

The political economy of long-lived decisions in Africa:

Framework Report



May 2015; Revised February 2017

Front cover photo: Workers maintain the thermal power station at Takoradi, Ghana, June 21, 2006.

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Abbreviations

ACTED	Agency for Technical Cooperation and Development	IGAD	Inter-Governmental Authority for Development
AfDB	African Development Bank	INGC	Instituto Nacional de Gestão das Calamidades [National Institute of Disaster Management] (Mozambique)
AMMA	African Monsoon Multidisciplinary Analysis		
AMU	Arab Maghreb Union		
AU	African Union	ITCZ	Intertropical Convergence Zone
CADFund	China–Africa Development Fund	LVBC	Lake Victoria Basin Commission
CCKE	Coordination Capacity Development and Knowledge Exchange	LWSC	Lusaka Water and Sewage Company (Zambia)
CENSAD	Economic Community of Sahel-Saharan States	NAPA	National Adaptation Program of Action (Burkina Faso)
CILSS	Comité Permanent Inter-Etats de Lutte contre la Sécheresse dans le Sahel [Permanent Interstate Committee for Drought Control in the Sahel]	NBI	Nile Basin Initiative
		NEPAD	New Partnership for Africa's Development
COMESA	Common Market for Eastern and Southern Africa	NERC	Natural Environment Research Council (UK)
CONASUR	Conseil National de Secours d'Urgence et de Réhabilitation, Ministère de l'Action Sociale et de la Solidarité National, Burkina Faso [National Council for Emergency Relief and Rehabilitation]	NWASCO	National Water Supply and Sanitation Council (Zambia)
		ODA	Official Development Assistance
CONEDD	National Council on Environment and Sustainable Development (Burkina Faso)	OECD	Organisation for Economic Co-operation and Development
		PIDA	Programme for Infrastructure Development in Africa
DFID	Department for International Development (UK)	RC	Research Consortium
EAC	East African Community	REC	Regional Economic Community
ECCAS	Economic Community of Central African States	SADC	Southern African Development Community
ECOWAS	Economic Community of West African States	SAGCOT	Southern Agricultural Growth Corridor, Tanzania
FAO	Food and Agriculture Organization of the United Nations	TANESCO	Tanzania Electric Supply Company Ltd
FCFA	Future Climate for Africa	UMFULA	Uncertainty Reduction in Models For Understanding Development Applications
FRACTAL	Future Resilience for African CiTies And Lands	UNDP	United Nations Development Programme
GEF	Global Environment Facility	UNEP	United Nations Environment Programme
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit	UNICEF	United Nations Children's Emergency Fund
HyCRISTAL	Hydro-Climate Science into Policy Decisions for Climate-Resilient Infrastructure and Livelihoods in East Africa	USAID	United States Agency for International Development
		WRMA	Water Resources Management Authority (Zambia)
ICA	Infrastructure Consortium for Africa	WWF	World Wide Fund for Nature
		ZESCO	Zambian Energy Supply Corporation.

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Part 1: Background



Chapter 1. Introduction

Future Climate for Africa (FCFA) is a five-year research programme jointly funded by the UK's Department for International Development (DFID) and Natural Environment Research Council (NERC).

It aims to generate a decision-relevant body of scientific evidence on climate change that can effectively support long-term planning and climate-resilient development on the continent. It will also take steps to ensure that climate projections can be integrated into decision-making and build the evidence base for delivering climate services in Africa.

FCFA projects will be delivered through collaborative partnerships of the world's best researchers.

Five Research Consortia (RCs) have been selected to apply cutting-edge science to realtime development decision-making contexts (see Box 1). To support communication among these consortia and encourage the dissemination of scientific insights in a form that supports practical decision-making on the continent, a Coordination Capacity Development and Knowledge Exchange (CCKE) Unit has been established.

FCFA has recognised that bridging the gap between the disciplines of fundamental climate science and economic decision-making is a challenge.

However, it also recognises that decisions over economic planning, as well as infrastructure design and delivery made in the short term, must be resilient to future climates. For these reasons, FCFA has argued that, in designing their research programmes, RCs should focus on key long-lived economic decisions. FCFA has asked researchers to approach the design of research from the development end of the challenge. This creative challenge is at the heart of the FCFA programme; it will ensure the integrity of climate science, and that the science produced can help shape the outcomes Africa needs.

As part of the programme, FCFA has identified a critical need to understand institutional decision-making structures, and to ensure that the scientific analysis FCFA researchers develop is decision-relevant.

The approach will be particularly relevant in the context of long-term climate change adaptation decisions where immediate development priorities result in limited institutional capacity to think over a longer 5–40-year time horizon.

In response, a project was commissioned to help FCFA identify and understand the political economy of long-lived economic decision-making in Africa.

This understanding was complemented by support to help FCFA and the four RCs develop a strategy for influencing institutional decision-making relevant for climate change adaptation. The project had four major phases of work and ran from February to October 2015. Figure 1 summarises the key phases and their core activities.

As a result of this work, FCFA expects to gain a clear understanding of the central institutions and processes that shape, and make, long-term economic decisions in Africa. It will also help to build understanding of how institutions access and reflect scientific insights in their decision-making processes. These insights will be used to support the RCs in developing their own research agendas. In particular, they will be used to help identify opportunities to effectively influence key long-lived economic decisions on the continent.

This effort is complemented by a sister project, 'Economics, political economy and behavioural science', that looks at the economics of making long-lived adaptation decisions in Africa. The project identifies cases in which it is economically rational to take account of medium- to long-term climate decisions and the reasons behind them (see Box 2).

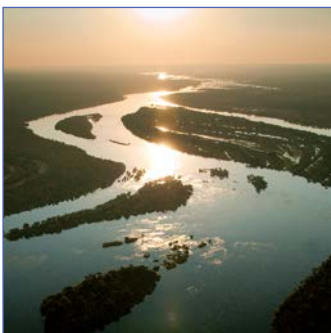
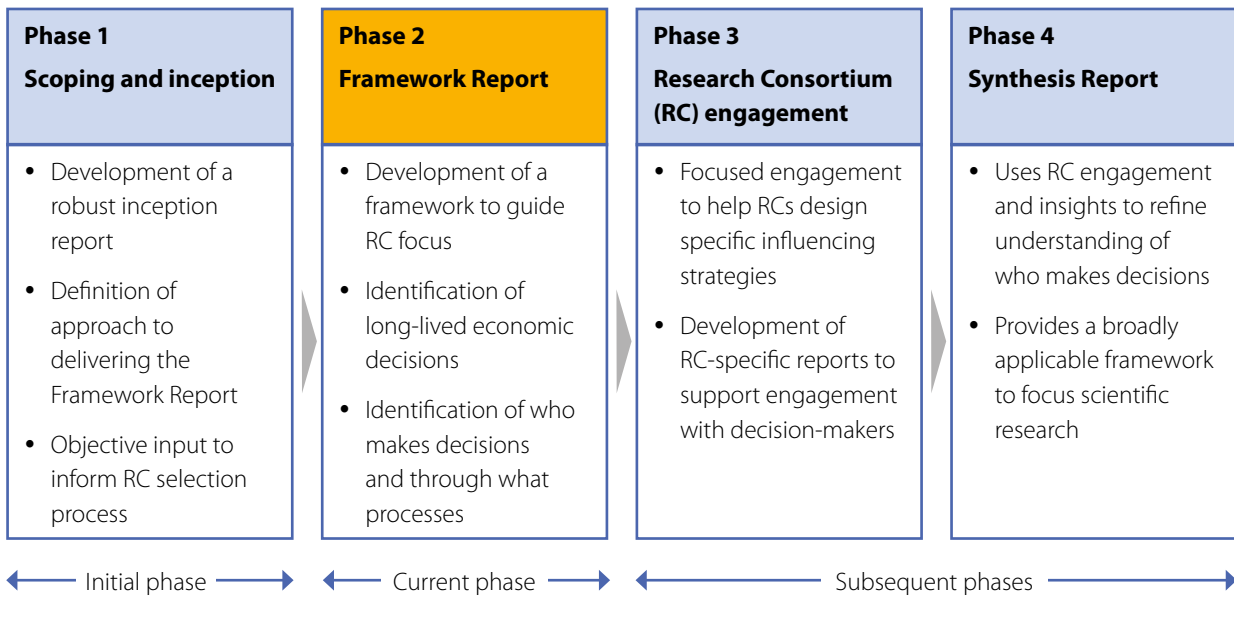


Figure 1. Phases of the FCFA project ‘The political economy of long-lived decisions in Africa’

1.1 The purpose of this report

This framework report has been commissioned to help the RCs and other stakeholders understand the complex nature of economic decision-making on the continent. The report is not an attempt to undertake a comprehensive analysis of the political economy of decision-making in Africa, but is intended to provide a framework within which we can begin to conceptualise these structures. Thus it aims to provide insights that can inform FCFA's efforts to identify and influence key institutions and entities on the continent with compelling new climate science.

1.2 The structure of this report

Part 1 of the report is structured around three primary research questions:

- Which long-lived economic decisions are most relevant to influence in order to respond to climate change adaptation imperatives?
- Which institutions and processes exert the greatest influence on long-lived economic decisions?
- What is the most appropriate strategy for influencing these institutions and processes?

Having outlined our methodological approach in Chapter 2, Chapter 3 focuses on understanding which economic decisions are relevant for FCFA to examine. It provides some simple conceptual devices that the RCs and other stakeholders may find useful when thinking about decision-making processes and scales. Chapter 3 explores how the evolving nature of investment on the continent could alter who makes decisions in the future, and how the decisions are made, and identifies the climate adaptation-relevant domains of decision-making used to select the case studies in Part 2 (Chapters 4–11). Part 3 highlights commonly encountered dimensions of decision-making that can help the RCs to develop their own strategies for informing long-lived economic decision-making, and makes provisional recommendations for how FCFA's work can be positioned to support decision-making.

Box 1. The Research Consortia and their focus areas

AMMA

The African Monsoon Multidisciplinary Analysis (AMMA) is an interdisciplinary programme that examines the West African Monsoon, its variability and its impacts on communities in the region.

As extreme droughts and unpredictable flooding continue throughout West Africa, highly vulnerable populations are at risk. While climate scientists have been able to understand the causes of climate variability in West Africa, there is still no agreement on how levels of greenhouse gases and high-impact weather events may change in the future. This uncertainty, as well as a lack of capacity to plan investments in the long term, has stifled the integration of climate change knowledge in development decision-making.

Building on the research conducted by its RC, the AMMA programme will use existing climate science, new tools and analysis, and climate projections to understand better how changes in water resources affect flooding and agriculture. In unpacking this discussion, the programme will help to develop social, ecological, economic and political narratives that guide decision-making processes.

In partnership and consultation with a wide range of stakeholders, AMMA has proposed two major pilot projects: an examination of how climate science affects urban planning processes in Ouagadougou, Burkina Faso, and an examination of farming systems and their adaptability to climate change in Senegal. These projects will use climate science to observe:

- how understanding future climate projections can help build climate-tailored solutions for decision-makers
- how building new tools and methodologies can help planning in the agricultural and hydrological sectors.

FRACTAL

Future Resilience for African CiTies And Lands (FRACTAL) seeks to integrate regional climate responses into medium- and long-term decision-making in city settings. Rapid urban growth challenges decision-makers to think innovatively in the face of intensifying climate stresses, affecting resource and infrastructure governance and management. The future climate variability and change in these city regions is poorly understood, as the available climate data are often poorly translated and not used effectively to inform policy- and decision-making in cities.

Despite the ramifications of a growing urban footprint, climate science has yet to respond adequately on an urban scale. This project focuses on three sets of cities:

- tier 1 cities: Windhoek, Namibia; Maputo, Mozambique; Lusaka, Zambia
- tier 2 cities: Blantyre, Malawi; Gaborone, Botswana; Harare, Zimbabwe
- two self-funded city partners – Cape Town and eThekweni (Durban) – in South Africa.

These key cities in the subcontinent represent a wide climate gradient, a significant contrast in terms of society and culture, a range of risk exposures and governance issues with local and regional dependencies, and different approaches about how to develop urban centres within developing-nation constraints.

Within this context, the critical resources for urban centres – and hence vulnerabilities – are water and energy, both of which heavily depend on a functional infrastructure. Thus the project interrogates the roles of water and energy and, to a lesser extent, food and health in building effective decision-making to engage the physical, economic and political drivers of vulnerability.

HyCRISTAL

Hydro-Climate Science into Policy Decisions for Climate-Resilient Infrastructure and Livelihoods in East Africa (HyCRISTAL) focuses on climate change adaptation issues in East Africa, and has identified Lake Victoria and the wider Lake Victoria Basin as an area of interest. Lake Victoria supports East African communities by serving as a

source of water, spurring industries such as fisheries and agriculture, and providing energy and transportation among numerous other benefits. The effects of climate change, which are expected to alter the sensitivity of lake temperatures, lake water balance and regional rainfall patterns – coupled with pressures from population growth, urbanisation and species introduction – have put stress on the basin.

HyCRISTAL will work to develop a new understanding of climate processes and models that help to reduce uncertainty in climate projections. This interdisciplinary research, coupled with stakeholder engagement, will allow HyCRISTAL to design climate change adaptation strategies that reduce the vulnerability of the poorest people in East Africa.

In partnership with a wide range of stakeholders, HyCRISTAL has proposed two major pilot projects:

- working with rural communities to develop climate-smart agriculture, fishing and production systems that help build and strengthen rural resistance and livelihoods
- working with urban populations to ensure cities deliver resilient water supplies and environmental sanitation services, and that urban infrastructure investments are climate-proof.

IMPALA

This project will focus on a single climate model, the Met Office Unified Model, to improve its simulation of African climate through a better understanding and representation of weather and climate processes. This will result in reduced uncertainty in future projections of the African climate and provide valuable information to climate scientists and modellers within Africa and worldwide, and empower decision-makers with information that can be used to reduce risks and help protect the livelihoods of the most vulnerable.

The initiative aims to deliver a step change in global climate model capability that will reduce uncertainty and enable better informed evaluation of the robustness of future projections.

The project aims to tackle a major scientific hurdle that limits decision-makers from using climate information: current climate models have only a modest ability to capture African climate systems. Because of this, there is large uncertainty and low scientific confidence in important aspects of the projections for Africa's climate in the next 5–40 years.

UMFULA

Uncertainty Reduction in Models For Understanding Development Applications (UMFULA) will provide a step change in climate science understanding in Central and Southern Africa. Most of the countries in this region have experienced rapid economic growth through major public and private sector investment programmes. Yet Central and Southern African economies are still sensitive to the impacts of climate change, as many are heavily dependent on primary industries. Despite this growth, these economic fluctuations – coupled with rapid population growth and migration, poverty and hunger, poor health and a complex disease burden, low education levels, gender inequalities, limited institutional and technological capacity, and the lack of effective governance – have made the populations of Central and Southern Africa particularly vulnerable.

Working closely with stakeholders, UMFULA will undertake two case studies to examine significant economic and social vulnerabilities to climate change:

- the Rufiji River Basin in Tanzania
- subnational decision-making in Malawi.

In Tanzania, the Rufiji River Basin has public and private stakeholders considering medium- to long-term investment decisions (e.g. in infrastructure). In Malawi, the focus is on investigating how high-resolution climate data and water and agriculture models can inform medium-term planning for resource use and sectoral growth priorities, as well as infrastructural investments.

