites in Africa. For instance, Harrison[50] partly explains the adoption of market-based economic reforms in Tanzania and Uganda in the 1990s through shared beliefs between Western donors, recipient politicians and civil servants, stemming from factors like shared educational background. Additionally, Jones et.al.[51] analyse the enactment of forms of 'New Public Management'[52] by illiberal statebuilding countries across

[48] E.g. in World Water Week 2015 panel titles included "water storage and hydropower as drivers for sustainable development" and "towards economically viable and socially just dams in West Africa".
[49] Interview, Former Senior Official, CCM, 2016.
[50] Harrison 2001.
[51] Jones, Verhoeven, and Soares de Oliveira 2013; Jones and Dye Forthcoming.
[52] Referring to the ideas Christopher Hood (Hood 1991) on practices like incentivised targets in the public sector and to a lesser extent on Douglas North and others on institutions' development role (North 1989; North 1990).

Africa, a theme further examined with regards to Rwanda in Chapter 3. Thus, desire to achieve local and national development contributes to the adoption of dam reforms.

Simultaneously, the national and international actors analysed here also have materialist motivations for adopting dam reforms. As analysed in Chapters 3 and 4, Rwanda and Tanzania receive significant budgetary and economic support from donors[53]. Given such donors' interest in sustainable development including international environmental and social standards, it is strategic for both governments to position themselves as adopters of dam reforms as part of their wider demonstration of 'good governance'[54]. Such policies can confer membership of the globalised community of respectable states[55]. This rationale is also significant for Nelsap. It was created through the initiative of the World Bank alongside other Western donors and, as demonstrated with Rusumo Dam, primarily implements donor-funded projects. Its adoption of these institutions' standards is thus important and indeed often mandated by financiers. Strategic rationales also exist for the World Bank. As demonstrated in Chapter 1 with regards to the stalling of dams, the Bank is vulnerable to international protests and is accountable to national governments sensitive to issues of environmental and social justice. Indeed, the author has been party to such lobbying against the Stiegler's Gorge Dam from the World Wildlife Fund and on Rusumo Dam's compensation scheme. Therefore, as Chapter 1 charts, the Bank has adopted dam reforms partly to legitimate its lending for large infrastructure[56]. To a lesser extent, many international companies have also decided to engage with reformist policies. Angelique and Odebrecht, to some degree, adopted policies that spread benefits and reduce negative impacts[57]. This is strategic, as corporate image can be a factor in winning dam-building contracts and securing credit from western financial institutions.

[53] Pitcher and Askew 2006.
[54] E.g. One former senior MEM official stated practising reforms "was a compliance thing" (Interview, 2016).
[55] Pitcher and Askew 2006, 7.
[56] An argument made by Usher 1997b) and others.
[57] E.g. Stressed in interviews with Odebrecht, 2016.

Bricolage in the Dam Resurgence

Finding a record of dam reform is significant as it reveals a degree of change in dam building processes. Moreover, it is important given these reform's foundation in opposite ideas to high modernism. Their key idea-practices include: the principle that dams' impacts can be so harmful that planners should consider rejecting individual projects; acknowledgement of the need to mitigate impacts at the expense of hydropower or water storage; and support for participation in decision making to ensure better outcomes for affected communities. These ideas are in turn founded on the premise that dams are political, that they have a record of different direct and indirect, positive and negative impacts on socio-political groups. Moreover, by stressing participation, reformist idea-practices also confer a degree of legitimacy on the opinions, knowledge and livelihoods of affected communities, countering the high-modernist binary of backward traditional people against modern rational citizens. Furthermore, reformist ideas see dams' developmental impact as limited or at least contingent on their socio-economic context and operation. The mere presence of a dam is not assumed sufficient to create local development, meaning that benefit-sharing schemes are required. This same premise of technological limits also influences the assessment of a dam's vulnerability to climate and reservoir sedimentation, sentiments Rwandan and Tanzanian officials expressed.

Despite such reformist policies having apparently oppositional assumptions to applied high-modernist practices, the thesis' central argument asserts that the ideology's discourse and practice coexists with dam reforms in this new resurgence era: Calls for understanding impact and compensation occur with the principle of dams as apolitical and of universal expertise as sufficient. Significantly, this does not happen in a layered sense: High modernist and reformist idea-practices are not applied to separate areas of planning and implementation. Nor are they expressed by different individuals within the same organisation. Rather, this thesis finds reform policies blended with high modernism. Thus, officials practiced policies and, within the same interview, expressed

discourse based on an oppositional set of assumptions. For instance, as analysed in Chapter 7, civil servants in Rubada described the negative impacts of the Stiegler's Gorge Dam at great length but then concluded that these could be solved through expertise: "the technology exists on how to deal with the problem, it wouldn't be easy but a strategic assessment could deal with it … it shouldn't be a problem (it is) just about managing the reservoir, surely there will be some sort of formula in the very dry period (that could work)"[58]. Similarly, one presentation by the Tanzanian Energy Ministry recognised the importance of flooding to downstream livelihoods and that the Stiegler's Gorge Dam would stop floods. However it simultaneously asserted that the dam would deliver the downstream water and sediment benefits that only occur with floods:

> "The project will provide flood control downstream where at present a major flood exceeding 2500m^3/s can occur once in a period of three years and usually occurs in March and April. The dam once constructed, will eliminate these damaging floods and simultaneously allow passage of water that is beneficial to agriculture flora and fauna and other downstream needs"[59].

A similar response was given with regards to Tanzania's new water regime. It requires dam projects to apply for a permit given by a water-basin committee made up of government officials and water users. This appears to recognise the politics of water, the need for participation in decisions over allocation. Consequently, these institutions could generate explicit recognition of dams' trade-offs for upstream and downstream river users. However, an official overseeing these committees, echoing others interviewed, argued that "once you have scientific facts, you can make scientific decisions"[60]; dismissing any idea of these committees as political.

The Rwandan government evidenced a similarly contradictory narrative. For instance, officials often recognised dams' environmental vulnerabilities: "micro-hydro we have in the country (but we do have issues) … too much rain, terrible silt problems ... dry spell (means) less

[58] Interview, Former Senior Official, Rubada, 2015.
[59] Masanja and Ministry of Energy and Minerals 2012, 12.
[60] Interview, Senior Civil Servant, 2015.

water" and that therefore "climate change is really an issue and should not be ignored like in the past"[61]. However, this former senior official was referring to instrumental inclusion, the principle that the environment should be measured for dam designs: They were not calling for critical reflection on the efficacy and trade-offs of hydropower. Similarly, as recounted in Chapter 3, officials in the ministry, utility and agency recognised sedimentation as a serious issue, but again asserted a belief in a technological fix: "In Rwanda a key problem is sedimentation … (related to deforestation, cultivation of land, landslides … easily dealt with … not a difficult thing to deal with (as technology available)"[62]. These examples in Rwanda and Tanzania present an exaggerated version of Usher's[63] analysis of *pervasive appraisal optimism* analysed as a high modernist concept in Chapter 1. Usher uses the term to describe a process of limited knowledge production understating and overlooking dam-induced changes, thereby projecting dams as depoliticised development infrastructure. In contrast, these quotes indicate an acknowledgement of impacts and of hydropower's technical limitations, but then assert their solvability, indicating an overwhelming belief in the power of science and expertise.

