## Chapter 12: Adaptation policy and planning in developing countries

Chase A. Sova[1] and E. Lisa F. Schipper[2]

1. World Food Program USA, csova@wfpusa.org
2. Environmental Change Institute, University of Oxford, lisa.schipper@ouce.ox.ac.uk

Author bios:

Chase A. Sova is the Director of Public Policy and Research at the World Food Program USA in Washington, D.C. He has professional experience in the areas of climate change and agricultural development with the United Nations Food and Agriculture Organization, International Centre for Tropical Agriculture and the CGIAR Research Programme on Climate Change, Agriculture and Food Security. Focused on agriculture policy, Chase has worked in 15 developing countries across Latin America, Sub-Saharan Africa and South Asia. Chase holds a DPhil from Oxford University.

E. Lisa F. Schipper is a Research Fellow with the Environmental Change Institute, Oxford University, and associated with the Overseas Development Institute and Stockholm Environment Institute Asia Centre. Lisa's research focuses on adaptation to climate change and disaster risk reduction in developing countries. Her interest is on community-level adaptation and examining the socio-cultural drivers of vulnerability to climate change and natural hazards. Lisa was a Lead Author in the IPCC AR5 and SREX reports, is currently a Contributing Author to the Special Report on 1.5C, and is a founding Associate Editor of the scholarly journal *Climate and Development*.

### Abstract

Developing countries are in urgent need of adaptation planning due to their high vulnerability to climate change. In order to be effective in developing countries, adaptation must take place in conjunction with multiple, rapidly occurring processes of change. This includes existing development deficits, the changing landscape of development funding, and broader forces of globalisation. This chapter seeks to outline what makes adaptation policy development and implementation unique in developing countries, explores the international policy instruments established in support of developing countries, and highlights examples of successful policy implementation in developing country settings. In doing so, the chapter addresses the constraints and opportunities for adaptation in developing countries including socio-economic, political, and physical geography considerations.

### 17.1 Introduction

As a result of global consensus that climate change is a high political priority, adapting to the changes no longer needs justification, but it still requires explanation. Many developing countries grapple with the question of how to adapt because they are unsure exactly what adaptation means: does it mean relocating entire communities living along riverbanks in coastal zones or on hill slopes or mountains? Does it imply building sea walls as protection

from sea-level rise and storm surges? Does it mean restructuring national institutions, policies, and regulations on disaster risk reduction? In short, adaptation has been slow to transition from theory to practice in developing countries because many questions around scale, time frame and other aspects have not been addressed adequately (Schipper et al, 2012). Each approach has financial, social, environmental, and political implications and, with limited capacity and resources, everything cannot be done at once. Developing countries face serious questions as to how to best prioritise these interventions in the context of severe developmental deficiencies and fast changing economies.

Adaptation is both a spontaneous, autonomous process of adjustment to changing conditions utilising existing capacities (so-called 'adaptive capacity') as well as something that can be planned. Adaptation policies, plans, and projects help to purposefully facilitate the move towards adaptation on all levels, from local to regional. But adaptation planning and policy-making is not as straightforward as simply integrating climate change into other planning processes, especially in developing countries where planning is often not centralised, regulated or formal. The inherent uncertainty of climate change impacts combined with high levels of poverty and development deficits, sometimes volatile political landscape, and an ever-changing global political economy, means that adaptation planning has to take multiple uncertain factors into account simultaneously (Arnall et al. 2013; Eriksen et al. 2015; Tanner and Allouche 2011). This chapter looks at how developing countries, including middle-income and least-developed countries, approach adaptation policy and planning.

## 17.2 Developing Countries

For as long as the contemporary notion of the nation state has existed, the world has long been divided between developed and underdeveloped countries. Accompanying their development in to the 19th century and into today, developed countries have played a disproportionally large role in emitting greenhouse gases in to the atmosphere, contributing to the warming of our planet and the changing of our climate systems. It is this historical fact that underpins our modern international institutions established to combat climate change.

While the global debate on climate change has historically recognised this outsized carbon footprint of developed nations and has built in measures to ensure global equitability in the response to climate change, emerging economies today are growing in population and—owing to changing diets and fast economic growth, especially in China—in their own emissions. Collectively, developing countries today are responsible for over 60 percent of global greenhouse gas emissions. China alone is host to a population of 1.4 billion people and produces approximately 20% of global emissions (WRI 2014). Developing countries have thus become major players—both in aggregate emissions and as a negotiating coalition—on the international climate change stage.

Sometimes referred to as the Global South or 'third' world[1], the term 'developing country' is a loosely defined classification representing a wide range of non-industrialised economies, ranging from least developed countries (LDCs) to heavily indebted poor countries (HIPCs), and so-called 'middle income' nations. The term has, in some instances, even been extended to those termed 'BRIIC' countries (Brazil, Russia, India, Indonesia and China). These different categories are important in the context of climate change adaptation, not only to signal generally where global investments are most urgently needed, but as an institutional and legal designation from the international community that offers privileged access to adaptation resources through international policy and financing mechanisms.