Box 2. Sister project: 'Economics, political economy and behavioural science'

This project is a companion study to the FCFA programme on the political economy of long-lived decisions in Africa. Running in parallel to the FCFA programme, it is conducted by Paul Watkiss Associates in conjunction with Vivid Economics. The aims of the first phase of the project are to:

- undertake an initial literature review on long-lived policies
- identify practical examples of long-term decisions
- review the barriers to long-term decision-making.

The findings are intended to provide initial conclusions and develop a framework and methodology for the second phase, which will involve a series of economic case studies.

Task 1: Identification of long-lived policies and investments

This task aimed to identify where and how long-lived policies, plans and investments are being made across sub-Saharan Africa, and where this evidence will shape vulnerability. Activities included:

- a policy review
- a development planning review
- economic scoping
- an examination of capital investments
- a quantitative assessment of decisions that lock in climate vulnerability.

Task 2: Practical examples of long-term decisions

This task explored a number of evidence lines, for example through a study on the evidence base for the costs and benefits of adaptation in Africa. It also briefly reviewed the methods and application of new decision-support tools for adaptation, many of which are targeted at addressing uncertainty in medium- to long-term decisions.

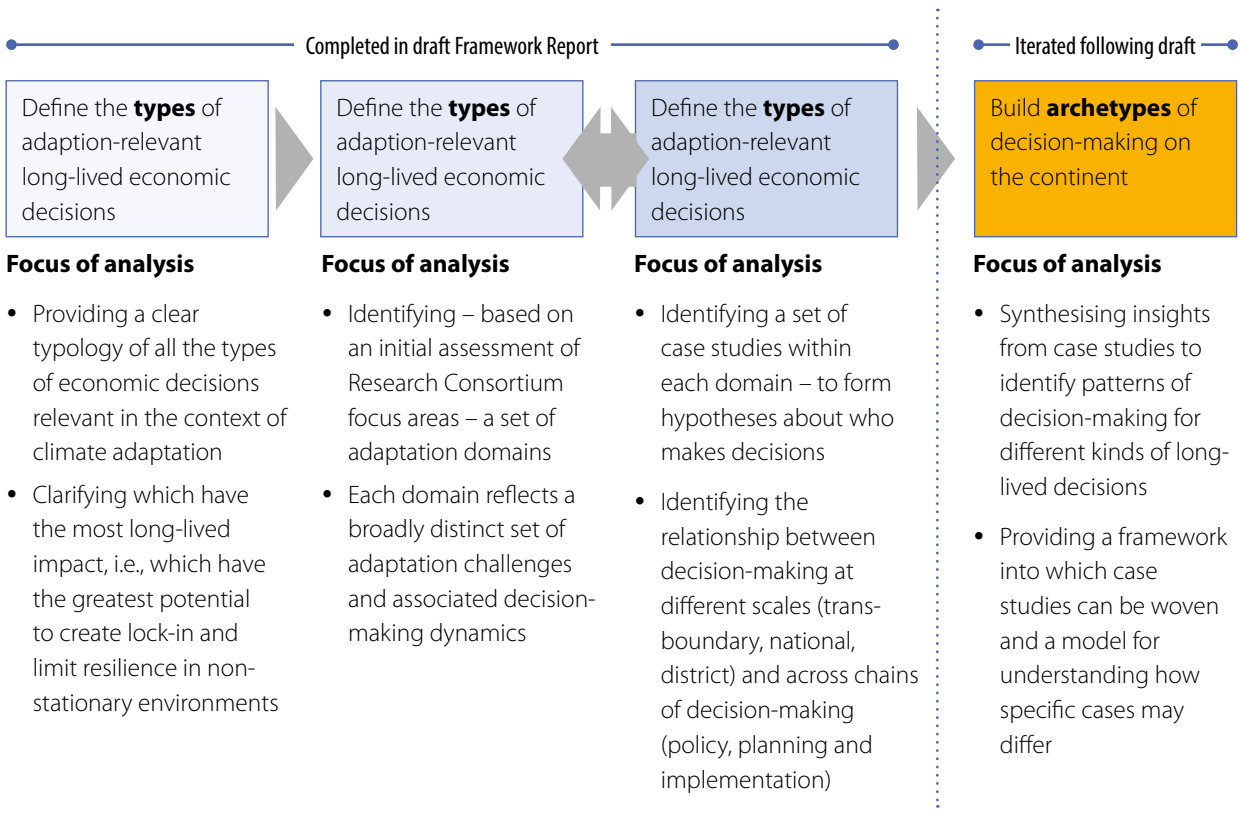
Task 3: Barriers to long-term decisions

This task involved a review of the literature on barriers to adaptation, and a more detailed review in relation to behavioural economics. An analysis was carried out on how these barriers might affect the medium- to long-term adaptation decisions identified in tasks 1 and 2.

1.3 A note on this report

This report is a 'living' document, updated based on insights emerging from the RCs' efforts to identify and understand the key long-lived economic decisions that need to be influenced in order to adapt to climate change.

The case studies are informed by desk-based research and, where possible, previous in-country experience. Thus they may not adequately highlight the nuances of decision-making processes. The relationships described may reflect formal relationships rather than the actual day-to-day interactions that take place in the country. As this project progresses, we intend to update these dynamic case studies with better information from the ground.

Figure 2. Approach to exploring the political economy

1.4 Approach to the political economy of long-lived economic decisions

This Framework Report is intended to help the RCs develop their own insights into the political economy of decision-making. A four-step process was used to develop the report. Step 1 focused on the **types** of long-lived economic decisions that are relevant for the FCFA programme. It proposed a simple typology that discussed the extent to which different decisions can be considered long lived. This typology provided a foundation on which to consider how decision-making can operate at different spatial scales.

Step 2 was to isolate the different **domains** of decision-making. These domains are based on the project team's attempts to characterise the key adaptation-relevant decisions experienced across Africa. While these domains are not an exhaustive description of climate change-related challenges, they identify areas where crucial long-lived decisions may be taking place.

Within these domains, a series of **case studies** were developed (step 3). These explore in detail the key climate adaptation issues, identify the major decision-makers involved, and try to tease out power dynamics and provide insights into who might be the most effective recipients of climate science.

The intention is that some of these case studies will be supplemented through further engagement with the RCs. This engagement is intended to help the RCs clarify the power dynamics associated with the economic decisions on which their research programmes will focus. As the project progresses, the collective experience from case studies will be synthesised (step 4) to inform the development of **archetypes** that describe generally observable models of decision-making and provide suggested approaches for influencing decision-making.

Chapter 2. Understanding relevant long-lived economic decisions

Economic decisions made today have impacts that extend far into the future. For instance, choices surrounding agricultural production have implications for how water and energy are used. In turn, this affects the kinds of infrastructure that will be developed and funded. While these decisions have a short-term impact on the location of infrastructure, they will also have second-order impacts regarding where people work, their standard of living, their consumption patterns and their ecological footprints.

These second-order impacts can be profound. Economic decisions can create pathway dependency and potentially lock in future behaviour patterns and economic activity trends. These impacts also have implications for the choices available in the future. Where the decisions allow for effective responses or build flexibility into future climatic regimes, they are welcomed as fostering resilience. When the decisions create vulnerabilities, they can be interpreted as ‘maladaptation’.

The next decade of development in Africa will be critical. An emerging demographic dividend could create a major opportunity for Africa to invest in basic infrastructure and diversify its economies.

At the same time, decision-making needs to consider the resilience of these investments in the face of climate change. Africa is anticipated to be the continent most negatively affected by climate change, due to a combination of particularly severe projected impacts and relatively low adaptive capacity.¹ According to the United Nations Environment Programme (UNEP), even if international efforts are able to keep global warming below 2°C, climate change adaptation costs in Africa will still rise to US\$50 billion per year by 2050.

By 2050, Africa’s population is likely to more than double. In positive scenario projections, the African Development Bank (AfDB) estimates that Africa’s gross domestic product (GDP) could increase to over US\$15 trillion in 2060, from a base of US\$1.7 trillion in 2010. The African middle class is expected to grow from 355 million (34% of Africa’s population) in 2010 to 1.1 billion (42% of the population) by 2060. These trends will see Africa’s role in the global economy increase substantially.

The growth in population and economy will need to be accompanied by structural transformation if it is going to have the maximum benefit in terms of reducing unemployment and alleviating poverty. Yet transforming African economies from low-income and agrarian to high-income and industrialised with inclusive growth remains a challenge.²

Africa is a rapidly urbanising continent. By 2030, almost 48% of Africans – 760 million people – will be urban residents. By 2050, half of its population – 1.2 billion people – will live in cities. Urbanisation will increase the pressure on existing social, health and economic services. It will also create an opportunity to transform service delivery on the continent and create substantial demand for new infrastructure and infrastructure services.

Africa’s infrastructure endowment lags behind that of other comparable regions. According to the World Bank,³ Africa needs investment in infrastructure to the tune of US\$93 billion annually, or additional financing of US\$31 billion a year. The availability of

new sources of capital, both from emerging markets such as China and from within Africa, creates the prospect that infrastructure development will accelerate on the continent, with implications for the balance and trade-offs between a centralised delivery system at the national level and the role of local elites under decentralisation.

This relationship is acutely relevant in Africa. Shifting demographics, accelerating economic growth and rising urbanisation will drive African decision-makers to make a range of significant strategic and tactical choices over the coming decade.

2.1 The focus of Future Climate for Africa

FCFA is focused on producing new scientific insights to inform effective long-term decision-making on the continent. In its scoping phase, FCFA identified very few examples of climate information being effectively integrated into economic decision-making. While examples do exist, for instance South Africa's attempts to integrate modelling of climate and biophysical impact with economic projects,⁴ they are infrequent.⁵

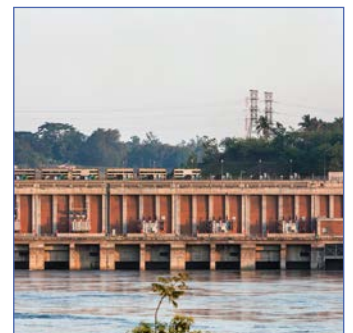
FCFA has identified a number of barriers to the use of climate information in decision-making. There are major challenges to effective long-term decision-making aside from those that are strictly 'climate relevant'. Political and business leaders can often be overwhelmed by immediate, short-term development needs that eclipse longer-term concerns. The incentives for effective long-term decision-making may also be limited in some cases. More pressing concerns from electorates and civil society's relatively weak ability to act as a check-and-balance to government decision-making could limit this process.

Where climate science targeted to Africa does exist, it has been interpreted as providing insufficient certainty to policy-makers. This has been argued to undermine their confidence and is a driver for FCFA to encourage researchers to invest in understanding policy-makers' mindsets. During FCFA's scoping phase, the project looked at Ghana, Malawi, Rwanda and Zambia, and at hydropower and port schemes throughout the continent, to understand how long-term climate information is used.⁶

In response to this challenge, FCFA is focusing explicitly on supporting decisions with impacts on the 5–40-year timescale or longer. It is these long-lived economic decisions that will avoid locking in unsustainable futures. While vitally important, shorter-term adaptive capacity is not the issue of study.

The following framework presents a useful categorisation for the major economic decisions of interest.⁷

- **Long-lived investments with large sunk costs** such as hydropower stations, roads, dams and other infrastructure. A failure to account for climate change in the development of these long-lived investments could mean that they underperform or are damaged. This lack of foresight could mean that investments need to be retrofitted or replaced prematurely, imposing greater costs.
- **Long-term planning and policy-making** such as growth strategies, sector development plans, poverty reduction strategies, coastal development plans and growth corridors, drought contingency plans and urban zoning. These can have far-reaching and complex consequences that influence vulnerability for decades to come. In some cases they will have positive co-benefits for long-term resilience, for example through strengthening governance, building capacity and increasing access to credit.



- **Interventions with long lead times**, where measures will take many years to implement. These will require planning now. Removing barriers to adaptation and building adaptive capacity can take time, as this can involve major changes in institutional, governance and legislative structures (e.g. land and water rights), decision processes, and cultural norms and behaviour.

These categories provide a useful starting point for analysis and are discussed in more detail below.

2.2 A typology for identifying adaptation-relevant economic decisions in Africa

To help unpack the range of economic decisions that are relevant in considering the context of adapting to climate change, it is useful to start with a simple typology. Building on the elements outlined above, we describe five categories of economic decisions, the relevance of each, and the extent to which their impacts can be considered long-lived. We conclude with some insights into the categories of economic decisions that are most relevant for RCs to consider within the FCFA programme.

Infrastructure

The design and delivery of climate-resilient infrastructure is a vitally important component of effective responses to climate change. In this case, infrastructure predominantly refers to 'hard'

Figure 3. Typology of adaptation-relevant economic decisions

Category	Description
Infrastructure <ul style="list-style-type: none"> • Decisions about the location and design of hard physical infrastructure • Covering water, energy, transport, ICT and agriculture • Includes economic and social infrastructure 	Institutional flexibility <ul style="list-style-type: none"> • Cutting across the four categories of decision-making, we have identified institutional flexibility as an important additional economic consideration • Some institutional mandates support flexibility, while others create rigidities or constrain adaptation (principle vs. rule-based systems) • Issues to consider include institutional mandates, accountability and autonomy
Natural resources infrastructure <ul style="list-style-type: none"> • Decisions about the management, use and conservation of natural resources • Covers aquatic, terrestrial and marine ecosystems • Includes the structure and management of land rights 	
Economic structure and strategy <ul style="list-style-type: none"> • Decisions that influence the prevailing economic development model and industrial strategy being pursued • Includes decisions about spatial planning of industry, settlements/cities 	
Social policy and systems <ul style="list-style-type: none"> • Decisions that impact social development – human capital formation and protection • Includes decisions and frameworks that govern welfare, labour rights, health and poverty alleviation 	

Out of scope: overarching governance issues – accountability, role of civil society, etc.

economic infrastructure, in particular the big three: energy, transport and water. Collectively, these three classes account for around 80% of total annual infrastructure spending needs on the continent.⁸ Irrigation and information and communications technology (ICT) infrastructure are also significant classes of spending. Although sometimes not distinguished from the above categories, urban infrastructure is also likely to be significant.

Given the longevity of physical infrastructure, ensuring its design is resilient to climate change and appropriate under future economic and development scenarios is vital.

Hard physical infrastructure, such as dams and reservoirs, and energy generation and transmission, will typically have a lifespan of 30–200 years. This permanency means that infrastructure must be designed for climatic conditions not only today, but far into the future. In addition to ensuring that infrastructure is resilient to temperature, precipitation and extreme weather events, infrastructure also needs to be made sensitive to the future developmental conditions and economic needs of its users. Failure to do so could result in stranded assets that are unsuitable for future use or have created negative economic and social dynamics (and thus might be considered to be maladapted). It is critical to consider the location as well as the design of infrastructure.

Not all infrastructure is created equal. Not all hard infrastructure is equally exposed to climate change or has such a long lifespan. So, in focusing on the key economic decisions, it is sensible to prioritise those with long lifespans and assess the risks surrounding poor design or location decisions.