Bricolage is therefore particularly prevalent in national government ministries and agencies, but research also demonstrated such ideological moulding at the level of international enablers, particularly in Nelsap and the World Bank. One World Bank official exemplified high modernist bricolage: After asserting a critical perspective on the problematic history and impacts of dams, he stated an ultimate belief that they are always developmental because of their ability to order environments, extend bureaucratic control and bring modernity to peripheral places. For these and many other individuals, such discourse was not contradictory, but rather coexisted to inform policy practice. Therefore, experiences and ideas countering the earlier high modernist

[61] Interview, Former Senior Official, Mininfra, 2015.
[62] Interview, Former Official, Mininfra, 2015.
[63] Usher 1997a.

faith are incorporated into justifications and implementation practices without a wider critique of the need for, and developmental limitations of, dams.

How then to understand the return, or persistence, of high modernist ideology amidst reformist policies in the dam resurgence? Inspired by Cleaver[64] this thesis asserts that such remoulding represents ideological bricolage. This concept of bricolage is ultimately rooted in Levi-Straus'[65] work. He defined the term as describing the improvised repurposing of objects and ideas into new configurations. Douglas[66] applied this concept to institutions, refuting the idea that they simply express rational behaviour. She describes institutions' everyday actions which muddle through by mixing cultural and social arrangements, norms and rules from a variety of sources. More recent literature advances this, de-emphasising the need for conscious agency. In development studies[67] bricolage is used to explain the way institutions are patched together with a dynamic mix of the new and old, formal and informal. For instance, Cleaver[68] uses bricolage to describe institutions consciously and unconsciously acting through fuzzy assemblages of contradicting or contrasting ideas and practices[69]. Building on this, and similar to Hurrell's use[70], the thesis applies the term bricolage to understand the construction of an ideology where new and old thought-practices consciously and unconsciously combine. Rather than merely assert the morphing of high modernism, the re-calibration of its bundle of core and applied ideas, this thesis finds ideological moulding among key national and international actors; a re-making of the ideology influencing dams through the grafting of old and reformist concepts**.**

[64] Cleaver 2012.
[65] Lévi-Strauss 2004.
[66] Douglas 2011.
[67] Galvan 2004 (analysing informal and formal institutions); Stark and Bruszt 1998; Sehring 2009 (analysing post-soviet contexts).
[68] Cleaver 2012.
[69] Cleaver 2012, 43–45.
[70] Hurrell 2013, 220: Discussing the integration of the emerging powers into the international world order where "old and new ideas and policies are melded together".

Nuancing the 'Authority' in Authoritarian States

In Scott's original formulation for 20th century high modernist development[71], successful implementation requires a ruthlessly authoritarian state overriding a prostrate civil society and singular in its programme of modernisation. On the surface, Rwanda[72] and Tanzania[73] fit these descriptions. In both states, centralised regime power limits press freedoms, undermines opposition parties and controls civil society. Rwanda achieves this to a greater extent[74] with virtually non-competitive elections, strong societal coercion and assassination of elite dissenters[75]. However, the presence of ideational and materialist rationales for dam-building reforms in-turn suggests a different type of authoritarianism from Scott's caricature of static, invulnerable governments. On the one hand, the Rwandan government, as Chapter 3 and five demonstrate, does at times respond to its citizenry. It has also attempted to learn from a variety of international policies, national political-economy models[76] and from their own experience[77]. As the thesis argues, the reason for adopting these new policy ideas is ideational, because politicians and civil servants believe in them, but also stems from materialist interests in fulfilling statebuilding missions and ensuring regime survival.

Moreover, whilst displaying a weaker instance of citizen responsiveness and more market-orientated economic policies, Tanzania differs most from Scott's model in its fragmentation of the ruling elite[78]. This characteristic is key to the regime's political settlement and has inhibited project implementation. This is demonstrated by its limited ability to coordinate infrastructure projects' official agreements, financing or contracting, particularly in the predictable manner desired by international firms tasked with constructing hydropower under President Kikwete. This conclusion

[71] Scott 1998; Scott 2006.
[72] Thomson 2013.
[73] Coulson 2013; Paget 2017a.
[74] Although this is changing under President Magufuli.
[75] Reyntjens 2013; Jones, Verhoeven, and Soares de Oliveira 2013; Thomson 2013.
[76] The latter especially explored by Behuria 2017.
[77] As demonstrated by Nyabarongo Dam.
[78] Kelsall 2013; Gray 2015.

rejects Scott's implicit treatment of states as essentially omnipotent and unreactive, calling for close attention to elites and the wielding of political power within states. Furthermore, both countries have vulnerabilities. They rely on significant donor money and want to keep reputations as reasonable destinations for international investment. In addition to this external pressure is the internal need to maintain support of the population. Rwanda's ruling elite are from a minority ethnicity and, arguably more significantly, come from an even smaller sub-section of that ethnicity, with roots in urban refugee camps in Uganda[79]. Additionally, Tanzania faces increasingly close elections with the opposition gaining strength[80]. Appearing to follow best policies, attempting to minimise grievances from infrastructure construction and achieve reasonably equitable development is thus strategically important for each regime[81].

Consequently, these countries do not completely fit Scott's[82] and other's[83] description of unyielding, invulnerable authoritarian governments in post-independence Africa[84]. Rather, both have certain economic and political vulnerabilities, are more responsive to the international community's policy norms, display some sensitivity to citizen concerns (albeit typically along feudalistic lines) and may be inhibited by elite-power fragmentation. Additionally, although limited in Rwanda and Tanzania, globally, civil society has been an active force challenging and influencing the practices of enabling actors. This is particularly notable in dam building where such actors contributed to the stagnation in dam building. Rather than Scott's prostrate civil society, this new global activism complicates the implementation of high modernism, pressuring financiers, international river-basin organisations and companies to adopt dam reforms regarding impact assessment, compensation and socio- ecological mitigation. This is not to overstate global civil society's influence, with numerous authoritarian regimes supressing international

[79] Jones 2014.
[80] Paget 2017a.
[81] Mann and Berry 2016; Dye 2016c.
[82] Scott 1998.
[83] Ferguson 1994; Crush 1995; Mitchell 2002.
[84] This also implies a different premise to Scott's underlying assumption of conflict between the state and subaltern people.

organisations and finance to NGOs[85]. However, their presence does underline a different descriptive formula from that proposed by Scott for cases of 20th century high modernism. A changed ideology exists with high modernist beliefs often joining in bricolage with dam reforms: Rather than a ruthless top-down implementor, more reactive and/or fragmented authoritarian states exist, and global civil society pressures (to varying success) many dam enablers. Whilst speaking to academics nuancing Scott's theory[86], this advances the literature by complicating simple labelling of the state as authoritarian. Rather it emphasises that high modernism requires a particular pyramidal constellation of power within illiberal regimes. It also asserts the significance of the international level, its civil society and enabling dam financiers and builders.