*What makes developing countries unique?*

Before entering in to a deeper discussion around adaptation planning in developing countries, it is worth asking what is unique about developing countries relative to developed nations. While there is inevitably some overlap between adaptation policy in developed and developing countries, there are several structural features of developing countries that render the adaptation planning and implementation process unique. Least developed countries tend to be concentrated in geographic areas with high exposure to natural hazards and climate change impacts, are heavily dependent on agricultural and natural resource-based economies, and experience extreme poverty and an associated reliance on development assistance (O'Brien et al. 2008). Each of these conditions makes adaptation all the more urgent, but also more difficult to plan given inherent capacity and development deficits.

With regard to physical geography, climate change will disproportionally impact lower latitude countries. Many developing counties, and LDCs in particular, are concentrated in environments prone to drought, low-lying flood prone areas, and coastal zones threatened by sea level rise (especially small island developing States). In fact, more than 80% of the global population suffering from extreme poverty live in areas that will be hardest impacted by extreme weather events (FAO 2016). In sum, climate change will disproportionally impact areas of the Earth that are already home to considerable resource degradation, are characterised by a high frequency of extreme weather events, and where crops are grown dangerously close to their biophysical thresholds (Parry et al. 1999; Lobell et al. 2008; Funk and Brown 2009).

Agriculture, together with other sectors relying heavily on natural resources and ecosystem services, is highly sensitive to changes in the climate system. Agriculture in developing countries often contributes to a large percentage of GDP and exports, employs up to 80% of the rural workforce, and overwhelmingly relies on rain-fed production with limited irrigation infrastructure (IFAD 2016). In fact, it is estimated that 60 percent of agricultural production in developing countries does not employ any form of irrigation (Wani et al. 2009). Poverty and food insecurity in the world tends to be concentrated in rural areas, often among subsistence farming communities (IFAD 2016). Paradoxically, over the half of the world's nearly 800 million undernourished people are in the business of farming (FAO et al. 2015). While the sector is highly vulnerable to the impacts of climate change, agriculture in

[1] These terms stem from the Cold War: 'first' world refers to developed countries and 'second' world, which is no longer used, referred to the communist-socialist countries.

developing countries is also a major emitter of greenhouse gases (GHGs). When the impacts of deforestation and other land-use change are considered the sector contributes almost one-quarter of all GHGs, more than the global transport and manufacturing sectors combined (Vermeulen et al. 2012).

Given the high reliance on subsistence rain-fed agriculture and extractive resource sectors, much of the developing world, especially LDCs, is mired in chronic, persistent poverty. Persistent poverty, in the parlance of climate change adaptation, is often referred to as a 'adaptation deficit' underlying to the innate deficits in adaptive capacity in developing countries (Burton 2009; Fankhauser and McDermott 2014). While the percentage of people living in extreme poverty (less than $1.90 a day) has fallen to its lowest global level in history, extreme poverty affects a disproportionally large percentage of the population in the developing world. In fact, over half of the world's extreme poor live in Sub-Saharan Africa alone where 41% of the population live in poverty (World Bank 2016). Poverty strains equitable economic growth and can contribute to civil unrest and political instability. Poverty is exacerbated in the developing world by high population growth contributing to a 'youth bulge' (i.e. the rich are getting older and the poor are not), and the world's highest urbanisation rates, which further undermines the developing world's ability to feed itself (World Bank 2013).

The stressors and vulnerabilities in developing countries produced by globalisation—or the increasing interdependence of the global economy and societies— and other drivers combined with the impacts of climate change have been referred to as 'double-exposure' (O'Brien and Leichenko 2000). There is considerable evidence that climate change will further exacerbate poverty and inequality in developing countries, threatening the development progress of the last half-century and further eroding the bases of adaptive capacity (FAO 2016). While many developing countries have made considerable progress during the Millennium Development Goals period (2000-2015), climate change will severely challenge developing countries' ability to meet the newly established and ambitious Sustainable Development Goals to 2030.

These unique characteristics of developing countries have also yielded—and have been shaped by—several other important features. Rapid urbanisation and youth unemployment, for example, are placing new pressures on developing country cities and rural areas' ability to feed them. Urban growth on the African continent, for example, is expected to increase from 40 to 56 percent between 2020 and 2050—among the fastest urbanisation rate in the world. Moreover, while some countries are successfully closing the development gap between rich and poor countries, the developing world is experiencing greater *intrastate* wealth inequality than ever before. Income inequality in developing countries increased by 11 percent from 1990 to 2010 (UNDP, 2013). That is to say, growth has been uneven and the rising tide of globalisation has not lifted all boats.

Despite these underlying challenges and vulnerabilities, many developing countries have been successful in integrating climate change adaptation into their development portfolios. These efforts have been shaped considerably by parallel advances in international support mechanisms for adaptation in the developing world focussing on capacity development, technology transfer, and financial support.