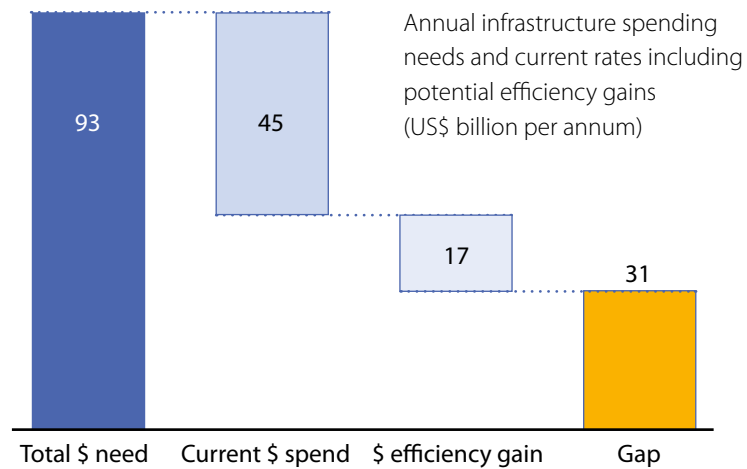
Table 1. Lifespan of selected infrastructure projects and exposure to climate change

Sector	Timescale (years)	Exposure
Water infrastructure (e.g. dams, reservoirs)	30–200	+++
Land-use planning (e.g. flood plains, coastal areas)	>100	+++
Coastline and flood defences (e.g. dikes, sea walls)	>50	+++
Building and housing (e.g. insulation, windows)	30–150	++
Transport infrastructure (e.g. ports, bridges)	30–200	+
Urbanism (e.g. urban density, parks)	>100	+
Energy production (e.g. thermal plant cooling systems)	20–70	+

Source: Hallegatte (2009).⁹

The delivery of appropriate infrastructure is a particular issue in Africa because of its substantial infrastructure deficit.

African infrastructure density lags in comparison to similar regions. For example, despite having three times the energy-generating capacity of South-East Asia in the 1970s, Africa is now behind on this, as well as a number of other measures of infrastructure density.¹⁰ Estimates of hard economic infrastructure needs compiled by the Africa Infrastructure Diagnostic Program suggest that US\$93 billion will be required each year to meet basic infrastructure needs across Africa. When current spending and efficiency gains are factored in, this implies an infrastructure financing gap of close to US\$31 billion per year.¹¹

Figure 4. African infrastructure financing needs

Although infrastructure assets are limited, demand is continuing to grow, creating an urgent imperative for new and refurbished infrastructure to be delivered. Sustained economic growth and inward investment, as well as enhanced political focus on infrastructure, creates the potential for this infrastructure gap to be reduced, if not filled entirely. Reducing this gap would suggest rapid expansion in the delivery of infrastructure across the continent.

There is a need to ensure that infrastructure is resilient to future climate conditions.

Missing the emerging window of opportunity would lock in unsuitable investments for anything from 20–100 years. Infrastructure must also be designed to service communities in a way that does not undermine important environmental and ecological services. Across the continent, as discussed in the next section, ecosystems provide a range of services, from supporting agricultural production to providing vital processes such as water filtration. Infrastructure plans should be configured to avoid undermining these important services.

Decisions about the location, design and maintenance of infrastructure are clearly a vital category of economic decision on which FCFA can focus. However, integrating infrastructure provision into the planning processes and associated broader economic strategies is essential. Arguably, this is particularly the case in Africa, where spatial planning plays a prominent role in a range of initiatives, from the prioritisation of regional transport corridors to the location of energy infrastructure to supply regional power pools. The role of economic planning decisions and the stakeholders involved are discussed below.

Natural resource infrastructure

Natural resource infrastructure (sometimes called ecological or green infrastructure) refers to naturally functioning ecosystems that deliver valuable services to people. Examples of natural resource infrastructure include wetlands, river catchments, sand dunes and mangroves, which reduce the impact of storm surges in coastal regions of Cameroon and Mozambique, for example (see Box 3).¹²

Natural resource infrastructure can play an important role in maintaining water quality and supply, and in attenuating the impacts of extreme weather events. Ecological infrastructure also supports a wide range of ecosystem goods on which rural populations across the continent depend (e.g. providing medicines, fuel and food) as well as biodiversity that attracts tourists and brings associated income.

The effective management of these complex ecological systems requires long-term policy-making and a robust understanding of the complex interactions between social, economic and ecological processes. Once degraded, natural resource infrastructure can take many years to regenerate, while some systems will be extremely costly and almost impossible to restore. Table 2 highlights the timescales over which restoration can take place and the variable timescales involved, suggesting that much natural resource infrastructure requires careful and long-lived economic decision-making.

Table 2. Timescales for restoring selected ecological infrastructure¹³

Type of ecological infrastructure	Timescale of regeneration (years)	Economic services provided
Mudflats	1–10	Flood regulation; sedimentation
Eutrophic grasslands	1–20	Carbon sequestration; erosion regulation; grazing for domestic livestock and other animals
Reed beds	10–100	Stabilisation of sedimentation; hydrological processes
Yellow dunes	50–100+	Coastal protection
Grey dunes and dune slacks	100–500	Coastal protection; water purification

Box 3. Mangroves in Mozambique

Mangrove forests occupy about 15 million hectares of tropical and subtropical coastline worldwide, one-fifth of which are in sub-Saharan Africa.¹⁴ Mangroves are a helpful tool as they trap the sediments that flow down rivers and off the land. They are useful in moderating monsoonal tidal flows and stabilising coastlines, particularly in areas that suffer from erosion caused by waves and storms, and are helpful homes for flora and fauna that have income-generation potential. But despite their usefulness, more than one-fifth of the world's mangroves have been lost in the past 30 years.¹⁵

In Beira, the second-largest city in Mozambique, mangrove forests support unique flora and fauna. Housing important shrimp and prawn fishing grounds, in 2009 Beira's mangroves yielded penaeid shrimps for export valued at US\$80 million a year, amounting to 3% of GDP.¹⁶ But in recent years, shrimp stocks have substantially reduced, largely due to the destruction of this coastal ecosystem.



There are implications for identifying who makes decisions. Although natural resources are recognised as providing important economic services,¹⁷ the institutional responsibility for their preservation and management can be contested, opaque or simply ill-defined. Identifying who has the responsibility for managing conservation is an important outcome. These institutions may also (but not always) have responsibility for setting and policing

controls over encroachment. Identifying who has the ability to influence or take fundamental decisions that affect these resources is important in order to best direct scientific insights.

For instance, in Tanzania's capital, Dar es Salaam, the encroachment of urban areas into the surrounding wetland ecosystems is pervasive. Understanding the relative influence and power of national institutions (such as the Ministry of Natural Resources) and local institutions (such as the Dar es Salaam City Council) is important in clarifying the central role of local institutions in planning urban expansion. Understanding their role has implications for the arguments and economic decisions that are most central to influence. In many instances where local planners are involved, conservation can be seen as a constraint on development. Recasting the issue as one of enhancing natural capital, building resilience and avoiding costs (from reduced flooding, water quality treatment, etc.) may be effective in making the case for action.

Economic strategy and planning

Decisions around national economic strategy create structural conditions. These decisions can alter patterns of vulnerability to climate change and support or undermine climate adaptation. They can also facilitate the context in which infrastructure is delivered.

Choices that fail to recognise the constraints imposed by climate change may lead to maladaptation. For example, it is reasonable to assume that in a drying climatic scenario, which is seen as plausible under a range of climate scenarios for Africa, efforts could be made in coastal urban areas to introduce large-scale desalination technologies. While effective in increasing water supply, these technologies are energy- and emissions-intensive. Without renewable energy as a power source, this risks locking in the use of energy-intensive technologies, which could become prohibitively expensive in a carbon-constrained world.

While these economic decisions may be upstream of what are commonly considered to be climate adaptation issues, they are vital in dictating the spatial pattern of economic development and infrastructure delivery. They can also have major implications for the sustainability of natural resource endowments in the future. For instance, the prioritisation of agriculture and mining, which are both primary export sectors, as part of South Africa's National Development Plan, has implications for a broad range of secondary economic decisions. This decision includes the location of a number of key industrial development corridors and their associated infrastructure.¹⁸ As well as the direct physical impact of these plans, there are wide-ranging implications for the location of human settlements and the development and, potentially, degradation of natural resources. These economic decisions may also rely on resources that could become increasingly constrained under future climate scenarios (e.g. water availability for mining and agriculture).

After the partial decline of national development planning in the 1980s and 1990s, a large number of African countries have now developed, or are in the process of developing, national visions and strategies. These are particularly important in countries where centralised planning is strong and there is bureaucratic commitment to delivery. National development planning may not take climate change into account in a systemic way. Failure to appreciate the constraints that climate change can create increases the risk that economic growth agendas will be undermined.

In addition to national-level strategies and plans, it is also important to recognise and engage with sectoral strategies. These can outline long-term objectives for key sectors that have impacts on land use, natural resource demands, demography, and infrastructure design and location.



Social policy and systems

Welfare systems, transfer payments,¹⁹ housing and education all play a vital role in supporting climate adaptation.²⁰ As is recognised in many African nations, adaptation interventions are indistinguishable from development interventions and are often the most effective way to build coping capacity and resilience. However, while central to adaptation responses, the majority of these systems and processes can plausibly shift, and be adjusted on shorter (less than five-year) timescales. As a result, the systems are not long-lived in the sense that they can potentially be changed on shorter timescales.

However, the institutional and political flexibility required to deliver wholesale change in social welfare is considerable. Underestimating the lead times associated with shifting these systems underplays the political economy of decision-making over welfare. In addition, the legacy of social policy and its systems is felt across generations. The benefits of particular policies, for example those that support the protection of capital and human assets, may take generations to be realised. This suggests that some social policy decisions should be considered as long-lived, and thus have long lead-in times from the point when they become policy to the point when the benefits are realised.

There is also a relationship between social policy and what might be considered hard social infrastructure, for example schools and hospitals. The location and design of this infrastructure will govern how services can be delivered in the future.

Institutional flexibility

Managing climate change creates challenges to the strategies and management behaviours of political and bureaucratic institutions. These challenges can be attributed to the uncertainty associated with future climatic regimes, their complex interactions with socioeconomic processes and the observable increase in volatility of weather events. Accepting and responding to uncertainty is – as has been highlighted by a broad range of behavioural economics literature – challenging for both individuals and institutions, requiring a move towards dynamic planning and response models.

In addition, many of the impacts of climate change in Africa are intertwined with collective action or common-pool resource problems (e.g. the management of water resources, and of land and ecosystems, to mitigate extreme weather events). Responding to these resource challenges can often require a transboundary approach, creating additional friction and challenges to traditional assumptions about sovereignty and management responsibility. The policy regimes that govern issues such as land rights can variously support or undermine the emergence of new forms of adaptive management. These systems themselves can be extraordinarily long lived.

As a result, political, legislative and bureaucratic institutions are being challenged to adopt new ways of thinking. While some institutions are inflexible, others can adopt or incorporate new adaptive management approaches to increase their responsiveness. For example, the adoption of market-based approaches to managing water can, in some instances, provide a useful system for allocating resources and responding to short-term changes in availability. The point is not that market-based systems are superior, rather that they provide examples of systems that can be responsive and may have advantages over command-and-control systems, particularly in non-stationary environments.

Other examples of institutional flexibility include political decentralisation of decision-making. By making planning more adaptive to local circumstances, some countries are already seeking to build more responsive administrative and management structures.

Decentralised systems can also empower and move resources to marginalised groups, who typically experience the most severe impacts from climate change, allowing them to be more responsive to change.

Examples of community-based monitoring systems throughout Africa are abundant. In the Garba Tula district of northern Kenya, farmers have come together to develop a community-based drought early warning system. Using local-language radio programmes to deliver forecasts, these farmers relay weather-related information and schedule follow-up meetings with extension agents and other intermediaries.²¹ In northern Uganda, the United Nations Children's Emergency Fund (UNICEF) and the Agency for Technical Cooperation and Development (ACTED) funded the Rapid SMS Community Vulnerability Surveillance Project, which provides at-risk communities with mobile phones to relay data to a monitoring centre.²² Empowering traditional forecasting methods and observations is useful as climate scientists work to harmonise traditional and modern scientific methods of climate prediction.²³

However, in other situations, the partial transfer of sovereignty to supra-national bodies can create advantages in the management of natural resources. The development of transboundary basin- and lake-management authorities has shown how new institutions, such as the Volta Basin Authority, can operate at a new spatial scale and begin to manage water resources in Africa more effectively.

Identifying long-lived economic decisions

The typology outlined provides an initial framing to help classify types of relevant economic decisions. However, in designing the FCFA programme, it was clear that the primary focus of its investigation should be on long-lived economic decisions, those with an impact of 5–40 years and beyond. As a result, some categories of decision may be more relevant than others for FCFA to focus on.

In this context, it is clear that there is a short- to medium-term opportunity to provide insights into future climatic conditions that could influence the design and location of major infrastructure projects. Africa has a particular opportunity because it is on the cusp of significant infrastructure development and is undergoing major institutional, social and economic change. Expansion and change are taking place at a time when the natural infrastructure and ecology are, in many areas, still relatively intact. Missing this window of opportunity would lead to the delivery of inappropriate infrastructure that will last for generations.

Natural infrastructure, although often harder to conceptualise and map, also plays a vital role in ensuring resilience to future climate change. Although the evidence may be incomplete, there are strong indications that decisions over the management of natural and ecological infrastructure can be at least as long-lived as hard economic infrastructure, if not more so.

Simultaneously, it is important to acknowledge that economic strategy and planning processes (across multiple scales) play a powerful role in establishing the spatial footprint of infrastructure and shaping future developmental conditions. Influencing these processes may be more challenging, and it may take longer to realise the direct effects, as infrastructure delivery may be up to 15 years downstream of planning decisions.

Arguably, to support effective long-term responses, FCFA needs a dual approach: focusing on practical impacts in the short term, while informing decision-making processes and promoting institutional flexibility in the longer term. This strategy is entirely compatible with FCFA's core principles.

2.3 Shifting investment flows and their impact on decision-making

Section 2.2 provides a typology for identifying decision-making in Africa. While that typology is the focus of this Framework Report, it is important to recognise that other factors play a prominent role in influencing decision-making. Global and intra-African investment flows are one such factor.

Understanding the changing nature of investment flows on the continent is important. The roles of conventional official development assistance (ODA), private investment (from both within and outside Africa) and capital from emerging markets are shifting. In all likelihood, the investment landscape in Africa in 5, 10 and 15 years will appear very different from that of today. These changes have implications for the political economy of decision-making. For instance, conventional ODA will have different return expectations and safeguards to investment from those of a sovereign wealth fund or private bank in an emerging market. These different sources of capital may be concentrated in specific regions and sectors, as well as having different investment horizons, tenures and trade-promotion ambitions. In this section, we look at emerging trends in investment in African infrastructure.

Africa is experiencing a surge of investment in the infrastructure sector, with total flows expanding from US\$5 billion in 2003 to US\$30 billion in 2012. Within this secular upward trend, there have been some important shifts in the origins of investment capital.

Direct national government funding continues to play a major role, accounting for 45–65% of total funding to the infrastructure sector, although sources disagree on the exact percentage. However, spending on infrastructure varies considerably by country, on both an absolute and a proportional basis. In terms of total investment, Kenya, Nigeria and South Africa account for the majority of direct budgetary expenditure on infrastructure. While it is suggested that a benchmark of 5–6% of GDP for infrastructure spending is appropriate, the reality across Africa shows that national expenditure varies considerably: Angola spends 8% of its GDP, South Sudan 0.1%.