The Politics of High Modernist Bricolage in the Dam Resurgence

This descriptive formula, and its concept of high modernist bricolage significantly advances the literature on dams by presenting a new framework to understand the dam resurgence and its complexities. It signifies the new cast of actors engaged in the phenomenon, highlighting the changed prominence of corporations and governments from emerging power countries. Whilst cases like Sudan and its Merowe Dam present greater similarity to violent 20th century examples like Cahora Basa or High Aswan Dams, this thesis demonstrates increased adoption of reformist idea-practices. They appear in rhetoric espousing sustainable development and policies involving degrees of participation and specific localised benefits. Marking another change, the national governments studied here focus primarily on the generation of megawatts not dams' symbolic embodiment of modernising development. This can give the dam resurgence a new discursive and policy appearance. But rather than challenging decision making, the choice of projects and practices of implementation, this research demonstrates that such reforms tend to be instrumentalised as tick-boxes in implementation. Thus, although premised on contrary

[85] Notable global recent examples including Turkey, Russia, India and China.
[86] Bähre and Lecocq 2007; Schneider 2014.

ideas, incorporation of reforms has not fundamentally challenged high modernist binary assumptions, whether about modern against traditional livelihoods or the legitimacy of scientific knowledge against participation from below. Nor do the cases demonstrate changed assumptions about technology generating linear socio-economic progress, even if emphasis has shifted from dams to electricity. Moreover, despite financiers, planners and constructors asserting the need for participation from a dam's locale, these communities are treated as singular objects, not as socially, economically and geographically differentiated subjects.

The influential ideology rationalising dam building therefore differs from the past 20th century, but whilst some policy change can have positive implications for some households, this change disguises the persistence of high modernist idea-practices associated with important aspects of the past dam building era. Therefore, the thesis finds that, like many 20th century dams, downstream impacts are dismissed with a focus on discreet areas, not biophysical systems: The interactions between livelihoods and river ecologies remain largely overlooked. As argued here, reasons for these practices are not exclusively ideological or conscious. However, this analysis of high modernist concepts advances the dam-building literature by specifically describing and explaining a limited pattern of reform and demonstrating its meaning for processes of planning and implementation. Given the poor long-term socio- ecological record and questionable, geographically-unequal development legacy of many past-era dams[87], this finding of high-modernism is significant.

[87] Ansar et al. 2014.

Conclusion

High Modernism and Ideology

Beyond conclusions about the dam-building resurgence, this thesis makes three pertinent academic contributions. The first regards high modernism and its role in development and politics in Africa. By analysing ideology and by taking the ideas and policy initiatives of African elites seriously, the thesis makes a methodological contribution to the study of Africa's political economy which tends towards materialist explanations[1]. This research demonstrates the usefulness of ideology as a lens through which to explain and describe development and policy changes. Moreover, the thesis furthers Scott's seminal work by providing a more systematic conceptualisation of high modernism as an ideology. This involves understanding its constituent core and applied practices and its incorporation into other ideologies. It also advances theorisation of the governance conditions empowering or challenging high modernism's implementation: Going beyond a simple authoritarian label, this analysis focuses on the nature of power in a state and its practices of decision making. It also discusses enabling factors and challenges from a project's international actors. Moreover, proposing applied high modernist idea-practices related to justifying, planning and implementing dams allowed research to trace the ideology's presence, its bricolage with dam reforms and therefore changed, but persistent, presence in case studies. This is significant because past high modernist practices tended to produce projects that underperformed in the delivery of developmental benefits[2] whilst entailing socially unequal negative impacts on livelihoods and ecologies. The persistence or return of high modernist ideology evidenced here therefore has important implications for the efficacy and geographic and social equality of development.

[1] E.g. in van der Walle's (van der Walle 2016) analysis of the turn towards illiberal states.
[2] For instance, Akosombo's electricity generation has not met plans or promises (Adams 1992, 137).

The New Dam Building Regime and Role of the Emerging Powers

A further contribution relates to the new combination of actors planning and implementing dams. In Africa's dam resurgence, the key construction firms now predominantly originate in emerging-power countries and, supported by finance from their governments, these firms play a more important role in driving projects than in the past dam-building era. This is partly because of the rise of energy-sector models whereby generation is owned by the private sector. Alongside these increasingly important players, multilateral and donor agencies continue to support dams and the major Western engineering consultancies typically undertake design and construction-supervision roles. Despite specific differences between these multiple actors, the case studies exhibit a common pattern of justifications[3] and key practices[4]. This suggests a degree of commonality, at least among the companies and governmental ministries and agencies that design, assess and construct dams. This finding marks another of the thesis' key literature contributions as such commonality has echoes of the past dam building regime, analysed in Chapter 1. Historically, the Tennessee Valley Authority formed the inspirational model for dam building, with its idea of apolitical, technocratic river-basin bureaucracy spreading worldwide[5]. Rather than one globally-influential Western model, today's regime is more disparate. Actors in the case-study dams here referenced the World Commission on Dams, the World Bank's safeguards, HSAF and Ethiopia and Brazil's approaches. The link across today's dam-building regime appears more in a set of justifications, primarily based around 'green energy', and combination of reformist and high-modernist practices. This suggests the importance of the network of international forums and organisations like the International Hydropower Association

[3] Focusing on electricity, not multipurpose benefits.
[4] Including compensation for directly affected; limited benefit sharing; decision making in a *technician's realm;* exaggerated *pervasive appraisal optimism* (recognising effects but presuming their solvability). A similar pattern is reported amongst Chinese actors (Qui, Mang, and Bosshard 2018).
[5] Hoag 2013; Klingensmith 2007.

and International Commission on Large Dams that spread such ideas and policies amongst companies, financiers and governments.

However, the comparison between the World Bank's Rusumo Dam and Indian and Brazilian involvement in Nyabarongo and Stiegler's Gorge respectively, demonstrates differences within the loose dam-building regime. Research found less stringent engineering and socio-ecological protocols among Brazilian and Indian financiers and companies and this entailed less reformist ideas in dam planning and construction, not to mention the Angelique-Nyabarongo case's poor technical construction standards. This conclusion is important for debates on the emerging powers. It differs from Narlikar's Delhi Consensus of a more benign Indian integration in Africa[6]. Furthermore, whilst analysis sought to complicate the singularity of the emerging powers label, evidence here suggests that the increasing role of India and Brazil in Africa's development can lower standards as does tend to be different from 'traditional' multilateral institutions. This conclusion agrees with Motta and Matthews[7] and Chen and Laundry's[8] studies of World Bank and Chinese financed dams. Thus research here demonstrates that the governments and companies from the emerging powers have a significant role in enabling the breadth of the resurgence in dam building and particularly its inclusion of more controversial projects like Stiegler's Gorge Dam. This argument differs in emphasis from some of the literature reviewed in Chapter 2: Whilst India and Brazil are not engaged in a deliberate dam-building agenda in Africa, their government finance is different to that of many 'traditional' donors and multilateral development banks. Indian and Brazilian finance, along with companies from these countries, are more open to low socio- ecological standards. This hands power over project planning, mitigation and compensation to national governments in Africa; which frequently entails more limited, surface-level adoption of reformist planning and implementing processes given such states' high

[6] Narlikar 2010b.
[7] Motta and Matthews 2018.
[8] Chen and Landry 2018.

modernism and desire for maximum energy generation in the shortest time and at the lowest cost.