## 17.3 Developing countries and the UNFCCC

International negotiations around adaptation frame debates at the national level in many developing countries. In fact, in many cases the institutional and policy structures around adaptation in the developing world are derived precisely from those negotiations and adherence to donor preferences regarding policy development and funding. To a great extent, therefore, how adaptation has emerged under the United Nations Framework Convention on Climate Change (UNFCCC) has its roots in the way that developing countries have influenced the negotiations processes leading up to the establishment of the UNFCCC, since its entry into force, and during the discussions on the 1997 Kyoto Protocol and the recent 2015 Paris Agreement.

Developing and developed countries have repeatedly clashed in the UNFCCC negotiations, and this has been both a fundamental characteristic of the process as well as a natural outcome, since climate change is a symptom of the development pathway that humans have followed for approximately the last 150 years. The divide between developed and developing country is evident in the negotiating 'blocks' that have evolved throughout the global negotiations. In 2015, for example, an initial group of 20 countries established the V20 Group, which aims to 'enable vulnerable countries to steer a high-level policy dialogue pertaining to action on climate change and the promotion of climate resilient and low emission development with full competence for addressing economic and financial issues beyond the remit of any one organisation' (V20 2016). The V20 Group has now grown into the V20 Forum, with 47 members, whose purpose is to set the agenda 'for highlighting concerns, issues and challenges faced by vulnerable countries', among other things. This group overlaps but is not the same as the 48 countries who are classified by the UN as LDCs, which were some of the first countries to take action on adaptation under the UNFCCC.

Debates within the UNFCCC have, at times, centred precisely on the role of adaptation. Adaptation is not a central feature of the UNFCCC, nor was it ever intended to be (Schipper 2006; Sarewitz and Pielke, 2000). Adaptation appeared in the UNFCCC as a way to address the capacity gap in responding to what was initially expected to be minimal impacts of climate change, since countries thought that it would be possible to reduce greenhouse gas emissions and thereby put a halt to the changing climate (Schipper, 2006; Parry et al., 1998; Burton, 1994, 2003). Because industrialisation in developed countries was blamed for the increasing greenhouse gas levels, the UNFCCC was based on the 'polluter pays' principle, and countries were divided into developed (Annex I) and developing (non-Annex I) countries for the purpose of actions.

Adaptation has since emerged has one of the main areas of action, growing out of the institutional architecture already in place to meet the needs and demands of non-Annex I countries. Adaptation for developing countries in international negotiations has been driven by the underlying concept of climate justice, both procedural and distributive. Developing countries are uniquely situated within the UNFCCC with preferred access to funding for climate change adaptation and, historically, a reduced legal role with regard to emissions reductions within climate agreements.

*Procedural Justice*

With regard to process, the UNFCCC and Conference of the Parties (COP) negotiations are driven by unanimous consent. Any decision, legally binding or otherwise, emanating from the Convention must gain the full support of developed and developing countries alike, providing an equal footing for all nations in the negotiation process. Developing country representatives are supported financially to attend annual climate negotiations. And importantly, the UNFCCC, although widely recognised as a mechanism for emissions reductions, also includes explicit articles in its charter with regard to adaptation, and has established work streams for 'loss and damage' that seek means to compensate developing countries for climate impacts resulting from industrialisation over the last century (James et al. 2014). Furthermore, LDCs have distinguished themselves in the UNFCCC process by establishing an LDC Expert Group, and negotiating a unique LDC Fund (LDCF) aimed at financing National Adaptation Programmes of Action (NAPAs).

With climate change rising to the top of many countries' political agendas, knowledge on climate change has grown among developing country delegates. Yet despite these efforts at procedural equity, developing countries have traditionally been at a disadvantage in the negotiations because they have had inadequate numbers of staff, some with a very limited understanding of climate change or of the ever-more complex UNFCCC process. The initial rule that only two formal contact groups to discuss different agenda items could meet simultaneously during the COP or the other meetings of the different negotiating bodies under the UNFCCC became pointless when groups were instead designated as 'informal' contact groups, thereby sidestepping the rule that was made to ensure that all parties could participate in all discussions. Even with countries grouping together, for example as the Group of 77 (developing countries), the Alliance of Small Island States or LDCs, the lack of participation has contributed to reinforcing countries' limited understanding of the UNFCCC process.

*Distributional Justice*

Regarding distribution of responsibility, the UNFCCC is broadly driven by the concept of 'common but differentiated responsibilities' (CBDR). CBDR acknowledges that all countries have an obligation to act with regard to climate change, yet some nations are historically more responsible for carbon pollution and should bear the brunt of the financial burden associated with mitigating impacts and adapting to changes to which the world is already committed. Under the Kyoto Protocol, for example, non-Annex I countries do not have any commitments to reducing their GHG emissions, reflecting the dominant view in the 1990s that there was a difference between what Agarwal and Narain called 'luxury emissions' in developed countries vs. 'survival emissions' from developing countries (1991). This is now different under the Paris Agreement, where countries are encouraged to identify their nationally determined contributions without distinguishing between Annex I and non-Annex I countries.