Multilateral and Organisation for Economic Co-operation and Development (OECD) bilateral assistance have traditionally been major sources of financing for infrastructure in Africa, particularly via funding from the World Bank. ODA actually grew between 2003 and 2012, and its focus on infrastructure intensified. However, despite this growth, its proportional role as a source of external financing for infrastructure has declined as other sources have grown. Estimates suggest that ODA now accounts for 35% of infrastructure financing on the continent. Increasingly, external finance comes from private and non-traditional sources. Private finance now accounts for 50% of external finance to the African infrastructure sector and has proven to be resilient to the financial crisis of 2008.

New or non-traditional sources of external investment in infrastructure come from a number of sources, with both China and the Gulf States playing a major role. While claims that Africa is the 'next frontier' for Chinese investment are arguably overblown, it is clear that investment from China has grown appreciably. While estimates of total investment vary considerably, they suggest that investment grew from less than US\$1 billion in 2004 to US\$4 billion in 2007. Other estimates are even higher, with the Infrastructure Consortium for Africa (ICA) estimating flows of US\$14.9 billion for 2011, US\$13.4 billion for 2012 and US\$13.4 billion for 2013.²⁴ Interestingly, analysis suggests that Chinese investment has, at least historically, been concentrated in the transport sector – road and rail account for 53% of China's investment in infrastructure in Africa – and the hydropower sector. This spending makes it distinct from traditional ODA, which has historically targeted the water supply and sanitation and transport



sectors. The Gulf States are also major investors in African infrastructure; according to the ICA, commitments from the Arab Coordination Group reached US\$3.1 billion in 2013.²⁵

Interrogating competing claims about the intentions of Chinese investment is beyond the scope of this report. However, it is important to note the recent expansion of a range of Chinese initiatives focusing on African infrastructure. The founding of both the BRIC Bank in 2012 and the Asian Infrastructure Investment Bank in 2014 is an important development in the formalisation of China's overseas investments. Together, these institutions will be capitalised to the tune of US\$100 billion, with China playing the major role in both. They could expand to hold US\$200 billion of subscribed capital, making them comparable in size to both the Asian Development Bank and the World Bank. With an explicit focus on infrastructure, it is likely that these institutions, in conjunction with existing bilateral Chinese support for African countries and institutions such as the China–Africa Development Fund (CADFund), will play a major role in the African infrastructure sector in the coming years.

2.4 Understanding complex decision-making

Having understood the types of economic decisions that matter, it is important to consider how discrete decisions are connected and how the locus of decision-making can be concentrated.

Thinking about chains of decision-making

Each area of decision-making discussed is composed of a complex web of related decisions and political, economic and bureaucratic considerations. To help break these down conceptually, and to pinpoint areas where scientific insight can be influential, it can be useful to think not only of discrete types of economic decisions (e.g. infrastructure versus economic strategy), but also of decision-making chains (Figure 5).

For instance, there are decisions made at the **policy** level that may determine the overall direction for a sector and set appropriate legal and regulatory guidelines. These set the boundaries for decisions around sectoral strategy, which focus intent and allocate resources to address economic and public-good demands. Once these strategies are endorsed and established, project **planning** decisions can be made, which may translate that intent into investment frameworks and the development and financing of specific infrastructure or initiatives. These plans may be more or less detailed and specific, depending on the situation.

In some instances, they will give significant autonomy to local bodies over **implementation** decisions, which include ongoing operation and maintenance. These decisions can be about the location, size, tolerances and management of infrastructure assets or service delivery. Embedded within this chain of decisions are ongoing efforts to **reform** the impact of decisions, adjust to new circumstances, and promote progressive changes and improvements.

Figure 5. A decision-making chain



Thinking about decisions in this way – as evolving from, and being informed by, prior decisions – can help trace the institutions and organisations involved in each stage of the decision-making journey. This thought paradigm can also help to identify which institution may be playing the dominant role as a decision-maker (and is most important to influence), and who in turn will have the capacity and interest to use scientific insights.

Thinking at different scales

While it might be assumed that major economic decisions often take place at the national level, it is clear that a range of different spatial scales of decision-making are relevant to FCFA. This report identifies at least four relevant levels. We begin by discussing the national level, which remains the central locus of decision-making power on the continent.

National-level decisions

While regional and local government institutions play important roles in influencing economic decisions, national institutions remain the primary decision-makers on the continent. Broad generalisations about the balance of power between different branches of government should be avoided, however, with each country having a specific dynamic as a result of its particular history and the configuration of its executive, judicial and legislative branches. However, some commonly encountered dynamics can be observed in political decision-making across Africa. Recognising these issues can provide a prompt for a more detailed examination of decision-making. These issues are now discussed further.

The balance of power between different ministries varies significantly. This sentiment reflects specific configurations of political power, as well as their influence over revenue collection and links to electoral power bases. It is not uncommon to find two or more line ministries with objectives that are in tension, and sometimes in direct contradiction. Understanding this dynamic is important when identifying opportunities to influence decision-making, as the ministry with the mandate to manage a particular issue may be reliant on, or at least obliged to consult and reflect the interests of, a counterpart ministry.

There is, as might be expected, often a **hub of decision-making power around the office of the president or prime minister**. However, it is important to note that in many parliamentary systems the executive branch can often have limited direct power over, for instance, departmental budgets. Instead, its primary power is political patronage, in that it can appoint ministers and other parties to public office. There are instances in which the offices of prime ministers and presidents have created special delivery units and task forces within government to advance specific issues. One example can be found in Tanzania, where the Big Results Now programme²⁶ to accelerate delivery of the national vision plays an important role in fast-tracking a range of decisions.

These units, where effective, act as concentrated hubs of political influence. In others, they can act as alternative power bases to established power in line ministries. Where they do exist, it is important to understand if they have the power to initiate consideration of key climate- and adaptation-relevant issues, or if they can act as a veto player.

It is often important to consider the **relationship between the national treasury, the ministry of finance and line ministries**. Treasuries play a central role in providing the funding that supports the delivery of national policy commitments and investment plans. Often, situations are encountered in which clear sector plans are developed by line ministries (for instance, for the energy sector), budget appropriations are secured and planning advances, only to experience a shortfall in the funding needed to support implementation. This investment gap often puts the treasury in a powerful position as the *de facto* enabler

or barrier to implementation, either intentionally (an alternative vision to a given issue) or unintentionally (a severe budget shortfall versus expectations).

In instances where dependency on external donor funding is high, it is also vital to consider the role of multilateral and bilateral aid. Some countries in Africa receive significant direct budgetary support, providing autonomy over decision-making. In others, funding will be channelled to specific ministries with clearer earmarking and influence over expenditure. It is important to understand the extent to which donors are directly involved in policy formulation.

Subnational level

At the subnational level, district councils, local planning bodies and regional utilities can be central to decisions over the implementation of policy. These institutions can often hold practical power over the prioritisation and location of infrastructure. In some instances, they will receive direct funding for local infrastructure from the national treasury, making them powerful agents in the decision-making process.

The strength of these local institutions can vary significantly. There is certainly a need to differentiate between non-federal and federal states in Africa (Ethiopia, Nigeria and South Africa are examples of federal and quasi-federal states on the continent).²⁷ In federal situations, a more devolved model of decision-making increases the role of districts and provinces, and of regional institutions versus the role of the central state.

City level

Cities can play an important role in influencing major economic decisions. In countries with representative governments, the concentration of electoral power makes it a necessity to prioritise urban needs. While national capitals can play a dominant role in directing and making decisions, it is not just mega-cities that are a key and growing locus of power. Secondary cities are expected to absorb 75% of new urban inhabitants over the next 30 years in Africa. This change would suggest plausible expansion in the power of local- and city-level legislatures (often city councils) and the executive branch (e.g. city mayors or mayoral committees).

While an increasing role for cities in decision-making is plausible, it is far from certain and highly dependent on specific circumstances. The legal position of city governments and their capacity to generate revenue autonomously reflects the particular economic, social and political histories of the countries concerned. For instance, cities such as Maputo operate within a Lusophone legal framework; this is very different from those operating under Anglophone systems, and suggests different models and degrees of decision-making autonomy.

In many contexts, the power of city administrations is limited. In some cities, it has noticeably been eroded. In Zambia, for instance, the government removed cities' ability to manage water and electricity distribution in the 1970s, undermining an important source of revenue. In Namibia, the removal of cities' mandate to provide electricity can be seen as having the same effect. These changes can lead to situations in which Southern African counties are not responsible for many of the functions of their own built environment.

In many cities, budgets must be approved by the national government. In some instances, appointments are made in the same way. In Malawi, a Local Government Service Commission makes all city staff appointments and the national president appoints the city's chief executives. In Tanzania, senior officials are also appointed by the central government.



Regional level

At the continental level, the African Union (AU)²⁸ is the highest representative body. Since 2008, it has adopted a set of principles²⁹ intended to bring into alignment various regional attempts at economic integration that have emerged since the 1970s, embodied by the overlapping Regional Economic Communities (RECs).³⁰ However, the role of the AU remains broadly one of harmonisation and guidance as opposed to direct decision-making. While the vision of an integrated African economic community arguably remains strong, the process for delivering it remains opaque. In many instances, in particular those related to economic decision-making on the continent, the RECs often serve as more influential bodies.

Africa's eight RECs are intended to play a central role as the building blocks of future regional economic integration. While their core focus is to promote economic and trade integration, they also play a limited role in informing and influencing a range of other relevant economic decisions. Consistent with their role in promoting trade, RECs work towards the harmonisation and expansion of transportation infrastructure. The establishment of energy 'power pools' and, in some instances, the management of common-pool resources, and transboundary issues, such as food security and climate change, are also priorities for these communities.

Decisions made by the RECs are important as they can set the framework for funding received from the AfDB. They also play a role in setting priorities that can be supported by external donors (the World Bank and bilateral donors, for example).

In a number of instances, implementation of the RECs' priorities is devolved down to specific transboundary agencies. For instance, the Lake Victoria Basin Commission in East Africa and the Nile Equatorial Lakes Subsidiary Action Program, part of the Nile Basin Initiative (NBI)³¹ play an important role in the establishment of spatial and management plans, and support the implementation of priority initiatives. In West Africa, the West African Power Pool, a collaboration between countries in the region with its base in Benin, provides an example of a growing, but still nascent, institutional player.

Sitting between the pan-African and regional institutions is the New Partnership for Africa's Development (NEPAD). As a programme of the AU,³² NEPAD is intended to support the institutionalisation and delivery of the AU's objectives and is, as a result, more overtly focused on planning. However, there continues to be uncertainty over the exact role of NEPAD and its degree of overlap with the AU. NEPAD does, however, alongside the AU, play a role in directing efforts, such as the Programme for Infrastructure Development in Africa (PIDA), which helps to set plans for infrastructure delivery in the energy, transport, ICT and transboundary water resources sectors. PIDA is a collaboration of NEPAD, the AU Commission and the AfDB, which acts as its executive agency.

The AfDB plays an important role in financing programmes across the continent and is therefore influential when it comes to implementation. Given its role in PIDA and the associated ICA initiative, the AfDB plays an active role in planning infrastructure, which accounts for approximately 40% of its lending activities.³³ The AfDB is also influential in shaping policy, providing 'policy-based' loans to member countries in the form of concessional loans predicated on the implementation of reforms (the rule of law, economic restructuring, etc.).

Chapter 3. Understanding how institutional decision-making works in Africa

3.1 Domains of decision-making

Economic decision-making in Africa is complex. The answer to the question ‘Who makes, influences and informs long-lived economic decisions?’ depends on the region, sector and issue being considered.

At this stage, it is neither practical nor desirable for this Framework Report to develop an exhaustive analysis of institutions and processes that shape long-lived economic decision-making. Instead, this phase of the project aims to develop a simple heuristic to identify some broadly distinct domains. These domains describe sets of decisions that are made in response to particular climate change adaptation challenges. From this basis, the project team will build case studies that identify sets of decision-making dynamics that may operate in each of the domains. It will also identify a set of key considerations that RCs should bear in mind when designing their specific pilots and engagements with decision-makers.

The project team has provisionally identified four key domains:

- **urban planning:** issues and decisions associated with managing the health and human safety impacts of flooding and securing urban water supplies
- **water and energy systems:** issues and decisions associated with the management of national, local and transboundary water resources in stressed regions, and the balancing of trade-offs among demand from agriculture, energy³⁴ and human consumption
- **agriculture and land systems:** issues and decisions associated with interrogating the management of agricultural production and land/rangelands across frontiers
- **flooding:** issues and decisions associated with coastal and inland flooding and saltwater intrusion from sea-level rise, with a strong focus on early warning systems and disaster management.

3.2 Identifying useful case studies

Case studies were selected based on a provisional understanding of the key decision-making areas of interest to the RCs. This was established prior to the project team having full access to all the details of each RC’s research programme. As a result, it is expected that as year one of the programme advances, the case studies in this report will be updated and refined.

The intention is that the case studies provide an overview of some of the key long-lived economic decisions that are relevant for the RCs to consider, and provide an initial foundation for identifying the decision-makers who may need to be engaged.

These case studies provide relevant counterpoints and alternative insights into decision-making that were judged to be important and broadly representative of the key challenges around long-lived decision-making on the continent. The case studies featured in this report are as follows.

- **Kafue River Basin, Zambia:** explores how economic development plans and climate-resilient infrastructure are being delivered to ensure water security



- **Ouagadougou, Burkina Faso:** explores how an expanding urban population and extreme flooding events are creating demand for new institutional structures and infrastructure
- **Rufiji River Basin, Tanzania:** explores the challenges of ensuring sustainable access to water in a highly stressed basin where expanding agricultural production, the demand for water for hydropower and climatic change are colliding
- **Maputo, Mozambique:** explores how flooding creates demands for the redesign of urban infrastructure and the delivery of flood defences
- **Senegal:** explores how land-management practices, market-access infrastructure and water management are being reconfigured to ensure the viability of dryland agriculture in a changing climate
- **Ethiopia:** explores the impact of climatic change on the management of dryland agriculture and grazing patterns
- **Lake Victoria Basin:** explores how climate change, in combination with prevailing socioeconomic trends, is expected to alter the productivity of the lake's fisheries
- **Kenya:** explores how water-sector reform is re-engineering and devolving the model of decision-making over water security and management infrastructure.

Part 2: Case studies



Chapter 4. Kafue River Basin, Zambia

Exploring how economic development plans and climate-resilient infrastructure are being delivered to ensure water security

4.1 Outline of the adaptation challenge

The Kafue River Basin is Zambia's economic hub. The basin is home to 52% of the Zambian population and provides 40% of the country's potable water. It is also home to a hydropower facility that produces 50% of all of Zambia's energy, and an agricultural area that produces 25% of the nation's maize and 90% of its sugar (which is a significant contributor to export earnings). Although currently not under stress, climate projections, in addition to population expansion and development in the basin, are likely to force trade-offs between water users. Informed decisions regarding the allocation and management of water resources in the Kafue River Basin, and in particular the Kafue Flats, are critical to ensure investments are resilient in the longer term.