Back to the Future?: The Illiberal Modernisers and the Politics of Development

A final, significant contribution turns to the apparent rise across Africa of statebuilding projects by authoritarian governments with developmental ambitions. Grand visions of large-scale transformation, embodied by mega-infrastructure and implemented in top-down, expert-centric practices, are associated with late-colonial and early-independence governments in Africa and were the subject of Scott's[9] original work. The dam resurgence, and this research on Rwanda and Tanzania, demonstrate that such authoritarian, modernising projects have returned. A number of other countries, mentioned here in regard to the dam resurgence, also exemplify this trend, including Ethiopia, Angola and Sudan[10]. Finance and the companies of the emerging powers have enabled this trend, increasing the policy space for governments in Africa by providing a greater volume of support and increased diversity of (more open) state and corporate actors. In turn the 2000-2014 commodity boom was central to this trend, increasing the political possibilities for some of these modernising regimes. However, rather than asserting replication, research here and elsewhere[11] appreciates this trends' nuances. For one, these illiberal modernisers combine often brutal authoritarian control with an outward veneer of democracy, including elections, parliaments and opposition parties. Moreover, market-led economic policies, entrepreneurship support, independent 'good governance' institutions and New Public Management policies sit alongside economic interventionism in the broad mould of East Asian developmental states[12]. Indeed, for many of these illiberal regimes' ruling elites, such policies seem central to the present-

[9] Scott 1998.
[10] As identified by Jones, Verhoeven, and Soares de Oliveira 2013; Jones and Dye Forthcoming.
[11] Jones, Verhoeven, and Soares de Oliveira 2013; Jones and Dye Forthcoming.
[12] Using the term developed by Leftwich (1995) and work of Atul Kohli (2004).

day ideas of modernity which are infused with the language of McKinsey, the aesthetic of Dubai skyscrapers and visions of technological business hubs serving global corporations. Additionally this thesis has demonstrated cases of moulding reformist ideas with high modernism, demonstrating global policy engagement. Although these characteristics vary across this group of countries[13], and whilst stressing the importance of analysing differences between elites, and appreciating each countries' particular context and history, this study suggests a somewhat common pattern of illiberal, modernising ideology. Despite its apparent newness, this thesis' finding of underlying high modernism indicates that these illiberal development projects will continue a pattern of development with significant and unequal impacts on society, the environment and economy.

[13] Sudan, for instance, typifies a more brutal, high modernist authoritarianism.

Appendices

Appendix 1: List of Interviews

Elite Interviews

Rwanda

Organisation	Position		Name	Date
Ministry of Infrastructure (Mininfra)	Minister of Infrastructure (2012-2014)		Prof. Silas Lwakabamba	August, 2016
	Minister of Energy (2006-2009)		Dr Albert Butare	September, 2015
	Energy Unit	Deputy Project Manager Micro and Pico Hydropower	Mr. Benjamin Mategeko	August, 2016
		Energy Sector Secretariat Coordinator & Advisor to the Permanent Secretary	Mr. Tom Rwahama	August, 2016
		Energy Unit External Consultant	Mr. Carlo Polacco	April, 2014
		Energy Unit External Consultant	Mr. Gareth Walsh	April, 2013 April, 2014; August, 2016
		Energy Unit External Consultant	Mr. Jamie Stewart	August, 2016
Energy Utility Known as Electrogaz; Rwandan Energy Company (RECO); Electricity Water and Sanitation Authority (EWASA); The Rwanda Energy Group (REG)	CEO		Mr. Jean-Bosco Mugiraneza	August, 2016
	Energy Development Corporation Limited (EDCL)	Managing Director at EDCL	Mr. Donath Harerimana	August, 2016
		Head of Generation Planning	Mr. Yves Nshuti	September, 2015; August, 2016
		Project Manager for Nyabarongo	Mr. Anicet Nsengiyumva	April, 2013; April, 2014; September, 2015
		Head Generation Projects/ Implementation	Mr. Theoneste Higaniro	April, 2014; September, 2015; August, 2016
		Senior Mechanical Engineer	Mr. Turambe Twizere	September, 2015

		Consultant External Consultant	Mr. Ahmad Parsa	August, 2016
		Consultant External Consultant	Mr. Julien Jomaux	August, 2016
		Hydropower Manager	Mr. Louis Murego	April, 2013; April, 2014
Ministry of Foreign Affairs (Minaffet)	Rwanda High Commission India		First Counsellor Joseph Kabakeza	March, 2016
	Rwanda High Commission UK		Mr. David Ruvubi	November, 2016
Ministry of Finance and Economic Planning (Minecofin)	Director of Capital Markets and Investment Schemes		Anonymous	September, 2015; August, 2016
	Energy Specialist		Mr. Eugene Karangwa	September, 2015
Ministry of Environment and Natural Resources	Head of Water Resources Management Department		Mr. Francois Xavier Tetero	August, 2016
Rwanda Environmental Management Authority	Director of Environmental Regulation and Pollution Control		Mr. Remy Duhuze	August, 2016
	Environmental Inspection Officer		Mr. Israel Dufantanyf	August, 2016
Rwanda Development Board (RDB)	Senior Transaction Advisor Strategic Investment Department		Mr. Shilesh Muralidhara	April, 2013; April, 2014
	Transaction Advisor Strategic Investment Department		Mr. Imad Ahmed	August, 2016
	Energy Specialist Investment Promotion and Implementation Department		Mr. Yves Tuyishime	September, 2015; August, 2016
	Environmental Impact Assessment Division		Anonymous	September, 2015
Office of the Ombudsmen	The Ombudsmen (Also a Rwandan Senator)		Senator Tito Rutaremara	August, 2016
Bank of Rwandan Development (BRD)	Investment Analyst (Energy)		Mr. Peter Rutayisire	August, 2016
RSW. Inc	Nyabarongo Managers		Mr. John Lee Pattinson	April, 2013; April, 2014
			Mr Jean Bosco	April, 2013
			Anonymous	April, 2014
Rwanda Investment Group	Executive Director		Dr. Ivan Twagirashema	August, 2016

Energy Investor	CEO	Anonymous	August, 2016
East African Power	CEO	Mr. Dan Klinck	August, 2016
	Engineer	Anonymous	June 2016
Hobuka Ltd	CEO (Previously of Ngali Energy et. al.)	Mr. Ntare Karitanyi	August, 2016
University of Rwanda	Centre Institute for Science and Technology: School of Engineering	Dr. Zimulinda Francois	September, 2015
		Dr. Senthil G. Kumaran	September, 2015
		Dr. Mbereyaho Leopold	August, 2016
	Faculty of Economics and Management	Dr. Jonas Barayandema	April, 2014
Consultancy	Africa Energy Services Group	Mr. Antoine Rugari Joyeux	September, 2015
USAID	Power Africa	Ms. Jeannetta Craigwell-Graham	August, 2016
	-	Anonymous	
EU Delegation	Energy Portfolio Manager	Mr. Massimiliano Pedretti	August, 2016
Japanese International Cooperation Agency (JICA)	Programme Officer, Economic Infrastructure Sector	Mr. Placide Nkunzenimana	August, 2016
Department for International Development, UK	Kigali Office	Mr. Sam Waldock	August, 2016
		Mr. Kenny Osbourne	August, 2016
GIZ (Energising Development Rwanda)	Senior Engineer	Mr. Stany Nizeyimana	August, 2016
United Nations Development Program	Poverty Reduction and Environment	Ms. Sophie Nyirabakwiye	August, 2016
World Vision	National Director	Mr. George Gitau	April 2013