Non-Annex I countries also received support for sustainable development—adaptation and mitigation—through the Clean Development Mechanism (CDM), a carbon emissions offset scheme, and the Kyoto Protocol's Adaptation Fund. Two percent of proceeds from the purchase of certified emissions reductions through CDM were directed to the Adaptation Fund. Since Kyoto, several other donor-funded mechanisms have been established to ease

the burden of developing countries in implementing changes to their economies and adapting to climate change. This includes the aforementioned LDCF, Special Climate Change Fund (SCCF), and, most recently, the Green Climate Fund (GCF). All told, there are approximately 26 global funds—multilateral and bilateral—established with this goal in mind[2]. Since its inception the LDCF has distributed nearly $1 billion to 51 LDCs, supporting over 210 individual projects (Sovacool et al. 2017).

*Policy Support*

To facilitate the procedural and distributive justice principles outlined above, the UNFCCC has developed a host of policy guidance materials to support developing countries in establishing adaptation plans. For instance, the UNFCCC calls on all non-Annex I member countries to submit national communications and, more recently, Biennial Update Reports, consistent with the country's capability to do so. Most developing countries have submitted their Initial and Second National Communications, while only 36 countries have completed the third round of reporting. National communications are intended to provide the Convention with a summary of national development priorities, a national inventory of carbon emissions by source, and actions that have been taken in developing countries to implement the convention. While the communications provide a broad overview of actions taken, international adaptation policy assistance for developing countries is centred around two guiding instruments: National Adaptation Programmes of Action (NAPAs) and National Adaptation Plans (NAPs).

NAPAs were the first iteration of adaptation policy guidance for developing countries was initiated in 2001, when at COP 7 the UNFCCC established the Least Developed Country Work Programme. NAPAs focused on 'urgent and immediate' adaptation requirements, supporting LDCs to establish adaptation plans and provide cost estimates for those initiatives. NAPAs served as a platform for linking donors and multilateral climate funds with the nationally determined priorities in developing countries. NAPAs were successful in raising awareness around climate change, and its country driven process promoted ownership and buy-in from LDC governments. Yet, NAPAs were plagued by several serious limitations. The LDC Fund, for example, established in COP 7 in Marrakesh together with the LDC Work Programme, did not have sufficient financial resources to fund the timely development and implementation of NAPAs. As a consequence, many countries – of the 51 NAPAs that have been completed (South Sudan being the most recent) – did not translate the NAPA plans into clearly defined implementation programmes. Additionally, the NAPA technical teams charged with developing the policies in each country often disbanded after initial planning stages. Countries that we deemed more successful in NAPA development and implementation were able to keep their teams together throughout the entire NAPA process, leading to many of the sustained institutional and policy structures around climate change in these countries today (UNFCCC 2012). Finally, the community engagement involved with the NAPA development process built expectations around the delivery of adaptation 'services' to communities—expectations that were often not delivered on, as NAPA funding was limited. As a result, many LDCs looked to project partners to facilitate access to funding sources, a development which the LDC Expert Group found to

[2] According to http://www.climatefundsupdate.org/listing at the time of writing in March 2017.

slow down the process and disbursements of funds (Ibid).

In Cancun (COP 16) it was agreed that National Adaptation Plans (NAPs) should be developed to address some of these indicated shortcomings in the NAPA process. NAPs were envisioned as a policy framework to provide for medium and long-term adaptation responses for both LDCs and other developing country countries. Guidelines were drafted and agreed upon at COP17 in Durban. In addition to the new policy timeframe (i.e. medium and long term versus 'urgent and immediate'), NAPs were also intended to integrate more robustly into existing development and sectoral planning processes. The 'mainstreaming' or 'climate proofing' approach was promoted, in part, to improve the processes for revisiting the NAP on a regular basis. As such, NAPs can be thought of as 'living documents' that, through a process of policy and social learning (i.e. adaptive management) evolve to meet ever-changing on-ground realities. In Doha (COP 18), the Subsidiary Board on Scientific and Technical Advice charged the Global Environment Facility (GEF), the official financing mechanism of the COP, with identifying funding (and funding rules) for the development of NAPs for both LDCs and non-LDCs. NAP guidelines have also been established by the LDC Expert Group to help guide developing countries through this new adaptation planning process (UNFCCC 2012). UNFCCC policy support has been increasingly met with financial support mechanisms, and COP meeting leading up to and in the aftermath of the Paris Agreement, in particular, have seen advances in the area of climate financing for adaptation.