Role of the Kafue Flats

To understand and adequately address the challenges of the Kafue River Basin, it is necessary to consider the role played by the Kafue Flats, a substantial area of swamp, lagoon and inundated floodplain on the Kafue River. The Flats are home to the Kafue Gorge Hydropower Facility, which provides a significant proportion of national power, as well as irrigating land and supplying 50% of the total water supply for Lusaka, Zambia's capital. Economic development in Zambia will increase demands on the Kafue Flats, as hydropower generation alters the flow of the rivers through the Flats, and ecosystem functions and water availability for productive uses (including irrigation and urban demand) are affected.

Climate variability is likely to cause major stress in the basin

Rainfall over the River Kafue's catchment is derived mainly from a low-pressure system associated with the Intertropical Convergence Zone (ITCZ). The Kafue Basin is at the intersection of the southern and north-western climate zones. As a result, it already experiences significant climatic variability as a result of the movement of the ITCZ. In years when the ITCZ moves southwards, additional rainfall occurs in the area. If the ITCZ moves northwards, the area can experience seasonal or intra-seasonal droughts.

A reduction in precipitation will have significant effects on small-scale farmers in the basin. An increase in temperatures may also cause an increase in evapotranspiration. Currently, approximately 49% of the water that leaves the Kafue Flats is attributed to evapotranspiration. As temperatures are projected to increase further, this may result in a loss of run-off for productive use. Changes in temperature and rainfall may directly impact biodiversity and natural resources by creating circumstances more conducive to the growth of alien species and less conducive to the growth of native species. For example, water hyacinth has plagued the River Kafue and now extracts significant volumes of water, clogs dams and disrupts normal ecosystem functioning.



4.2 Key long-lived economic decisions that need to be made

There are two key long-lived economic decisions that are relevant when considering water security in the Kafue River Basin.

An integrated planning and decision-making framework for managing water's role in the economy, water allocation and trade-offs between sectors within the Kafue River Basin

Multiple sectors have laid out clear expansion plans. These include hydropower, irrigation and Lusaka's urban water-supply utility. Each sector's expansion causes additional stress on the already limited water resources. The recently established Water Resources Management Authority (WRMA) has the mandate to ensure that water users are licensed and allocated their water supply. However, there is little evidence of a strategic approach to the allocation of water resources, one that takes into consideration the entire remit of government ministries and stakeholders that have a role to play. Current water permits are being reviewed, with the ambition of managing the diverse water demands in the catchment more effectively.

How to conserve the natural resource infrastructure within the Kafue Flats while developing hard infrastructure for economic and social development

Ecosystem functions supported by the natural resource infrastructure are fundamental to the Kafue Flats, not only for the Ramsar wetlands and rich environmental value of the region, but also for the livelihoods that depend on rainfed irrigation, fisheries and grazing within the Flats. However, in conjunction with keeping ecosystem functions in the Flats, there are demands for increased infrastructure development to support the expansion of hydropower generation, irrigation and urban demand. These needs must be balanced in a strategic and sustainable manner for the benefit of Zambia as a whole.

Closely associated with these two challenges is the need to build institutions that can identify and manage water resources. The Department of Water Affairs, which sits within the Ministry of Mines, Energy and Water Development, established the WRMA, a semi-autonomous catchment management institution that is supported by catchment and sub-catchment councils. It is a relatively new institution, having been established in 2002, and is not yet fully capable of fulfilling its mandate. In order to act as an effective custodian of water resources, the WRMA needs to work effectively with the National Water Supply and Sanitation Council (NWASCO) and the Lusaka Water and Sewage Company (LWSC). The NWASCO regulates the provision of water supply and sanitation services across the country, while the LWSC is a commercial water utility providing water and sanitation services to Lusaka Province. Further complicating the institutional environment are many other major institutions, such as the Zambian Energy Supply Corporation (ZESCO), which have a significant effect on water-resource availability and timing in the Kafue Flats through hydropower generation. The Ministry of Agriculture and Livestock also plays a role through the expansion of irrigation projects in the region. The mix of public, semi-autonomous and private sector institutions involved in water resources and economic development in Zambia makes the institutional framework particularly complex.

4.3 The institutional decision-making framework

One of the largest recent shifts in the institutional decision-making framework for Zambia was the establishment of the Water Resources Management Act in 2011. This was enacted by the Parliament of Zambia to establish the Water Resource Management Authority and, among other things, to provide for the management and protection of water resources and ecosystems, and to create an enabling environment for adaptation to climate change. There are still a number of other actors, in addition to the WRMA, that play an instrumental role in water resources management.

Economic development

- **The Ministry of Finance and National Planning** plays a critical role in making investment decisions for the region. The Ministry of Finance is charged with economic and national development planning and budgeting, and has financial management responsibilities. The Planning and Economic Management Division is the national think tank for moving the country towards improved development. It is responsible for preparation of the national long-term development vision, integration of the sector, and regional development programmes and strategies.³⁵
- **The Zambia Development Agency**, established in 2006 under Act No. 11, is responsible for fostering economic growth and development through promoting trade and investment and an efficient, coordinated private sector economic development strategy.

Mines, energy and water

- **The Ministry of Mines, Energy and Water Development** plays an important role and has to balance the overlapping and sometimes conflicting interests of its various subdepartments (principally the Department of Geological Survey, Department of Mine Safety, Department of Energy, Department of Water Affairs and Department of Planning and Information).
- Within the water services sector, the major decision-maker with regard to urban water supply is the **LWSC**. As a commercial utility, it is regulated by the **NWASCO**. Within the water resources management sector, there is currently a capacity gap as the **WRMA** further develops into its role as a water resources authority.
- From an agricultural perspective, the **Ministry of Agriculture and Livestock** plays a role in the provision of extension services to promote improved farming techniques.
- Within the energy sector, the major decision-maker is **ZESCO Limited**, a parastatal company operating at arm's length from the government. Although ZESCO renegotiates its contracts with the Ministry of Mines, Energy and Water Development periodically, in reality it drives the evolution of the energy system in Zambia.

Importance of the donor community

The majority of funding for the Zambian water sector comes from the donor community. In 2002, US\$33 million was provided from donors for the water and sanitation sector, representing 98% of total investments. The Government of Zambia used its own resources for the remaining 2%.³⁶ The actual investments spent are a fraction (approximately 10%) of the projected investments required for the sector.³⁷

Zambia's most important bilateral and multilateral development partners in the water supply and sanitation sector include Denmark, Germany, Ireland, Japan, the Netherlands and the USA. The largest single donor is the USA which, through the Millennium Challenge Corporation, provided a US\$355 million grant for water supply and sanitation in Lusaka, approved in March 2012. The USA also supports water supply and sanitation in 800 rural schools through the United States Agency for International Development (USAID).

In 2013, the European Investment Bank, Europe's long-term lending institution, agreed to provide €75 million for the rehabilitation and expansion of the water and wastewater services of the Mulonga Water and Sewerage Company, situated within the Copperbelt Province.

Germany supports the water and sanitation sector in Zambia through financial cooperation carried out by the KfW Development Bank and German Technical Cooperation, carried out by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). GIZ has been active in strengthening the NWASCO through a sector-information system and improved

planning capabilities. One of GIZ's largest projects is the Water Sector Reform Programme in Zambia, which has been running since 2004. The total cost of the project is approximately €17 million.

The AfDB currently supports the National Rural Water Supply and Sanitation Programme (NRWSSP) in addition to supporting the development of multi-purpose small dams. The AfDB has also been supporting the seven local authorities, in terms of institutional reform and infrastructure rehabilitation, under a project approved in 2003. In 2008, the AfDB set aside US\$52 million for Zambia's Water Supply and Sanitation Project.

Donor funding in Zambia has tended to follow a project-based approach, although steps are now being taken towards harmonisation through formalisation of the Informal Donor Group, which now meets quarterly for programmatic discussions on aid policy and common approaches and procedures.

4.4 Who is dominant in each domain?

There are specific influential institutions in Zambia that guide decisions regarding water resources management and planning.

Decisions at the implementation level are dependent on finance. The most influential institutions include the financial institutions and development organisations that provide funding or finance for investments, or assist institutional reform. One such external institution is GIZ, whose projects include the development of "legal, organisational and institutional framework conditions to improve the access that poor population groups have to clean drinking water and appropriate sanitation and to improve the integrated management of water resources."³⁸ From an internal perspective, the Ministry of Finance and National Planning plays a critical role in supporting large-scale investment projects in the Kafue River Basin.

Decisions at the strategy and planning level in water resources stem from a wide range of actors. From a water resources management perspective, funding organisations such as GIZ play a critical role in supporting the ministry in developing institutional capacity. From a national planning perspective, GIZ facilitates the drafting and implementation of Zambia's national development plans, in particular their macroeconomic aspects and monitoring and evaluation frameworks. GIZ also supports the ministry's capacity development efforts. Long-standing components of the cooperation include strengthening the budgeting process, improving the links between budgeting and planning processes, enhancing analytical capacities, and improving monitoring and evaluation procedures. These efforts are expected to promote evidence-based policy-making in the country.³⁹

At the policy level, the government, through its relevant ministries and departments, pronounces and updates the overall legal and policy framework for Zambia. The Ministry of Mines, Energy and Water Development has the legal mandate to coordinate matters on water resources management. In the spirit of cooperative governance, this ministry works with other ministries and statutory agencies.

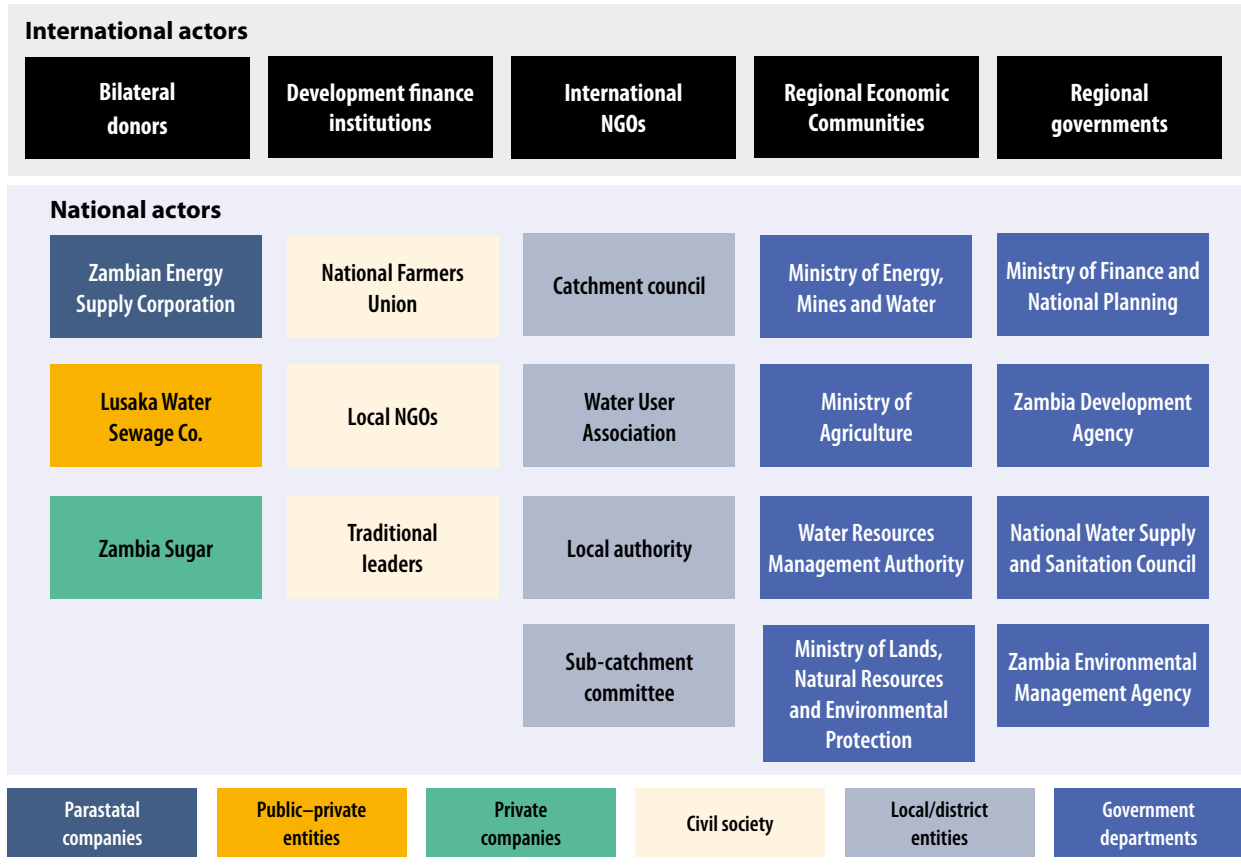
The Government of Zambia, through the Ministry of Energy, Mines and Water Development, has been instrumental in finalising water resources management reforms through the implementation of the Water Resources Management Act (2011) and the National Water Policy (2010). The major institution of relevance in implementing the policies is the WRMA.



Water Information Stakeholder Analysis

According to a recent Water Information Stakeholder Analysis for Zambia,⁴⁰ there is a range of relevant primary and secondary institutions in the water sector.⁴¹

Figure 6. Institutions involved in the Kafue River Basin, Zambia



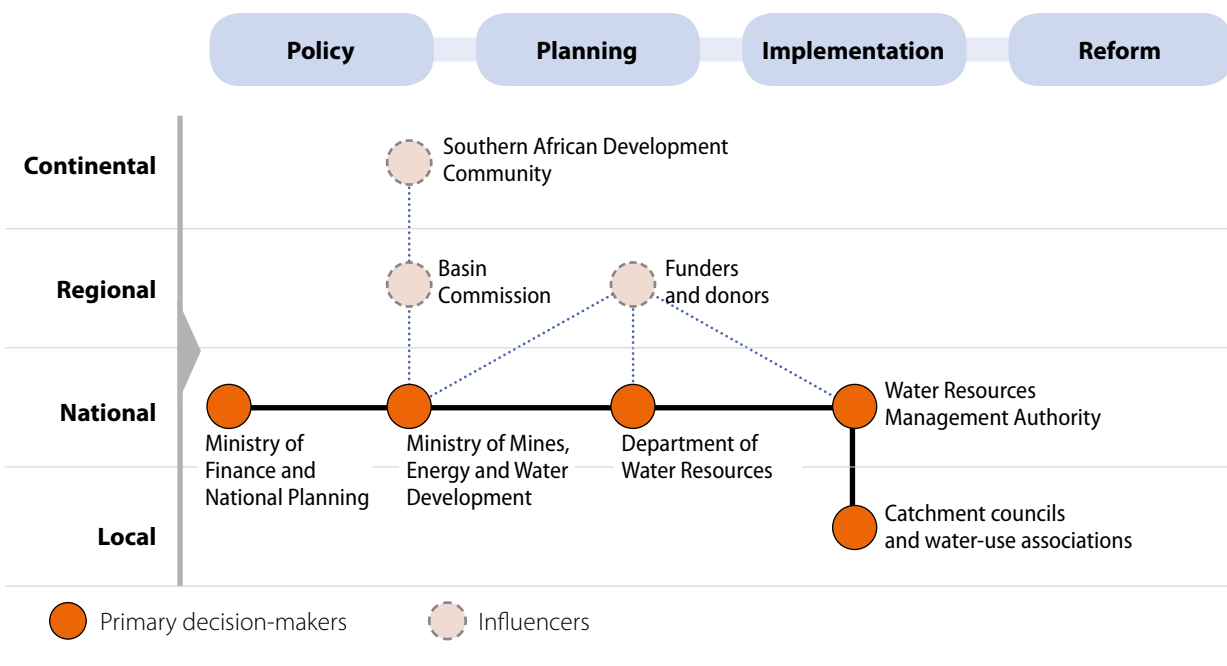
National stakeholders that are of particular importance include the following:

- ZESCO, as a hydropower generator, represents the largest water users within the Kafue River Basin. Its control over the flow within the Kafue Flats, through the Itezhi-Tezhi Dam operating rules, makes it a central organisation in the management of the basin.
- Zambia Sugar and other private companies in the Kafue Flats represent some of the largest users of water. Decisions that they make internally can have significant effects on water supply and the quality downstream of their intake and discharge points.
- The LWSC is responsible for the provision of water supply and sanitation services under the jurisdiction of its area.
- The Ministry of Energy, Mines and Water Development’s Department of Water Resources is responsible for the provision of sector guidance and policy.
- The WRMA, which falls under the Ministry of Energy, Mines and Water Development, is responsible for implementation of the integrated water resources management national policy.
- Traditional leaders have historically commanded a lot of control over natural resources. This is partly because the bulk of the land is owned under customary laws and associated with various natural resources. The traditional leaders or traditional authorities play a role

in promoting and policing sustainable methods of resource use and conservation of the environment by their subjects. This role also includes water resources. As custodians of the land and other natural resources, these leaders have the power to persuade communities to support project implementation for sustainability. They know the mandates of the local communities and local authorities over the forests and rangelands, and the benefits that would eventually accrue.