Rusumo Dam Planners

Organisation	Position		Name	Date
NELSAP	Former Regional Coordinator		Dr. Antoine Sendama	August, 2016
	Regional Coordinator		Eng. Elicad Elly Nyabeeya	September, 2015
	Water Resources Engineer		Mr. Arsene Mukubwa	August, 2016
	Programme Officer		Mr. Maro Andy Tola	September, 2015
	Rusumo Implementation Unit	Communication Officer	Mr. William Katete	September, 2015
		Project Manager	Mr. John Lee Pattinson	September, 2015; August, 2016
		Project Coordinator and Social Lead	Mr. Anecto Kayitare	October, 2017
	Rusumo Power Company Ltd	Managing Director	Eng. Joackim Joseph	August, 2016
African Development Bank	Principal Power Engineer		Mr. Richard Humphrey Ndwiga	September, 2015; August, 2016

World Bank

Organisation	Position	Name	Date
World Bank Head Office	Senior Hydropower Specialist	Mr Pravin Karki	August, 2017
	Senior Hydropower Specialist	Dr. Rikard Lidén	August, 2017
	Lead Safeguards for Hydropower	Ms. Alexandra Bezeredi	August, 2017
	Environmental Safeguards	Mr Edward Felix Dwumfour	August, 2017
	Lead Economist for Africa Region	Dr. Richard Damania	August, 2017
	Senior Social Development Specialist	Mr Vincent Roquet	August, 2017
	Rusumo Manager	Ms. Yadviga Semikolenova	September, 2015; August, 2017
Rwanda Field Office	Energy Specialist	Ms. Norah Kipwola	September, 2015; August, 2017
	Operations Officer	Mr Peter Isabirye	April, 2014
	Communications Officer	Mr Rogers Kayihura	April, 2014
Tanzania Field Office	Energy Specialist	Ms. Nataliya Kulichenko	November, 2015

Tanzania

Organisation	Position		Name	Date
Ministry of Water	Asst. Director Transboundary Water Resources Management		Mr Sylvester A. Matemu	June, 2015; November, 2015; July, 2016
	Former Permanent Secretary and Chairman of Water Council		Mr Christopher Sayi	June, 2015; November, 2015; July, 2016
Ministry of Foreign Affairs	Embassy of the United Republic of Tanzania	Diplomat	Nathaniel Daniel Kaaya	May, 2016
		First Secretary	Frank John Minha	May, 2016
Ministry of Energy and Mines	Minister 2007-2012		Mr William Ngeleja	September, 2016
	Ministerial Delivery Unit		Eng. Dominic Mosha	July, 2016
	Energy Division	Deputy Commissioner	Eng. Leonard Masanja	July, 2016
		Principal Energy Engineer	Eng. Juma Mkobya	July, 2016
		Deputy Commissioner Renewable Energy	Eng. Edward L. Ishengoma	July, 2016
		Energy Engineer	Mr Erick Rugabera	July, 2016
		Energy Engineer	Mr Mhina Kiondo	July, 2016
Rural Energy Agency (REA)	Anonymous			July, 2016
Tanesco	Managing Director		Eng. Felchemi Mramba	December, 2015
	Deputy Managing Director - Generation		Eng. Nazir Kachwamba	November, 2015
	Manager Investments		Eng. Rwabangi Luteganya	July, 2016; September 2016
	Senior Manager Strategic Planning		Eng. John I. Kabadi	July, 2016; September 2016
	Investments-Strategic Planning Official		Eng. Frank Halinga	July, 2016
	Investments-Strategic Planning Official		Eng. Kalenga	July, 2016
	Investments-Power Sector Master Plan Official		Eng. Abdallah Chikongo	July, 2016
Tanzania Petroleum Development Corporation (TPDC)	Head of Exploration		Ms. Venosa Ngowi	November, 2015
Vice President's Office	Environment Division		Mr Ladislaus Kyaruzi	July, 2016

National Environmental Management Council (NEMC)	Director of Environmental Impact Assessment	Dr. Fadhila Hemed	July, 2016
	Official EIA Division	Ms. Gloria Kombe	July, 2016
University of Dar es Salaam	Professor and Former Rubada Chairman	Prof Raphael Mwalyosi	November, 2015
	Professor and Energy Sector Consultant	Prof Nelson Lujara	November, 2015
	Department of Economics	Prof Alfonso Mascheranus	July, 2016
	Department of Politics	Dr. Ally Bashiru	July, 2016
	Department and Former Tanesco Board Member	Dr. Haji Semboja	July, 2016
Clyde & Co Tanzania	Senior Associate	Ms. Amalia Lui	July, 2016
	Associate	Ms. Kankiza Tibaijuka	July, 2016
RUBADA	Director General	Dr. Deogratias Lwezaura	December, 2015
	Senior Planning & investment Officer	Mr. Emmanuel Maziku	December, 2015
	Civil Engineer	Eng. Wenceslas Lambileki	November, 2015; July, 2016
President's Delivery Bureau	Energy Sector Manager	Mr. Kenneth Mutaonga	July, 2016
World Wildlife Fund	Selous Campaign Manager	Mr. Anthony Field	October, 2016
World Heritage Consultant	Author of Selous' Status Reports	Mr. Guy Debonnet	July, 2016
Essential Destinations	Chief Ecologist	Mr. Malcolm Ryen	July, September 2016
German Embassy	Natural Resources	Ms. Lena Thiede	September 2016
Japanese International Cooperation Agency (JICA)	Senior Representative	Mr. Amatsu Kuniaki,	July, 2016
Norwegian Agency for Development Cooperation (NORAD)	Energy Counsellor	Ms. Katrine Vestbøstad,	December 2015; July, 2016
United States Agency for International Development (USAID)	Energy Projects Development Specialist	Mr. Rogness Swai	November 2015; July, 2016
Swedish International Development Agency (SIDA)	Programme Officer for Energy	Mr. Stephen Mwakifwamba	July, 2016
	Senior Programme Manager: Energy	Mr. Jorgen Eriksson	July, 2016