### 17.4 Adaptation Planning and Mainstreaming

Derived in large part through the international adaptation policy processes described above, developing countries have utilised a wide range of administrative and legal measures to integrate climate change in to their development planning. This ranges from constitutional amendments, the re-branding and reorganisation of Ministries, the establishment of Presidential or Prime Ministerial committees, and a range of other institutional structures (see Table 2). In their business as usual development planning, developing countries operate based on annual, medium and long-term development plans, each affected by shorter-term political party priorities. In some cases, these economy-wide or sectoral plans are donor-mandated and established based on the conditions of loans and grants provided by Multilateral Financial Institutions. This is true of 'poverty reduction strategy papers', for example, which are required by HIPCs before they are eligible for International Monetary Fund (IMF) and World Bank loan programmes. Sectoral plans like agriculture or health are also established by individual Ministries to guide work in that sector. Combine national and sectoral plans with myriad project and programme documents from donors and the short-term whims of election cycle manifestos and the adaptation policy landscape in developing countries quickly becomes complicated.

**Table 2. Example policy and institutional environments in two developing countries: Ghana and Nepal**

| | Grouping | Domestic Policies | Domestic Climate Change Institutions | UNFCCC Coordinating Agency | NAPA | NAP | Notes |
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|---|---|---|---|---|---|---|---|
| Ghana | Heavily Indebted Poor Country (HIPC) | National Climate Change Policy (NCCP); National Climate Change Adaptation Strategy (NCCAS); Integrating Climate Change and Disaster Risk Reduction into National Development | The Ghana Environmental Conventions Coordinating Authority (GECCA); Ghana Climate Adaptation Network (G-CAN); Ghana Climate Change, Agriculture and Food Security Platform | Environmental Protection Agency (EPA)—the technical, implementing agency of the Ministry of Environment, Science, Technology and Innovation (MESTI) | No | No | |
| Nepal | Least Developed Country (LDC) | Climate Change Policy (CCP); National Planning Commission has developed a Climate Resilient Planning; Local Adaptation Plans of Action (LAPA) | Climate Change Council (CCC); Multi-stakeholder Climate Change Initiatives Coordination Committee (MCCICC) | Ministry of Science, Technology and Environment (MoSTE), Climate Change Management Division | Yes | Yes | Nepal's climate change portfolio is guided by a legislative imperative that 80% of all climate funding in the country should be directed to 'local level' actions. |

Table 2 note: While Ghana and Nepal vary in terms of their economic development, political stability, and ability to access international financial assistance, elements of their adaptation policy regimes are nonetheless shared. While Ghana has not formally adopted UNFCCC policy mechanism like the NAPA or NAP, institutional infrastructure for adaptation has been built in both countries with support from elected bodies, explicit adaptation policies have been developed to guide investment and attract donor funding, and multi-stakeholder platforms have been established to draw support from civil society and private sector actors, among others.

Planned adaptation is about reducing or avoiding the impacts of climate change, either as a reaction to what is being experienced, or in anticipation of what is expected to come and is often associated with national-level policy making. However, planned adaptation must be done in co-ordination with other policies, plans, programmes and institutions that deal with climate-relevant issues such as agriculture, human security, or environmental protection, among others. If such initiatives are not aligned with climate change adaptation objectives, they instead risk increasing exposure and sensitivity to climate change. For example, prioritising intensive agriculture with heavy reliance on irrigation may provide high returns in the short turn, even in countries where water resources will be threatened by climate change. But in the medium to long term, if water resources become scarce and unreliable, this choice

will be wasted investments that will leave people demanding new alternatives, unable to rely on previous arrangements, and lacking the skills or means to adopt new ways. This is also referred to as maladaptation, where the action inadvertently leads to greater vulnerability and impact.

The measured integration of climate change adaptation into existing development processes is often referred to as climate 'mainstreaming', or climate policy integration (Reid and Huq 2014; Kok et al. 2008; Sietz et al. 2011; Klein et al. 2005). Mainstreaming in developing countries must take in to account not only development priorities related explicitly to climate change, but must also recognise that sectoral policies themselves influence both vulnerability and vulnerability reduction, requiring a more holistic view of the development policy environment. Many people in developing countries are only marginally adjusted to current climate variability, which means that the adaptation process must not only enable people to cope with and overcome climatic change and shocks, but should also serve to address existing development gaps. Mainstreaming is typically billed as the most effective way to ensure that sustainable development objectives are met while neither increasing people's vulnerability nor compromising on well-being (Ayers et al, 2014).

Despite the relative standardisation of climate policy provided by NAPAs and NAPs, mainstreaming is not a uniform process. Where the process of mainstreaming begins can be mapped on a spectrum, from purely sector-driven approaches led by relevant ministries to hybrid- or nationally-driven efforts co-ordinated by a central planning agency or administration. In developing countries, mainstreaming often begins with stocktaking of the existing policy landscape followed by an analysis of likely climate impacts, identification of vulnerable populations, the prioritisation of adaptation strategies, and the development of implementation and monitoring and evaluation platforms (UNFCCC 2012). So while NAPAs and NAPs provide broad guidelines for developing countries to build adaptation plans following this general strategy, doing so in practice requires a host of higher resolution support tools. The availability of these tools and their use in adaptation planning varies between country contexts.