- The World Wide Fund for Nature (WWF), an international NGO with a local presence in Zambia, plays an important role in civil society, highlighting the critical role of environmental sustainability in the region.

Figure 7. Key decision-makers and influencers in the Kafue River Basin, Zambia



Chapter 5. Ouagadougou, Burkina Faso

Exploring how an expanding urban population and extreme flooding events are creating demand for new institutional structures and infrastructure

5.1 Outline of the adaptation challenge

In June 2009, heavy rainfall throughout West Africa led to the flooding of the Pendjari, Niger, Volta and Senegal rivers. The floods affected 12 countries in West Africa, killing 193 people and affecting 940,000 more. Though one of the most severe floods in the region, the 2009 flood was not an isolated incident. From 1991 to 2009, Burkina Faso experienced 11 major floods, killing 93 people and affecting 383,203 others.

Massive flooding throughout the capital has caused considerable damage to crop fields and agricultural infrastructure. In 2014, an estimated 38% of the country's GDP came from agriculture. According to the Food and Agriculture Organization of the United Nations (FAO), the Ouagadougou floods put at risk the livelihoods of small traders and small-scale producers in urban and peri-urban areas throughout the city. Families lost their houses and their only sources of income, and often required urgent assistance to begin replanting crops.

Extreme climate changes pose continuous health and financial risks for planning authorities. Climate change may affect the region through severe variations in rainfall, water shortage and low agricultural yield. According to the values adopted by the government under the National Adaptation Program of Action (NAPA), Burkina Faso will experience a 0.8°C rise in average temperature by 2025 and a 1.7°C rise by 2050.

Burkina Faso's population has doubled over the past 25 years. As the population continues to grow it will put pressure on natural resources, causing increased deforestation, depletion of the vegetation through overgrazing and resettlement of the population in flood-prone areas, among other negative side effects. Expected climate variability and change will have a negative impact on the economy of the poor, making it even harder for the 80% of Burkinabe who depend directly on agriculture.

5.2 Key long-lived economic decisions that need to be made

There are three major sets of decisions that are relevant when considering flooding in Ouagadougou and the surrounding areas.

How to build and strengthen institutions that can respond to disasters

Burkina Faso has devised numerous legislative and regulatory documents that could provide strategies to cope with climate-related disasters, including the NAPA, the National Action Plan for Desertification Control and the Action Plan for Integrated Water Resource Management, as well as other instruments aimed at regulating energy, cereal and food security policies. Yet the National Council for Emergency Relief and Rehabilitation (CONASUR), attached to the Ministry of Social Action and National Solidarity, has limited technical capacity to deal with the disasters at hand. A parallel structure, the National Council on Environment and Sustainable Development (CONEDD), in charge of promoting environment and sustainable development policies and regulation, was established to ease effective mainstreaming of key environmental management principles into national and sectoral development policies. Unfortunately there is no functional relationship between these two organisations.



How to ensure technical tools are implemented to prevent long-lived negative impacts from flooding

Throughout the country, assessment of hydro-meteorological risks and disaster prevention is carried out on a project-specific basis. In 2006, as part of the NAPA diagnostic of the country's vulnerability to climate change, an assessment prioritised risks and highlighted the most relevant threats. Although this would hypothetically allow for more realistic planning in the formulation of contingency plans, no such follow-up has been undertaken. Several research centres, subregional organisations and government groups, including the Department of Meteorology, the Directorate General for Water Resources and the Directorate General of Plant Protection, have all carried out risk assessments. Until these reports are regular, complete and collected in a one place, it will be difficult to process them appropriately.

How to implement contingency plans in light of a lack of funding

Burkina Faso developed a three-phase (pre-, during and post-disaster), multi-risk contingency plan in 2009. Three government organisations – the Food Security Information Coordination Committee, the National Stock Security Management Company and CONASUR – have worked together to build an integrated plan, but a lack of funding and trained personnel makes it difficult to ensure continuity. It is highly likely that extreme weather events will affect communities. In the absence of appropriate disaster planning, these events can have a long-term impact on decisions about community structures and where national planning funding is allocated.

5.3 The institutional decision-making framework

In this section, we discuss who makes long-lived decisions about the supervision of flood management and disaster relief in Ouagadougou, Burkina Faso.

Federal level

- **CONASUR:** Established by the government in response to the frequency of natural disasters in Burkina Faso, CONASUR operates on regional, provincial, district and village levels, with committees formed at each level. All disaster risk-reduction activities fall under CONASUR and are attached to the Ministry of Social Action and National Solidarity.
- **CONEDD:** Established by the government to address climate change impacts, promote environment and sustainable development policies and regulations, and mainstream key environmental management principles into national and sectoral policies, CONEDD focuses on climate change and is a designated national authority for the Clean Development Mechanism.

Despite CONEDD and CONASUR having a similar technical structure, with both addressing climate change and working to manage disaster risk reduction, there are huge problems in communication between the two organisations.

- **National food security programs:** During short and long crises, the food security situation in the country is managed by the Food Security Information Coordination Committee (in charge of managing the early warning system to send food into risk-prone areas). The National Stock Security Management Company (which manages the national buffer stock and ensures that food aid is granted to the state) works with CONASUR to coordinate disaster responses.
- **National planning documents:** The NAPA, formulated in 2006, assesses the country's vulnerability to climate change. The assessment determines the country's risks and highlights potential relevant threats. This document is responsible for foreseeing

Figure 8. Institutions involved in Ouagadougou, Burkina Faso

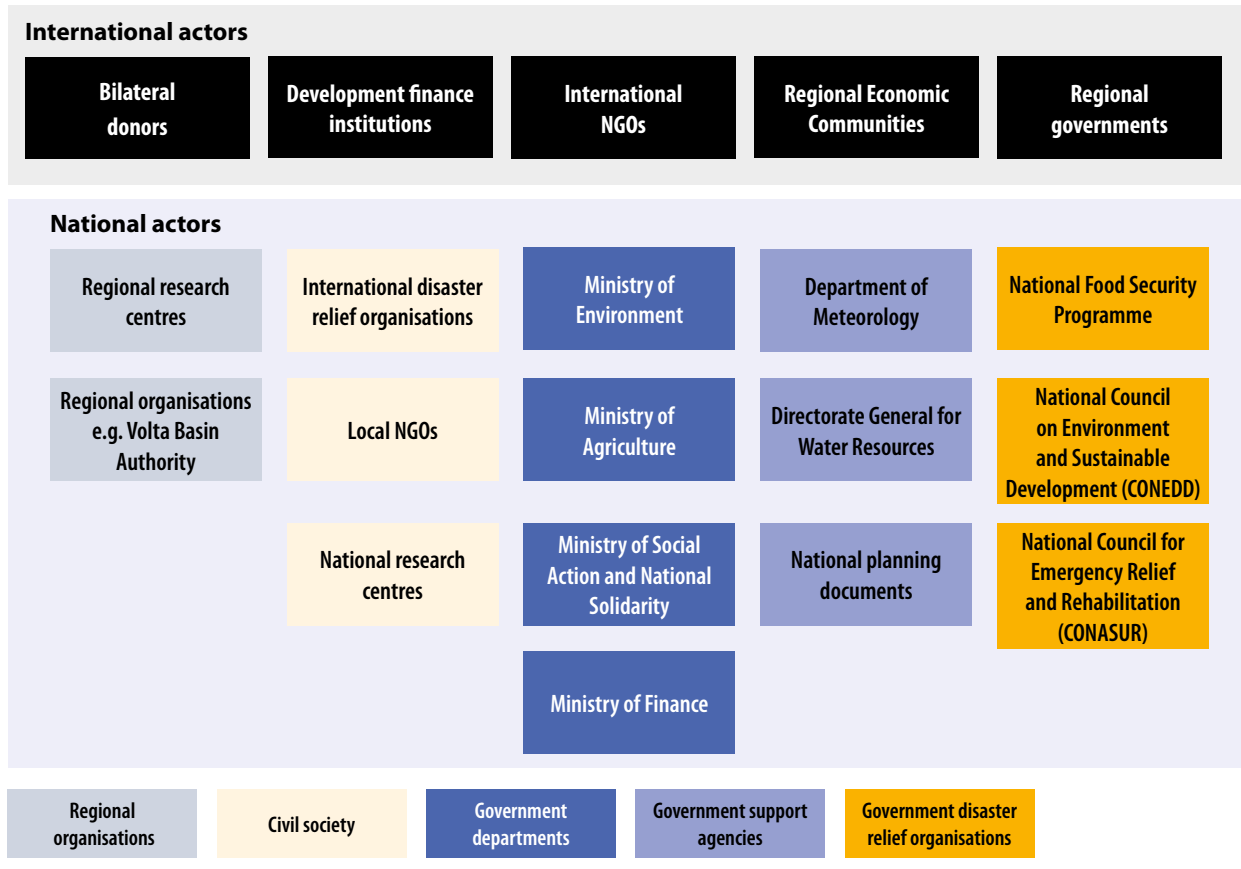
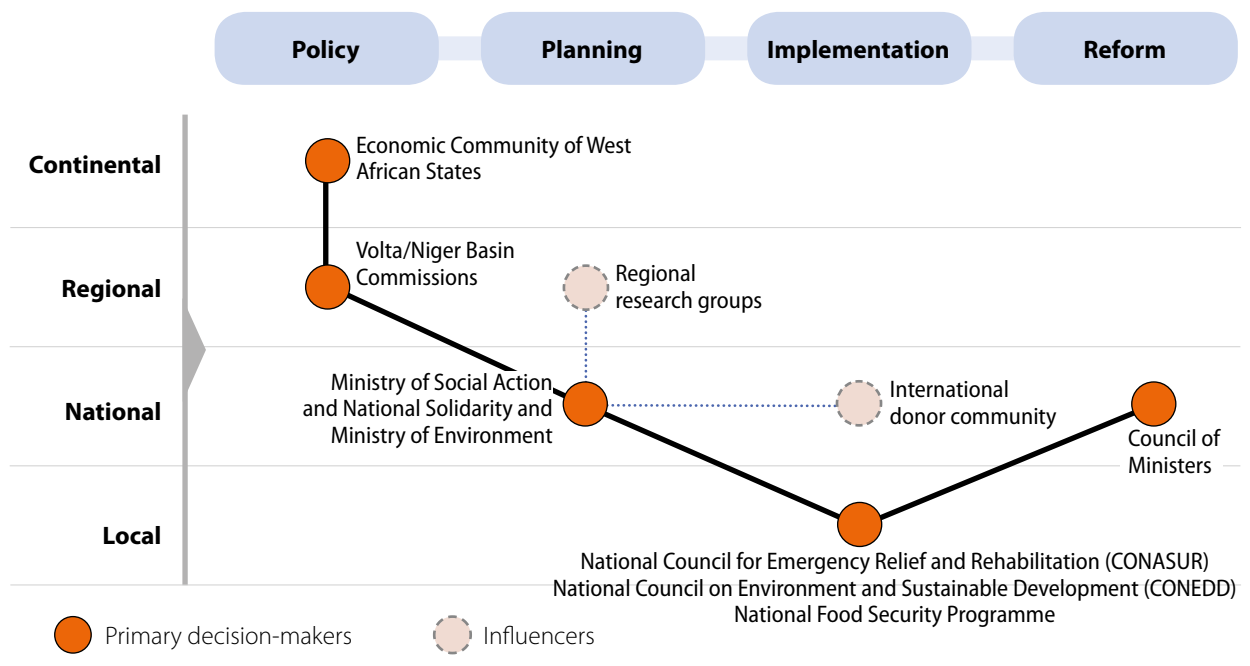


Figure 9. Key decision-makers and influencers in Ouagadougou, Burkina Faso



contingency plans in the case of a natural disaster. The Science Application and Popularization Institute supports the assessment. The NAPA is supported by the Global Environment Facility (GEF), the Japan International Cooperation Agency and the Danish International Development Agency.

- **Directorate General for Water Resources:** This is responsible for assessing and monitoring the level of major rivers and waterways through reporting stations. This information is sent on a weekly basis to provide the Council of Ministers with an assessment of hydrological data. Although monitoring is supposed to be continuous, there are often difficulties in providing real-time data.

Regional and international levels

- **Regional organisations:** Numerous regional organisations, including ECOWAS, the Niger Basin Authority and the Volta Basin Authority, are responsible for monitoring the behaviour of rivers and waterways. They are supposed to conduct spatial analyses of the vulnerability of their areas and prepare for flood risks. Often a lack of funding, poor communication between countries and a lack of data sharing make these organisations ineffective. Although there is no harmonised mechanism across the region, Burkina Faso has had some success in assessing and predicting risk through early warning systems.
- **International NGOs:** Organisations, such as Catholic Relief Services and the Burkina Faso division of the Red Cross, support CONASUR's initiatives and those of the Directorate General of Civil Protection. They note that CONASUR officials are often called in to help with disasters (also true of technical support staff from other ministries), but most are not trained in crisis prevention, management and recovery. Multilateral organisations such as the United Nations Development Programme (UNDP), WWF, FAO, Le Comité Permanent Inter-Etats de Lutte contre la Sécheresse dans le Sahel (CILSS), the United Nations Institute for Training and Research, and the World Bank have also been instrumental in supporting interventions in the area of climate variability and change. As is often the case, funding for international and national organisations related to disaster management remains limited.
- **Research centres:** Several research organisations exist at a national and regional levels. Centres, such as the West African Seasonal Forecast Centre, work to build national capacities in weather forecasting throughout the region. Others, including the University of Ouagadougou's Department of Geography and Department of Sociology, carry out research on climate change in Burkina Faso. Findings from the studies are often poorly integrated into national planning processes and, as a result, national strategies do not take potential climate impacts into account.