Germany Development Cooperation Agency (GIZ)	Team Leader Renewable Energies	Mr. Henning Vogel	September, 2016
German Development Bank (KfW)	Energy and Conservation Programme Officer	Ms. Viviana Klein	November 2015; July, 2016
Department for International Development, UK (DFID)	Deputy Team Leader, Sustainable Energy Team	Mr. Tim Bushell	July, 2016
United Nations Development Program (UNDP)	Head of Development Partners Group Secretariat	Mr. Christian Shingiro	November 2015; July, 2016
Secretary of Energy Group	Co-ordinator Secretariat Tanzania Energy Development Partners Group	Mr. Erneus Kaijage	September, 2016
African Development Bank (AfDB)	Chief Power Engineer	Mr. Ram Babu	November, 2015
BG Gas Group	Tanzania Office	Mr. John Wijnberg	December, 2015
		Mr. Samson Kiware	November, 2015
		Mr. James Hunkin	December, 2015
International Energy Investment Company	Tanzania Investments Manager	Anonymous	December, 2015
University of Glasgow	Cartographer and researcher on the Selous	Dr. Mike Shand	April, 2015
Selous Game Reserve	A Guide		September, 2016
	A Driver		September, 2016
	Two Hotel Managers		September, 2016

Brazil

Organisation	Position		Name	Date
Ministry of Mines and Energy	Department of Energy Development	Director	Mr. Gilberto Hollauer	April, 2016
Itamaraty (Ministry of External Relations	Former Minister (1993-1994; 2003-2010)		Ambassador Celso Luiz Nunes Amorim	May, 2016
	Diplomat (Formerly Angolan Embassy)		Mr. Daniel Leitao	April, 2016
	(Vice-Minister) Undersecretary-General for Economic and Financial Affairs		Ambassador Carlos Márcio Cozendey	April, 2016
	Technical Advisor		Mr. Daniel Costa Figueiredo	April, 2016
	Department of Trade and Investment Promotion	Third Secretary, Investment Division	Mr. Andre Colins Campeneli	April, 2016
		Head of the Trade Promotion Programs Division	Counsellor Glaúcio José Nogueira Veloso	April, 2016
		Head of the Trade Promotion Operations Division	Counsellor Jean Marcel	April, 2016
	New and Renewable Energy Resources	Head of the Division	Mr. Renato Domith Godinho	April, 2016
	Tanzanian Embassy	Counsellor and Charge d'affaires	Mr. Marcelo Grim	April, 2016
		Ambassador 2015-	Ambassador Carlos Alfonso Iglesias Puente	July, 2016
		Ambassador 2009-2015	Ambassador Francisco Carlos Soares Luz	May, 2016
	Development Agency (ABC) Officer		Anonymous	May, 2016
	Head of Africa Division (1999-2004) and Ambassador to Ghana		Ambassador Irene Vida Gala	April, 2016
	Africa Division		Mr. Jackson Luiz Lima Oliveira	April, 2016
Ministry of Industrial Development and Trade	Foreign Trade Chamber	Foreign Trade Analyst	Mr. Natasha Martins do Valle Miranda	April, 2016

			Mr. Henrique Martins Sachetim	April, 2016
			Mr. Luiz Felipe Gondin Ramos	April, 2016
Apex (Brazilian Trade and Investment Promotion Agency)	International Business Analyst		Mr. João Ulisses Rabelo Pimenta	April, 2016
			Mr. Thiago Pessoa Gusman	April, 2016
	Internationalisation Unit	Manager	Mr. Hanna Tatarchenko	April, 2016
Ministry of Planning, Budget and Management	Secretariat of International Affairs	Advisor	Mr. Jose Nelson Bessa Maia	April, 2016
		Deputy Secretary	Mr. Flávio Augusto Corrêa Basílio	April, 2016
		Coordinator of the International Relations	Mr. Rafael Ranieri	April, 2016
FINAME	Formerly of President of FINAME (2004-2007), Executive Secretary Ministry of Science and Technology (2007 to 2011) and Executive Secretary Ministry of Sports from (2012 to 2015)		Professor Luis Manuel Rebelo Fernandes	May, 2016
Brazilian Bank for Economic and Social Development (BNDES)	International Division	Head of Africa Department	Mr. Paulo Roberto de Oliveira Araujo	May, 2016
		Economist	Mr. Marcelo Trindade Miterhof	May, 2016
		Analyst for Africa, China and India	Mr. Alexandre de Souza Ramos	May, 2016
	Infrastructure Division	Deputy Managing Director	Mr. Luciene Ferreira Monteiro Machado	May, 2016
	Export Credit Division	Manager	Mr. Arnaldo Antunes Maciel Leal Medeiros	May, 2016
		Manager and Transaction Support in Africa	Mr. Augusto Cesar Arenaro e Mello Dias	May, 2016

		Head of Department	Mr. Henrique de Azevedo Avila	May, 2016
Electrobras	Business Department	-	Mr. Paulo Roberto Freitas Fonseca	May, 2016
		Manager	Mr. Marcos Barbosa de Oliveira	May, 2016
Queiroz Galvão	Manager		Anonymous	November, 2015; July, 2016; September, 2016
Odebrecht	Business Development		Mr. Tito de Morais Serra	July, 2016; September, 2016
	Head of Government Affairs and External Relations; Director for Africa, UAE, and Portugal		Mr. Antonio Poncioni Merian	
	Previous Corporate Social Responsibility Officer		Anonymous	April, 2016
CNI	Foreign Trade Unit	Executive Manager	Mr. Diego Bonomo	April, 2016
	International Negotiations Specialist	Policy and Industry Specialist	Mr. Fabrizio Sardelli Panzini	April, 2016
FGV	Associate Professor and Centre for International Relations	Associate Professor	Dr. Matias Spektor	April, 2016
	Law School and Brazilian Centre for Analysis and Research		Professor Michelle Ratton Sanchez Badin	April, 2016
University of São Paulo	Institute of International Relations		Professor Alexander Moreli	April, 2016
			Dr. Vinicius Rodrigues Vieira	April, 2016
	Institute of Brazilian Studies	Professor of Economic History and International Economics	Professor Alexandre de Freitas Barbosa	April, 2016
		Doctoral Student	Mr. Henrique Gerken Brasil	April, 2016
BRICS Policy Centre	Researcher		Mr. Geovana Zoccal Gomes	April, 2016

IPEA	Senior Research Fellow		Dr. André de Mello e Souza	April, 2016
	Director of International Relations		Dr. Mathias de Alencastro	April, 2016
Federal Rural University of Rio de Janeiro	Department of History and International Relations		Professor Pedro Campos	May, 2016
Consultant and Former World Bank Employee			Dr. Ricardo Gazel	April, 2016
Consultant and Researcher			Mr. Altair Maia	April, 2016
International Rivers	Amazon Program Director		Mr. Brent Millikan	April, 2016
Independent Journalist			Ms. Natalia Viana	May, 2016
Journalist, Author and Researcher			Ms. Amanda Rossi	April, 2016
Conectas	Development and Socioenvironmental Rights	Coordinator	Mr. Caio Borges	May, 2016
Folha de S. Paulo	Politics Editor		Mr. Fábio Zanini	April, 2016