These decision support tools for developing countries are supported at a high level through the UNFCCC's Compendium on Methods and Tools and are often accompanied by technical assistance from international development organisations. For example, a necessary precursor to any vulnerability assessment is climate modelling and the ability to forecast climate trends and their likely impact on key sectors. For these purposes, developing countries often rely on international academic and research institutions to support them in developing and interpreting General Circulation Models (GCMs)—mathematical models of ocean and atmospheric circulation—and downscaling the temperature and precipitation trends from those models to a sufficient resolution so as to be meaningful to developing country decision makers. In the agricultural sector, this often is taken one step further, incorporating trends for key indicators in to complex crop models that account for growing condition and biophysical requirements of specific crops. Once climate impacts are identified, identifying priority adaptation measures that respond to likely hazards, align with national development priorities, and represent the highest possible return on investment are considered (Kissinger et al. 2013). Prioritising interventions between and across sectors requires considerable organisation and support from the highest levels of government. Both of these processes—climate and crop modelling and adaptation prioritisation—are highly

technical processes for which developing countries often rely on external support.

## 17.5 Implementation of Adaptation Strategies

Just as climate change adaptation has been slow to transition from theory to practice in the policy development space, developing countries, in particular, have also experienced considerable challenges implementing adaptation policies—transitioning from policy to action. Implementation has been plagued by controversies over measuring success in adaptation, insufficient funding, low capacity and a lack of domestic ownership over adaptation processes, among other considerations.

Nevertheless, adaptation policies are being implemented today across many developing countries, and some indication of common interventions is emerging. Biagini et al. (2014) in analysing 92 projects financed by multilateral agencies suggest that ten principal adaptation process types exist: capacity building, management and planning, practice or behaviour, policy, information, physical infrastructure, warning or observing systems, "green" infrastructure, financing, and technology. In practice, in developing countries, this often includes measures to adapt agricultural systems through the adoption of new crop varieties, changing of planting dates, improved soil and water management practices, among others (Vermeulen et al. 2012).

### Measuring adaptation success

While there is increasing understanding of the types of adaptation measures being implemented in developing countries, less is know about whether those measures are leading to improved adaptive capacity or achieving the desired outcomes for vulnerable populations (Brunner and Lynch 2010; Ford et al. 2015). Success to date in adaptation has been measured predominantly by the mere existence of adaptation planning and policy mechanisms (Olazabal et al. 2017). Since adaptation plans and policies have existed for just over a decade, there exist relatively few examples of adaptation implementation in practice and there is considerable debate over how to measure success in adaptation. Adaptation occurs in complex socio-political and institutional environments. Where the boundaries between actors and system are drawn is highly relevant and plagued by considerable trade-offs (Mimura et al. 2014). Do we measure success in adaptation, for example, through the plight of those least well off in society or through macroeconomic indicators that signal the broader health of a nation? Ultimately, when assessing success in adaptation one must take into consideration the unit of adaptation (i.e., nation, region, community, individual) and the timeframe for analysis, among other key considerations.

Maladaptation is when adaptation does not only fail to be effective, but actually makes people more vulnerable to climate change than they were previously (Magnan et al 2016). Maladaptation can occur in adaptation regimes when short-term adaptations, for example, leave individuals or communities vulnerable to long-term impacts of climate change either by way of a changing stressor or an unfit 'solution' (Adger and Vincent 2005). Adaptation is often considered for the scale of its effects—incremental, systemic, and transformational. Success in incremental adaptation (e.g., a farmer changing planting dates) may be considered failure from a systemic (e.g. a change in cropping systems) or transformational scale (e.g., a strategic diversification out of farming altogether). While there have been several attempts to

define success theoretically — Adger (2005), for example, defines success as adaptation that "balances effectiveness, efficiency and equity through decision making structures that promote learning and are perceived to be legitimate"— most scholars point to the need to develop transferable monitoring and evaluation frameworks

**Funding adaptation**

Given existing development deficits, developing countries often lack the domestic resources to properly invest in climate change adaptation activities. Donor budget support is a critical supplement to country-led efforts, but this comes at a certain cost to country autonomy, often referenced in work on 'dependency theory' (Smith 2011). Developing countries rely to varying degrees on international funding mechanism as discussed in the previous section (e.g., LDC Fund, SCCF, GCF etc.) The cost of adapting to climate change in developing countries varies between studies, but will likely fall somewhere between USD 100 billion to USD 500 billion annually by the year 2050 according to recent estimates (UNEP, 2016). A donor "Roadmap to 100 billion" estimates that public sector financing for adaptation from developed countries—through bilateral and multilateral funds—will reach USD 67 billion by 2020. In order to meet the full costs of adaptation by 2030, however, public financing would have to increase by 6 to 13 times from its current levels (UNEP 2016). Climate change financing should be 'additional' to existing flows of Official Development Assistance (ODA). This condition is not uniformly met, however, with several experts asserting that considerable portions of climate financing constitute a mere repackaging of business as usual development assistance (Ayers and Huq 2009).