Chapter 6. The Rufiji River Basin, Tanzania

Exploring the challenges of ensuring sustainable access to water in a highly stressed basin where expanding agricultural production, the demand for water for hydropower and climatic change are colliding

6.1 Outline of the adaptation challenge

The Rufiji River Basin in Tanzania is experiencing significant water stress. This situation is likely to worsen without action, given the likelihood of increasing climate pressure and growing demands from the agricultural and energy sectors. Informed decisions over the allocation and management of water resources, as well as the delivery of multi-sector water infrastructure, are vital to ensure water security for Tanzania's citizens.

The Rufiji River Basin is an area of high agricultural productivity and is strategically important for Tanzania's economic growth agenda. The largest of Tanzania's nine river basins, it covers one-fifth of the country's total land area. The Basin plays a central role in the Tanzanian economy, acting as a major source of agricultural output, export earnings and employment. There is strong political commitment to increasing agricultural production and productivity in Tanzania. This is driven by economic growth imperatives and the need to support a population that remains reliant on the sector for jobs and livelihoods.⁴²

The Rufiji is central to these plans and is the location for much of the Southern Agricultural Growth Corridor, Tanzania (SAGCOT). The SAGCOT is a key strategic initiative aiming to deliver economic growth and improved food security. The plans for development across the corridor, which includes large parts of Rufiji, are extensive, with the intention to create roughly 400,000 jobs and increase agricultural revenues by approximately US\$1 billion. The government's Big Results Now initiative⁴³ is also supporting growth in the agricultural sector and pressing for expansion of sugar, maize and rice. Both of these schemes require an expansion in irrigated land and a substantial increase in water demand.

However, competition for water resources is significant. **The Rufiji is a major source of hydropower production and water for human consumption.** The Rufiji generates 80% of the country's hydropower (35% of Tanzania's electricity supply) and 49% of the total national hydro-thermal power capacity. Additional hydro-capacity in the region is already being assessed by the Tanzania Electric Supply Company (TANESCO), the state power producer.

In addition to competition with energy producers, there is growing demographic pressure on the limited water resources. The Rufiji already supplies domestic water to 4.5 million people. This demand is likely to increase as urban and peri-urban settlements grow and the SAGCOT initiative encourages higher population densities in key areas of the Rufiji. In this context, competition for finite water resources will understandably be fierce.

Climate change is likely to intensify competition for water resources, making the securing of water security a vital adaptation challenge. Climate projections indicate that over the next 90 years the average rainfall in the wet and dry seasons is expected to experience minor changes in all Rufiji sub-basins. Increased flooding and severe droughts are also expected. Average temperatures throughout the Rufiji's sub-basins are projected to increase by an average of 1–3°C (for moderate and diminishing emissions) and 3–5°C (for the aggressive scenario) and hence will bring an increase in potential evapotranspiration. This trend will significantly affect the availability of water resources in all Rufiji sub-basins, but will



be particularly stressful for the Great Ruaha sub-basin, which is already impacted by intense irrigation practices.

There are already clear signs that water insecurity is having an impact on economic growth in Tanzania. The severe drought of 2005/2006 resulted in 1% loss of GDP.⁴⁴ Similarly, the impact of drought and flooding is expected to cause losses of 0.7–1.7% of aggregate GDP by 2030.⁴⁵

6.2 Key long-lived economic decisions that need to be made

Three major sets of decisions are relevant when considering water security in Tanzania.

How to manage water allocation and trade-offs between sectors

Within the Rufiji, multiple line ministries are creating demands on finite water resources. To deliver on their respective mandates, new energy capacity, irrigation plans and urban sanitation schemes are all being planned. However, there is limited evidence of a collective approach to assessing available water resources and then testing sector strategies based on the need to allocate between sectors. Effectively, there seems to be an assumption that supply can be assured. At a national level, the National Planning Commission appears to lack the mandate or capacity to integrate sector strategies. Often sector strategies will be added into a national document without taking time to ensure that strategies do not conflict, missing a huge opportunity to build a comprehensive, inclusive, unified strategy.

How to build institutions that can effectively identify and manage water resources

Since the 1990s, the Ministry of Water has had the mandate to act as the custodian of water resources. However, its capacity to manage water resources and police allocation effectively is in question. The recent creation of River Basin Authorities, which have some degree of autonomy, has allowed for flexibility in the management of resources. However, these institutions are still new, lack technical and managerial capacity, and do not have the political mandate to engage with other line ministries (e.g. agriculture, energy, tourism) to negotiate water access.

How and where to build multi-sector water security infrastructure

There is a critical need to develop infrastructure that supports Tanzania's recent growth and continues to ensure future growth. There is insufficient storage infrastructure⁴⁶ across the country and levels of water-use efficiency are inadequate.⁴⁷ The delivery of infrastructure is hindered by poorly integrated planning processes at both national and local levels (where District Councils are key decision-makers). Climate change has the potential to exacerbate the magnitude of these challenges.

6.3 The institutional decision-making framework

In this section, we discuss who makes long-lived decisions about the allocation and management of water, and the delivery of water-security infrastructure in the Rufiji.

- **Treasury:** Although the Ministry of Water has the official mandate to manage water resources and define water infrastructure plans, ultimately it is reliant on funding from the Treasury. For example, through the Water Sector Development Plan, the Ministry of Water has defined the technical assistance and infrastructure requirements it sees as necessary to deliver water security in Tanzania. This is approved by the Cabinet but, when the new financial year starts, funding from the Treasury fails to match the spending requirements

laid out. Funding for certain projects will arrive late or not at all, curtailing the Ministry of Water's ability to act. The same pattern is seen in the Ministry of Agriculture, Fisheries and Cooperatives, and the Ministry of Energy, among others, limiting their capacity to deliver water-security infrastructure and highlighting the need to persuade the Treasury of the central role of water as an economic issue.

- **District Councils:** In Rufiji and across the country, District Councils play a significant role in securing central funding and support for multi-sector water infrastructure. Planning bodies at this regional level become significant when decisions need to be made about the exact location, size, specification and funding allocation of water infrastructure.
- **Donors:** Donors play a central role in supporting ministerial activities in Tanzania, accounting for some 8% of gross national income (GNI) from 2010 to 2014, close to 30% of total government expenditure. This funding is frequently allocated through line ministries. Donors, their selection of projects and the degree to which they factor in climate change decisions all play a vital role in shaping the decision-making process.
- **National Planning Commission:** In Tanzania, it is observable that the National Planning Commission is not actively involved in helping broker a nuanced discussion between ministries about their competing water demands – and how they may be impacted by climate change and other factors. This limits the available mechanisms for discussing trade-offs in the management and use of water across sectors and undermines inter-sector decision-making (see Chapter 12).
- **Office of the President:** The President's support for the SAGCOT initiative has been significant, as has his support for the Big Results Now initiative. The SAGCOT has been criticised for prioritising the concerns of multinational stakeholders over the impacts of water security concerns and climate change. There is some evidence to suggest that, because of the political commitment to the SAGCOT, supporting it to make enlightened and robust decisions about the location of its out-grower schemes (specifically the infrastructure needed to manage its expansion equitably) could be a valuable way of influencing a broader agenda in the Rufiji.

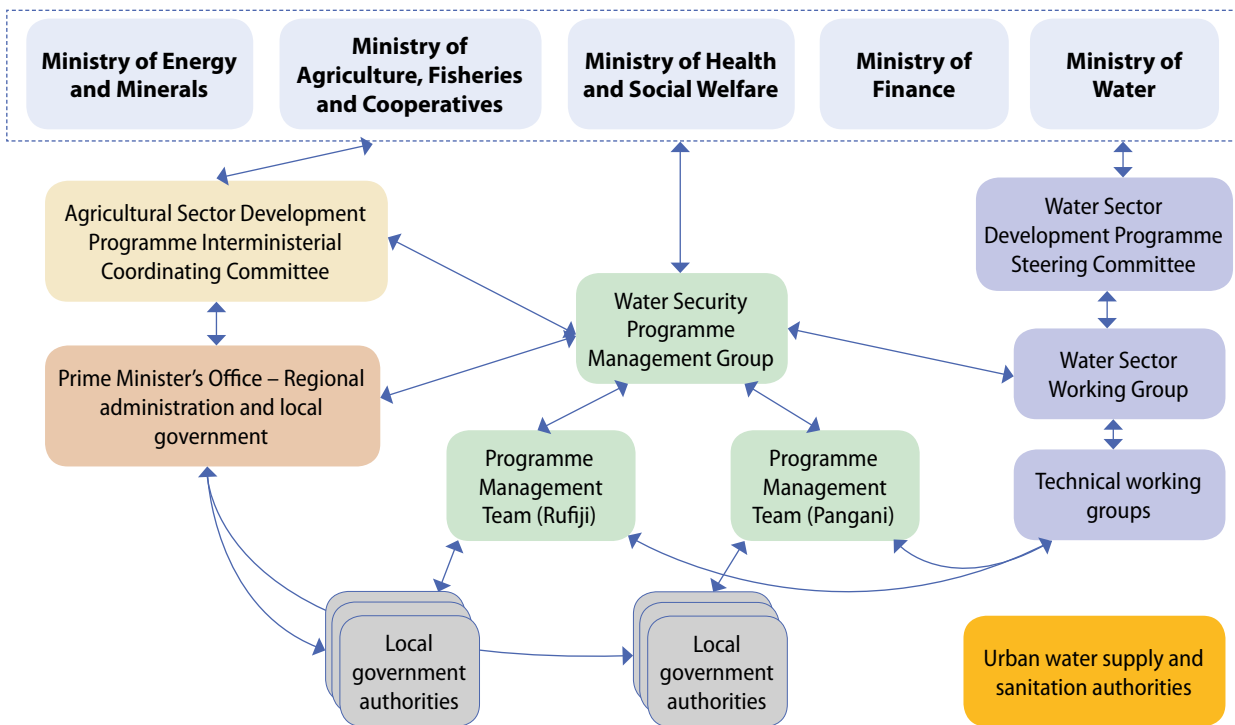
There is a lack of integrated decision-making between line ministries: in the Rufiji, the limited degree of coordination between the Ministries of Agriculture and Energy and the SAGCOT has been cited as a barrier to integrated decision-making.

6.4 Who is dominant in each domain?

The Ministry of Water, empowered by the 2009 Water Resources Management Act, is the custodian of national water resources. However, given the practical politics of Tanzania, the Ministry of Agriculture, Fisheries and Cooperatives and the Ministry of Energy also play key roles in determining the extent to which water allocations can be secured.

The Ministry of Water is reliant on the Treasury to provide the funds allocated to support the operationalisation of its strategy and integrated water resource management plans. The Ministry also receives considerable funding from donors through the Water Sector Development basket. As a result, donors exert a considerable influence on the ways in which funds are allocated in the sector.

At the basin level, mechanisms expected to manage water resources, Basin Water Boards, have been established. Supported by the Ministry of Water, the Basin Water Boards are expected to develop resource management plans and establish catchment management authorities (composed of local community stakeholders) semi-autonomously. These institutions will often need to negotiate with TANESCO as well as with major agribusinesses

Figure 10. Tanzania: Organisational structure

for water allocation. These are potentially powerful organisations and there have been instances where power production has required the diversion of significant water resources from communities to secure urban power supplies.

Similarly, agribusiness has significant water-resource requirements which, in times of stress, can create tensions with local communities. Although large agribusinesses tend to use massive amounts of water, international businesses are held to international standards and norms. The pressure from civil society, the press, international organisations and governments helps to ensure that these businesses keep their promise to promote high water-efficiency standards. Because of these standards, in some cases international businesses tend to have a less detrimental impact on the water situation than national ones.

At the basin level, District Councils also play a prominent role in infrastructure delivery, alongside local government authorities, urban water and sewerage authorities and small town authorities.

Figure 11. Institutions involved in the Rufiji River Basin, Tanzania

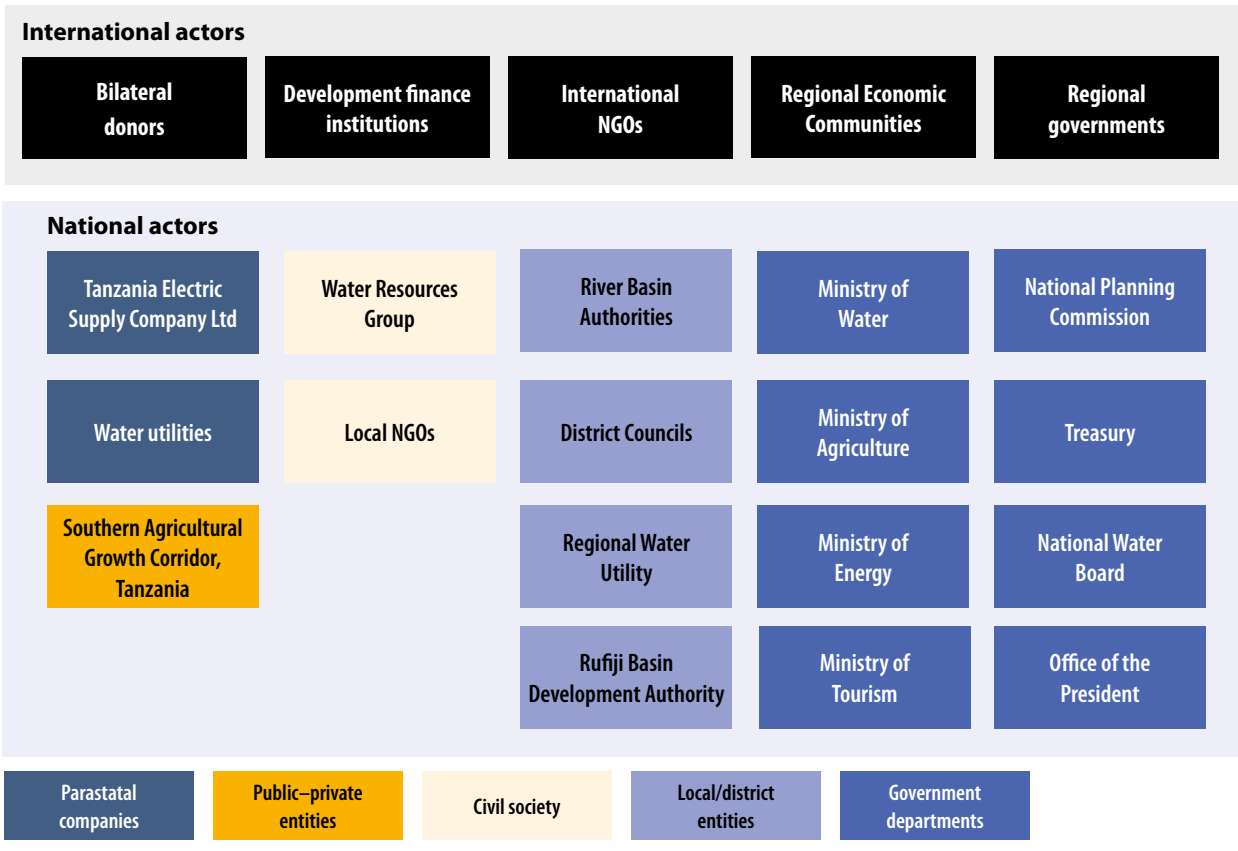
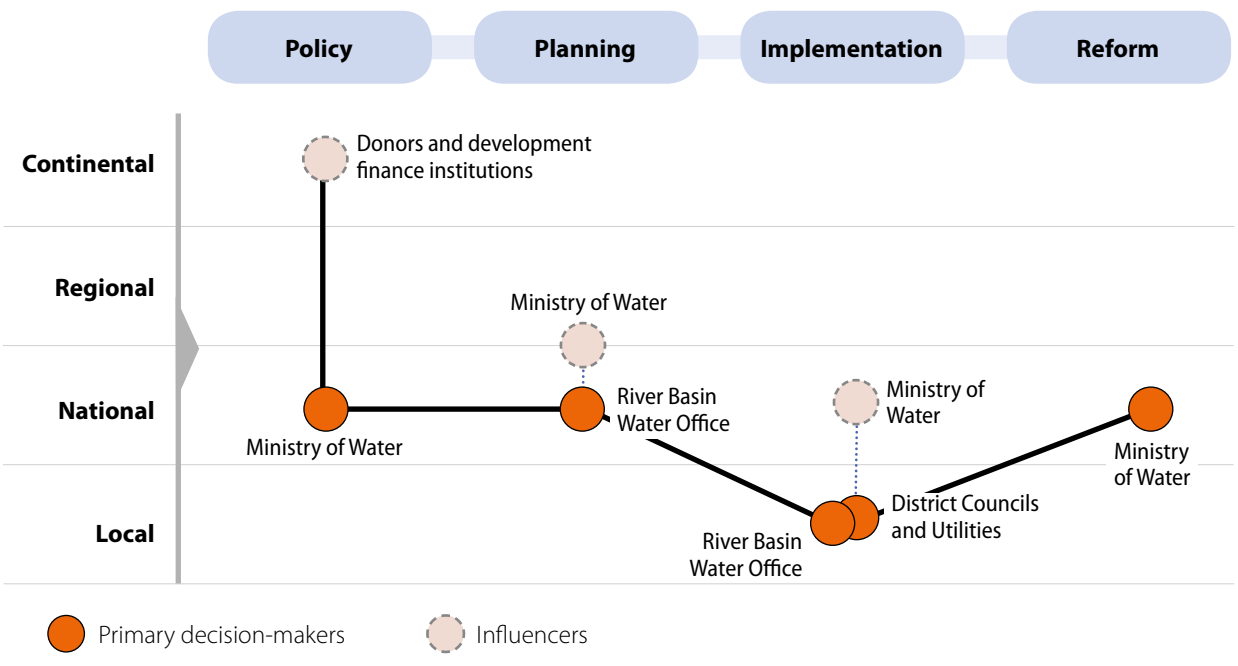