India

Organisation	Position		Name	Date
Ministry of External Affairs (MEA)	Development Partners Association	Director (International & Special Projects)	Ms. Mukta Shekhar	March, 2016
		Under Secretary to the Government of India	Mr. Sudhir K. Kharb	March, 2016
	Former Foreign Secretary (2004-2006)		Ambassador Shyam Saran	March, 2016
Confederation of Indian Industry (CIA)	International Department	Director - Africa	Mr. EB Rajesh	March, 2016
		Deputy Director -Africa, Gulf and Middle East	Mr. Aditya Ghosh	March, 2016
		Head International Policy and Trade	Mr. Pranav Kumar	March, 2016
	Former Head of Research		Dr. Omkar Goswami	March, 2016
(ExIm) Export-Import Bank of India	Chief Manager		Mr. Rahul Mazumdar	March, 2016
	Deputy Director		Mr. David Rasquinha	April, 2016
Federation of Indian Chambers of Commerce & Industry (FICCI)	International Division	Assistant Secretary General	Ms. Sheila Sudhakaran	March, 2016
Centre for Policy Research Institute	Indian Development Cooperation Research Project		Mr Kashyap Arora	March, 2016
	Senior Visiting Fellow		Ms. Rani Mullen	March, 2016
Institute for Defence Studies and Analyses	Research Fellow		Mr. Uttam Kumar Sinha	March, 2016
	Senior Research Associate and Coordinator, Africa, Latin America, Caribbean		Ms. Ruchita Beri	March, 2016
Oversees Infrastructure Alliance	Former chairman (also former ambassador)		Ambassador Dr V. B. Soni	April, 2016
National Institute of Public Finance and Policy	Director		Dr Rathin Roy	March, 2016
Observer Researcher Foundation	Associate Fellow		Ms. Malancha Chakrabarty	March, 2016
	President		Mr. Samir Saran	March, 2016
	Researcher		Ms. Urvashi Rathore	March, 2016
Indian Council of World Affairs	Research Fellow		Dr. Nivedita Ray	March, 2016

The Energy and Resources Institute (TERI)	Water Resources and Forestry Division	Distinguished Fellow and Director	Dr. Syamal Kumar Sarkar	March, 2016
		Associate Director	Mr Anshuman	March, 2016
Indian Council for Research on International Relations (ICRIER)	Senior Fellow		Professor Rajeev Anantaram	March, 2016
	Senior Fellow		Dr. Saon Ray	March, 2016
Research and Information Systems for Developing Countries (RIS)	Director- General		Professor Sachin Chaturvedi	March, 2016
Journalist	Indian Express	National Affairs Editor	P Vaidyanathan Iyer	March, 2016
	The Hindu		Suhasini Haider	April, 2016
University of Delhi	Institute of Economic Growth		Professor Amita Baviskar	April, 2016
Jawaharlal Nehru University	Centre for Africa Studies		Professor Ajay Kumar Dubey	March, 2016
	Department of Politics and International Relations		SCR Murthy	March, 2016
Centre for Development Impact and	(Also Prominent Researcher and Policy Advisor)		Professor Shekhar Singh	April, 2016
South Asia Network on Dams, Rivers and People	Founder and Head		Himanshu Thakkar	March, 2016
Wildlife Trust of India	Executive Director		Vivek Menon	March, 2016
Public Intellectual			Dr. Dilip Simeon	April, 2016
Uni of Mumbai	Centre for African Studies	Senior Lecturer	Renu Modi	
Bharat Heavy Electricals Ltd. (BHEL)	International Operations Division	General Manager	Mr. P.P. Yadav	April, 2016
	Mergers & Acquisitions; Partnerships & Alliances	Executive Director	Mr Akhil Joshi	April, 2016
	Industrial Systems & Products	Director	Mr Amitach Mathur	April, 2016
		Deputy Manager	Dr Aniruddha	April, 2016
	Nyabarongo Project Manager		Anonymous	April, 2014
Angelique International Limited	Project Director		Mr G P Singh	March, 2016
	Chief Financial Officer and Senior Vice President		Pankaj Goyal	March, 2016

Others

Organisation	Position	Name	Date
International Rivers	Policy Director	Mr. Joshua Klemm	August, 2017
	Africa Director	Ms. Rudo Sanyanga	June, 2016
International Hydropower Association	Senior Hydropower Analyst	Mr. Mathis Rogner	March, 2016
World Heritage Committee Panel	IUCN World Commission on Protected Areas Vice Chair for World-Heritage	Mr. Cyril F. Kormos	February, 2016
	World Heritage Conservation Officer	Mr. Remco Van Merm	February, 2016

Interviews in the Dam Locales

Nyabarongo (Conducted in May, 2014)

Village A		**Village B**		**Village C**	
Name	Main Participant(s)	Name	Main Participant(s)	Name	Main Participant(s)
1A	Female Shopkeeper who Received compensation	1B	Female Shopkeeper	1C	Male Received compensation
2A	Male Shopkeeper	2B	Male work on the dam	2C	Male occasional construction worker
3A	Male Shopkeeper	3B	Female	3C	Male with learning disabilities
4A	Female Shopkeeper	4B	Elder Female	4C	Two Females. One received compensation
5A	Male Bar owner who Received Compensation	5B	Male and Female who received compensation	5C	Young Male. Employed on the dam
6A	Female Butcher	6B	Elder Male	6C	Female
7A	Male and Female bar owners	7B	Female Bar owner	7C	Elder Male
8A	Male recently moved to village. Employed on the dam	8B	Elder Male	8C	Male and Female
9A	Male recently moved to village. Employed on the dam	9B	Female	9C	Male employed on dam
10A	Male and Female recently moved	10B	Male employed on the dam. Rents new land	10C	Female Received compensation
11A	Male and Female recently moved. Employed on the dam	11B	Male Received some compensation	11C	Elder Female
12A	Male Shopkeeper. Employed on the dam	12B	Male	12C	Female
13A	Female.	13B	Female	13C	Two Females
14A	Elder Male and Female. Received Compensation.	14B	Male employed on the dam	14C	Male
15A	Elder Male moving into village	15B	Female who received compensation		
16A	Elder Female recently moved	16B	Male rents new government land		
17A	Female Orphan				
18A	Elder Female recently moved				
19A	Female				
20A	Female and Male who received compensation				

Rusumo (Conducted in September 2015 and 2016)

Rwanda Side	Main Participant	Tanzania Side	Main Participant
1Rw	Group including fishermen, shopkeepers and those compensated	1Tz	Male business man
2Rw	Household engaged in border trade	2Tz	Women, bar manager
3Rw	Women business owner	3Tz	Male shopkeeper
4Rw	Women landless	4Tz	Women shopkeepers
5Rw	Women, household renting farmland	5Tz	Male fisherman and brickmaker
6Rw	Women land-poor	6Tz	Women, shopkeeper
7Rw	Household, used marshland	7Tz	Women, compensated
8Rw	Male farmer, missed compensation	8Tz	Two women
9Rw	Male farmer, renter	9Tz	Male farmer
10Rw	Male farmer, compensated	10Tz	Group, farmers, traders
11Rw	Farmer, missed compensation	11Tz	Women and man compensated
12Rw	Household, received compensation	12Tz	Male fishermen and brickmakers
13Rw	Farmers, Fishermen Compensated and Uncompensated	13Tz	Male fishermen and brickmakers
14Rw	Upstream Uncompensated Renters	14Tz	Compensated household
15Rw	Border Smugglers	15Tz	Two women farmers missed compensation
		16Tz	Compensated
		17Tz	Local government official
		18Tz	Group of compensated males
		19Tz	Land owner upstream
		20Tz	Household missed compensation
		21Tz	Household missed compensation
		22Tz	Compensated household
		23Tz	Two women farmers
		24Tz	Women, household engaged in border trade
		25Tz	Women, former village representative
		26Tz	Compensated Male
		27Tz	Compensated Male
		28Tz	Female Kabuye
		29Tz	Large group Kabuye
		30Tz	Two households Kabuye
		31Tz	Household Kabuye
		32Tz	Large group Kabuye
		33Tz	Male, received compensated
		34Tz	Women, missed compensation
		35Tz	Women, compensated
		36Tz	Local government official
		37Tz	Male, compensated