Ultimately, climate change adaptation policy and financing in developing countries exists within the broader universe of global development. Today's modern international development model, consisting of transfers of ODA in the form of funding from developed countries to the developing world, originated in the aftermath of the Second World War and the establishment of Bretton Woods Institutions like the IMF and International Bank for Reconstruction and Development—today's World Bank Group. Historically, concessional loans through the World Bank and IMF have been conditional on certain 'structural adjustments' to markets and governance structures in developing countries. Individual countries have established agencies like the United States Agency for International Development (USAID), the Canadian International Development Agency (CIDA), and UK Department for International Development (DfID) to facilitate bilateral transfers of ODA and technical assistance to developing countries. Today, ODA amounts to almost $140 billion dollars each year. It is in this context of this longstanding development 'industry' that climate change adaptation has only recently emerged.

There is some evidence to suggest that this 'north-south' model of global development is beginning to be disrupted by increasing south-south cooperation (i.e., cooperation between developing countries), especially given the urgency of adapting to climate change (Brewer 2012). Global extreme poverty has fallen to its lowest levels in recorded history, and for the first time represents less than 10% of the world's population (World Bank 2016). Meanwhile, food insecurity, the lowest manifestation of extreme poverty, has consistently fallen, with over 200 million people pulled from hunger in the last two decades alone (FAO et al. 2015). While most LDCs and developing countries remain agricultural and primary resource based,

in many developing countries there is a growing service and technology sector, broadening tax bases, and an improved domestic budget.

As a result of this growth and development progress, since the Organization for Economic Cooperation and Development (OECD) first monitored the transfer of ODA in the late 1960s, the percentage of ODA—or transfers of development funding from industrialised nations—relative to all capital flows entering in to developing countries has declined dramatically. Domestic resource mobilization in developing countries has increased six-fold in the last 15 years, and remittances from workers in developed countries to their families in the developing world represented almost half a trillion dollars in 2016 (Dunning and Leo 2016). Meanwhile, Foreign Direct Investment (FDI) in developing countries—the preeminent metric for private sector investment—accounts for almost 50% of global FDI, reaching almost $800 billion annually (UNCTAD 2016). In fact, the Green Climate Fund, comprising both government funding and private sector financial transfers to developing countries is expected to leverage almost US$25 billion annually from private sector financiers (OECD 2016).

**Adaptation 'ownership'**

The lack of available domestic financing for adaptation and dependency in developing countries has surfaced important questions about developing country ownership over the adaptation process (and development more broadly), visible in debates over selective funding and so-called technocratic adaption.

A heavy reliance on donor support has led to a proliferation of project-style development activities in developing countries. Projects tend to be short term, geographically narrow in scope, and importantly, do not always clearly align with country-led development plans. Project-type work in the context of climate change adaptation is important for experimentation and policy learning, allowing risks to be taken in a smaller, controlled environment. However, when not properly incorporated into decision-making structures, learning can be lost. Project activity can also serve to undermine state-managed vulnerability assessments. In just one example, Barrett (2014) suggests that sub-national financial allocations in Malawi, for example, are based not on vulnerability alone, but on donor utility, including project accessibility and cost minimisation. Consequently, vulnerability assessments informing national adaptation plans that are intended to guide donor activity do not always achieve this goal.

This 'selective funding' through project activities is justified by donors by inherent capacity deficits among developing country government functionaries, prompting donors to work around the government in delivering adaptation resources. The experience thus far with climate financing mechanism like the GCF, for example, is that government capacity to perform due diligence in administering grants is a hurdle in its own right. A study conducted by Debrah notes that among Ghana's almost 300,000 civil servants working at the local level, 60% lack the requisite skills and expertise to perform their functions (2014). In response to these capacity deficits, many climate change adaptation projects and programmes have made local capacity building in developing countries a central feature of their work, addressing this foundational need on which all other adaptation planning and implementation will be built

upon. This is true of the Pilot Programme for Climate Resilience, for example, a USD 1.2 billion initiative designed "strengthen capacities at the national levels to integrate climate resilience into development planning", implemented by various multilateral investment banks.

While the capacity gaps in developing countries are very real, some commentators argue that this provides a ready excuse to circumvent developing country plans in exchange for donor priorities (Sova et al. 2015). This is exemplified, to a certain extent, in the share of climate funds directed to adaptation in developing countries. The bulk of approved funding through multilateral climate funds was designated for mitigation activities. Of the approved multilateral climate funds for 2016, just USD 300 million (17.6%) of the USD 1.7 billion total was allocated for adaptation activities (Nakhooda et al. 2016). In Sub-Saharan Africa, for example, where 47% of climate change projects are adaptation related, the total amount of funds approved for mitigation projects is three times that of adaptation (Afful-Koomson 2014). It has been suggested that this trend reflects the donor community's ideological and economic preference towards mitigation actions that more equitably share the mitigation burden between developed and developing countries (Sova et al. 2015).