Appendix 2: World Bank Policies signalling gradual return to dam-funding

Year	World Bank Action	Comment
2003	Water Resources Strategy	Sees Water as an exploitable resource for national development
2007	Clean Energy for Development	Argues for the necessity of renewable power. Cited in justification for Rusumo Falls (Chapter 6 case-study)
2009	Directions in Hydropower	Clearly addresses the Bank's policy to increase dam-finance
2012	Bank President Robert Zoellick convenes Hydropower Taskforce.	In order to re-engage on a sustainable basis with hydropower
2013	"Toward a sustainable energy future for all: Direction for the World Bank Group's Energy sector"	World Bank's policy document firmly supports dams as an energy solution

Appendix 3: Table of Constructed Electricity-Generation Plants in Rwanda's Megawatt Mission

Date	**Total Generation Capacity (MW)**	**Power Plant Constructed**	
		Generation Technology	Plants
2003	39.95	Existing Capacity	
2004	47.75	Petroleum Thermal	Jabana I (7.8MW
2005	57.75	Petroleum Thermal	Rented Aggreko I (10MW)
2006	62.75	Petroleum Thermal	Rented Aggreko II (5MW)
2007	63.1	Solar	Kigali Jali Solar (0.25MW)
		Hydropower	Nyamyotsi I (0.1MW)
2008	67.3	Methane	KP1 Methane Plant
2009	82.5	Petroleum Thermal	*(End of Rented Aggreko II*): Jabana II (20MW)
		Hydropower	Mutobo (0.2MW)
2010	91.9	Hydropower	Agatobwe (0.2MW) Rukarara I (9MW) Murunda (0.1MW)
2011	97.52	Hydropower	Nyamyotsi II (0.2MW) Rushaki (0.04MW) Keya (2.2MW) Nkora (0.68MW) Kimbili (0.3MW) Rugezi (2.2MW)
2012	108.82	Petroleum Thermal	Kigali Special Economic Zone Thermal (10MW)
		Hydropower	Nyabahanga (0.2MW) Janja (0.2MW) Nshili (0.4MW) Mazimeru (0.5MW)
2013	112.42	Hydropower	Gashashi (0.2MW) Nyirabuhombohombo (0.5MW) Mukungwa II (2.5MW) Musarara (0.4MW)
2014	146.62	Hydropower	Nyabarongo (28MW) Rukarara II (2.2MW) Giciye I (4MW)
2015	159.12	Solar	Gigawatt Global Solar (8.5MW)
		Petroleum Thermal	SES CIMERWA (Cement Plant) (10MW)
2016	189.12	Methane	KivuWatt (26MW)
		Hydropower	Giciye II (4MW)
2017	204.12	Peat	Gishoma (15MW)
2020* (Estimate)	527.966	Hydropower	Under Construction (16MW) Under Development (23.246MW) Rusumo (26.6MW)
		Methane	Symbion (50MW) KivuWatt (74MW)
		Peat	Hakan (80MW)
		Solar	(10MW)
		Petroleum Thermal	(50MW)

Appendix 4: Table of Constructed Electricity-Generation Plants in Tanzania

Date (* Predicted)	Total Generation Capacity (MW)	Power Plant Constructed	
		Generation Technology	Plants (Government Owned Unless Stated)
1964	21	Hydropower	Hale 21MW
1968	8	Hydropower	Nyumba Ya Mungu
1975 + 1980	204	Hydropower	Kidatu
1980	7	Petroleum Thermal	Zuzu Diesel
1988	82.7	Hydropower	Mtera (80MW)
		Hydropower	TANWAT (2.7MW)
1991	0.843	Hydropower	Uwemba
1995	68	Hydropower	New Pangani Falls
1999	180	Hydropower	Kihansi Dam
2002	103	Petroleum Thermal	Tegeta ITPL (IPP)
2004	47.75	Petroleum Thermal	Songas I (IPP)
2005	57.75	Petroleum Thermal	Songas II (IPP)
2006	62.75	Petroleum Thermal	Songas III (IPP)
	40	Petroleum Thermal	Aggreko (IPP)
2007	20	Petroleum Thermal	APR Energy (IPP)
2009	-60	Petroleum Thermal	Aggreko and APR
	102	Gas Thermal	Ubungo I
	45	Gas Thermal	Tegeta Gas
2011	112	Petroleum and then Gas Thermal	Symbion Dar (formerly Richmond) (IPP)
	55	Petroleum Thermal	Symbion Dodoma (IPP)
	17	Biomass	TPC
	100	Petroleum Thermal	Aggreko
2012	105	Gas Thermal	Ubungo II
	55	Petroleum Thermal	Symbion Arusha (IPP)
	4	Hydropower	Mwenga (IPP)
2013	63	Petroleum Thermal	Nyakato
2014	-160	Petroleum Thermal	- Symbion and Aggreko
	0.46	Hydropower	Mbangamao (IPP)
2015	0.96	Hydropower	Darakuta (IPP)
	5	Hydropower	Tulila (IPP)
	0.6	Hydropower	Ikondo (IPP)
	150	Gas Thermal	Kinyerezi I
2016	-50	Petroleum Thermal	Aggreko
	0.95	Hydropower	Yovi (IPP)
2018	240	Gas Thermal	Kinyerezi II
2019*	-20	Petroleum Thermal	Zuzu
	20	Hydropower	Mapembasi (IPP) & East African Power (IPP)

	185	Gas Thermal	Kinyerezi Extension
	125	Wind	Singida Wind (IPP)
2025*	758.7	Hydropower	Kakono (87MW), Malagarasi III (44.7MW), Rumakali (222MW), Ruhudji (358MW) & Lower Kihansi (Expansion) Dams (47MW)
	1268	Gas Thermal	Kinyerezi III (600), Somanga Fungu (320MW), Mtwara (18MW) & Kinyerezi IV (330MW)
	100	Wind	Njombe Wind (100MW)
	50	Solar	Dodoma Solar (50MW)
2030*	3912	Hydropower	Stiegler's Gorge (2100MW), Mnyera (668.2MW), Kikongo (300MW), Mpanga (160MW), Songwe (336.8MW) & Upper Kihansi (Expansion) Dams (47MW)
	1040	Gas Thermal	Somanga (240MW), Somanga (300MW), Bagamoyo (200MW) & Mtwara (300MW)
	2200	Coal Thermal	Mchuchuma I-IV (600MW), Kiwira I (200MW), Kiwira II (300MW), Ngaka I (200MW), Ngaka II (300MW) & Rukwa (300MW)
	200	Wind	Singida Wind
	150	Solar	Simiyu Solar

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