This mitigation-adaptation funding divide foreshadows a second major theme in development country ownership over adaptation policies: technocratic adaptation. International development, for much of its early existence, was synonymous with so-called 'technocratic development', a model for development built on the premise that technology and specialised knowledge alone would deliver on poverty reduction goals, independent of broader socio-political considerations. Techno-centrism is the subject of a wide body of work in development literature (Bardhan 1993; Reddy and Heuty 2008; Stiglitz 2000; Bryld 2000; Wilson 2006).

Technocratic development has experienced resurgence in the context of climate change adaptation given the privileged access to climate data and forward-looking modelling tools enjoyed by industrialised economies and increasingly, by non-state technical actors in the form of international NGO's academic institutions (Schroeder and Lovell 2012). To this end, some authors have suggested that the perpetuation of a narrative of climate impacts as 'highly uncertain' and climate responses heavy dependent on climate data allows expert trustees to co-opt the decision making process, effectively de-valuing the role of 'non-experts' in the regime (Sova et al. 2015), and raising concerns about who drives climate change ontology. This highly uncertain, expert-driven notion of climate change policy reduces the value (or utility) of consensus decision making and participatory processes, and in its place creates a necessary binary between experts (developed countries and INGOs) and subjects (developing nations and LDCs). Developed country experts and international consultants are the keepers of this immutable and unquestionable knowledge (ibid).

Ultimately, the question of policy ownership impacts on the types of adaptation options adopted by developing countries. Some authors on adaptation note that developing countries, especially indigenous populations, have been adapting to climate change for millennia, accruing a wealth of local and indigenous knowledge that can be applied to the challenge of adaptation (Agrawal 2002; Cameron 2012; Derbile 2013). Community based adaptation (CBA) is a growing field of adaptation work that recognises the need to make

adaptation planning and implementation more responsive to local needs, including the increased incorporation of such indigenous knowledge into formal policy development and implementation mechanisms. Despite these efforts, the literature suggests that planned adaptation in developing countries tends to be focused on hard, 'techno-fix' interventions (Thornton and Manasfi 2010). This despite the fact that high resolution, localised studies of adaptation indicate that most adaptation measures adopted by households are non-engineering measures (Chen et al. 2014). The IPCC Fifth Assessment Report states "engineered and technological options are commonly implemented adaptive responses, often integrated within existing programmes such as disaster risk management and water management" (IPCC 2014 p. 8).

## 17.7 Conclusion

Adaptation to climate change in developing countries faces unique constraints driven by high vulnerability, low capacity, and existing development deficits. The weight of these factors in shaping adaptation outcomes varies between contexts as 'developing' countries has come to be a catch-all term referring to countries in various states of economic, political, and social development ranging from LDCs to middle-income nations. Consistent across most of these settings, however, is a physical geography centred around the Earth's equatorial region in tropical environments with disproportionate exposure to climate impacts, economies relying heavily on agriculture and extractive resources, and chronic poverty and development deficits that undermine the adaptive capacity of vulnerable populations.

Recognising these challenges as well as the undersized contributions to global GHG emissions historically generated by developing countries, international climate change institutions aim to provide unique support to developing countries. Through principles for distributive and procedural justice like CBDR and 'polluter pays', to rule-making procedures like unanimous consent, the UNFCCC has endeavoured to make the rules of international climate negotiations work in favour of developing countries. Mechanisms for policy support and technology transfer, for example, have been developed along with guidance documents and decision support tools and methodologies. Yet these procedural and distributive justice mechanisms are imperfect, leaving developing countries to face continued structural inequities in adapting to climate change.

Mainly, human resource and capacity deficits prevent developing countries from participating more fully in UNFCCC negotiations and adaptation funding often does not meet the 'additionality' condition set by global financing mechanisms. Questions remain over the ownership of developing country adaptation agendas, more broadly, given the heavy reliance on international consultants for policy development, a preference for project as opposed to programmatic adaptation interventions, and conditional and selective adaptation funding by major donor agencies. Collectively these trends, some have argued, have led to a preference for techno-fix style adaptation—emphasising high-input infrastructure-based interventions, or so-called 'hard adaptation'—at the expense of community-based and less capital intense interventions.

What is universally true about developing countries, however, is that they are in a constant state of change and growth. Increasingly developing countries represent a growing proportion of global emissions. Domestic budgets in many countries have also grown,

increasingly the potential for national investments in adaptation that can serve to reduce reliance on support from international organisations and increase domestic ownership over adaptation agendas. These advances come at a critical time in the international system where unprecedented human displacement and global instability threaten to erase this progress and further undermine the adaptive capacity of the world's most vulnerable people. For adaptation planning in this context, this means the double challenge of navigating a complex and dynamic institutional landscape in order to identify the most efficient and effective solutions to a complex and dynamic changing climate.

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