Figure 12. Key decision-makers and influencers in the Rufiji River Basin, Tanzania



Chapter 7. Maputo, Mozambique

Exploring how flooding creates demands for the redesign of urban infrastructure and the delivery of flood defences

7.1 Outline of the adaptation challenge

Maputo, located on a bay near the mouth of four large rivers, is exposed to both coastal and inland flooding. Since 2000, Mozambique has experienced 23 separate flood events, causing over US\$650 million of damage.⁴⁸ The most extreme flood killed 800 people.⁴⁹ In Maputo, these floods caused almost US\$100 million of damage and forced the evacuation of 8,400 people.

Despite climate challenges, Maputo is one of the major engines of economic growth and development in Mozambique. Around one sixth of the country's GDP is generated in the city⁵⁰ and the population has grown by 13% between 1997 and 2007.⁵¹ With one of the highest urbanisation rates in the world at 4%,⁵² Maputo is likely to continue to grow in strategic importance.

Two areas in the city have particularly high exposure to flooding: informal settlements and new developments along the coast. First, many of the informal settlements lie on marshy, flood-prone land. Up to 75% of the population of Maputo is now living in informal settlements, a response to the booming population and lack of opportunities for affordable, formal housing within the city.⁵³ Second, new, expensive developments in Maputo Bay along the Costa do Sol are exposed to damage from coastal flooding.⁵⁴

Pressures from population growth and urbanisation, coupled with substandard infrastructure and destruction of natural flood defences, have increased the vulnerability of Maputo and its citizens. Drainage and waste collection are particularly problematic, with current systems unable to deal with population levels.⁵⁵ As build-ups of solid waste continue to block drainage systems, improved storm water systems are necessary to reduce the volumes of run-off water following storms. Destruction of green areas, wetlands and coastal mangroves to provide land for use (either formal or informal) has reduced the natural absorptive capacity and increased exposure.⁵⁶

Mozambique is one of the countries most exposed to climate change, and the frequency of flood events already appears to be increasing.⁵⁷ While different climate models produce different predictions for changes in the magnitude of rain in Mozambique, the vast majority of models find that rainfall is likely to become more concentrated, with drier dry seasons and wetter wet seasons. In addition, extreme rain events, such as storms and tropical cyclones, are likely to become more common.⁵⁸ Sea level rise will also contribute to greater exposure to coastal flooding.⁵⁹

In economic terms, the expected loss to Maputo due to climate change is likely to be 3–5% of GDP by 2030.⁶⁰ The majority of these costs are the result of coastal and inland flooding.

7.2 Key long-lived economic decisions that need to be made

There are three main types of long-lived economic decisions that are relevant to flooding in Maputo.



How to build institutions to incorporate resilience into land-use planning and effectively enforce decisions

Discouraging construction in high-risk areas, as well as in areas that provide natural flood defences, can minimise the damage from flooding. It could also be necessary to provide options for the relocation of highly vulnerable populations. While mangrove restoration provides natural flood defences, it also requires rigorous planning and enforcement to prevent construction, particularly of informal settlements. Given the limitations on land within Maputo, it is necessary that all these decisions are reached through institutions that are fair, transparent and rigorous in their decision-making.

How to improve urban infrastructure to mitigate the risk of floods

As mentioned, improved urban infrastructure will be necessary to minimise damage from floods. For instance, it may be necessary to construct additional canals, reservoirs and other drainage systems. These decisions need to be integrated with improved waste disposal, as this will reduce blockages and maintenance needs for drainage systems. Constructing these systems requires significant investment as well as institutional innovation to ensure they continue to function as required.

How to improve resilience

Direct investment in flood defences has generally been found to be less cost-effective than other methods.⁶¹ Land-bank reinforcement, in particular, can be used to prevent the erosion of natural flood-prevention barriers and could be effectively employed, while sea walls and other coastal barriers, though effective, are significantly higher in cost. It will be necessary to determine whether such measures are necessary and, if so, how the investments will be financed.

Other less long-lived initiatives can also help to build resilience. In particular, community engagement and capacity-building exercises can be extremely useful in preventing climate change-related injuries, deaths and damage to property. Early warning systems can reduce the damage from both coastal and inland flooding, and seem likely to offer a strong short-term option for mitigating flood damage.

7.3 The institutional decision-making framework

There are a large number of potential players at the national level.

- **Conselho Nacional para o Desenvolvimento Sustentável (National Council for Sustainable Development):** This is the cabinet's consultative body on sustainable development, reporting to the Prime Minister's office. It is chaired by the Minister of the Environment and includes ministers and vice-ministers from each of the relevant departments, including planning and development. However, reports and stakeholder consultation suggest that it is widely perceived as weak and of limited capacity.⁶²
- **Ministério Para a Coordenação da Acção Ambiental (Ministry for Coordination of Environmental Action):** This is the agency with overall responsibility for coordination of environmental activities, intended to improve the integration of sustainable development into sectoral development plans. It appears that, as a department, it has limited political leverage and relatively low capacity. Financial resources are limited and the mandate of coordination is too weak to drive significant change.⁶³
- **Ministério das Finanças (Ministry of Finance) and Ministério da Planificação e Desenvolvimento (Ministry for Planning and Development):** These are responsible for the creation and coordination of integrated national development plans, implemented

by the various line ministries. In particular, they have direct control over the budget allocations of ministries and initiatives, and the Ministry for Planning and Development is responsible for planning disaster risk mitigation and response. However, while the Ministry for Planning and Development does contain an environmental unit, neither ministry appears to have a clear focus on environmental issues, nor do these issues appear to be strongly integrated into development planning.⁶⁴

- **Fundo Nacional do Ambiente (National Environment Fund):** This is a financially autonomous fund that provides financing for environmental activities at district and municipal levels. All funding from international donors for adaptation is required to be channelled through this fund.⁶⁵
- **Instituto Nacional de Gestão das Calamidades (INGC, National Institute of Disaster Management):** This is responsible for disaster management and response, and is increasingly adopting a proactive planning role with regard to adaptation to climate change, in addition to having a significant presence at the central level, including developing assessments of the impact of climate change on Mozambique and national adaptation plans. The INGC also has considerable presence on the ground and is heavily involved in the implementation of policies related to disaster response and relief.
- **Asset-holding companies:** The Fundo de Investimento e Património do Abastecimento de Água (the Water Supply and Investment Fund), operating under performance contracts from the Ministry of Public Works and Housing, owns the water and sewerage assets in the 13 largest cities, including Maputo. The Administração de Infra-estruturas de Abastecimento de Água e Saneamento is its sister operation, owning the water and sewerage assets in secondary towns. Together, they work with small-scale independent water providers to deliver water.

At the local level, the **Conselho Municipal de Maputo (Municipal Council)** is the most significant local player. The municipality of Maputo is governed by a directly elected mayor, who holds significant power over strategy and implementation. The Council is responsible for the delivery of a wide variety of services, including solid waste management, water and sanitation, urban roads, drainage and urban planning, and is split into a number of directorates. Outside the key directorates responsible for financial planning, capacity remains limited. Many positions are unfilled, with high staff rotation.⁶⁶

Beyond government, a range of NGOs, civil society stakeholders and international donors are involved in adaptation activities. The World Bank is particularly involved in Maputo as the funder of ProMaputo, a programme to strengthen the capacity of the city council of Maputo. The World Bank is also involved in adaptation activities through its role in the Pilot Program for Climate Resilience, which is active in Mozambique. DFID is involved in a variety of programmes, many with a focus on improving civil society participation; and UNDP was a key contributor to the development of the Mozambique Adaptation Program.

7.4 Who is dominant in each domain?

In Mozambique in general, **policy-making power** remains concentrated at the central government level. Despite consistent efforts to increase the decentralisation of power, capacity constraints are still significant in municipalities, especially outside the key directorates. Maputo is perceived to have higher capacity than most municipalities, but it remains relatively understaffed. At the federal level, line ministries participate to some extent in the determination of national development policy, but most decision-making occurs within the Ministry of Finance and the Ministry of Planning and Development.

National development policy then forms the basis for other policy decisions. While Mozambique does have a separate legislative branch, it is entirely dominated by the ruling party, the Mozambique Liberation Front (FRELIMO), and has little or no independent policy-making power. The INGC, as a coordinating body, plays a key role in bringing together relevant ministries to participate in emergency planning, and leads a technical council that produces a contingency plan each year. However, this plan focuses largely on reactive measures to deal with emergencies, rather than the proactive long-lived economic decisions discussed above.

Strategic and implementing power is somewhat more dispersed. In particular, Maputo is notable for the strength of the local mayor and municipal council. The mayor has strong control over the implementation of various local city services, and is able to make key decisions about how they are structured. Particularly relevant in this context is the municipal control of waste and drainage. However, as noted above, capacity in the municipal directorates can be weak, which limits the extent to which this power can be exercised. In addition, the decentralisation of some key infrastructure is still incomplete: the National Directorate of Water still controls some of the local drainage systems in Maputo, for instance. The central government also fully controls municipal budgets; its only independent source of revenue is cooperation with international donors. As a result, the central government effectively exercises veto power over municipal decisions. Nonetheless, given the limited desire and capacity to exercise oversight over all municipal decision-making, councils do maintain some autonomy in strategic decisions.

Chapter 8. Senegal

Exploring how land-management practices, market-access infrastructure and water management are being reconfigured to ensure the viability of dryland agriculture in a changing climate

8.1 Outline of the adaptation challenge

The agricultural sector remains by far the most important sector in Senegal in terms of employment. In 2007, when the last reliable estimate was produced, over 75% of the population earned their livelihood through agriculture.⁶⁷ Productivity, however, remains extremely low, with agriculture accounting for less than 15% of total GDP.⁶⁸ This low productivity is largely the result of low levels of fertiliser use, limited adoption of improved seeds, declining soil fertility and poor access to capital equipment.⁶⁹

The sector is dominated by dryland systems, with less than 1% of agricultural land irrigated.⁷⁰ Groundnut and millet, both raised largely through rainfed systems, account for over 50% of the harvest area.⁷¹ The main areas for their cultivation are Casamance and the groundnut basin, including regions such as Kaolack and Kaffrine. Rice is the main staple and accounts for the vast majority of irrigated agricultural activity, but remains a more marginal crop in terms of production in Senegal, accounting for only around 4% of the total harvest area, and is geographically focused in the north of the country. Instead, large quantities of rice are imported each year.⁷²

There are some risks to agriculture as a result of changes in temperature, with average temperature expected to increase by at least 1°C across the country by 2060. Temperatures are predicted to increase more in the interior than in those areas closer to the coast, with potential increases in average temperature up to 3.1°C.⁷³

Nonetheless, given the reliance on rainfed agriculture, the key climate risks revolve around potential changes in the quantity, variability and timing of rainfall. A recent report has found that 50% of the variation in total production of key crops is explained by interannual rainfall variability.⁷⁴ Yields of millet, sorghum and groundnut are also strongly associated with the timing of the onset of the rainy season.⁷⁵

Rainfall quantity, variation and timing are likely to change in the near future, though leading climate models are split on the extent of the problem. Some show decreases of up to 20% in the quantity of rain. The most extreme effects are expected to be concentrated in the eastern region of Senegal, where the majority of livelihoods are pastoral or agro-pastoral rather than purely agricultural.⁷⁶ It seems likely that the total area that is suitable for the growth of millet will reduce. Other models show little change in rainfall quantities, or even increases in the annual quantity of rain in Casamance.⁷⁷ Increases in annual rainfall have been observed from the 1990s onwards, lending credence to more positive appraisals.⁷⁸

Finally, extreme weather events – particularly droughts and floods – are likely to increase in frequency.⁷⁹ Given the dependence of most of the Senegalese population on rainfed agriculture for income, the increased frequency of droughts is likely to compromise food security and create significant hardship across the country.



8.2 Key long-lived economic decisions that need to be made

There are several potential long-lived decisions that need to be resolved to improve the resilience and productivity of the Senegalese dryland agricultural systems.

How to develop long-term strategic plans for the sector that take account of food security issues

Developing adaptable farming practices and long-term policy plans that promote resilient agriculture will be essential to mitigating the effects of climate change. These also need to consider the potential role of external trade dynamics in shaping national responses to increase food security, or to establish reserves.

How to build infrastructure for improved water management

Where possible, increased investment in irrigation could greatly improve the productivity of agricultural land. However, for much of the area currently dedicated to dryland agriculture, large-scale irrigation will not be an option. In these cases, investment in improved water management to make effective use of rainwater will become increasingly important. For instance, water-retention ponds and *demi-lunes* have both been effectively deployed in Senegal.⁸⁰ Such strategies need to be employed more widely, but it is unclear how this will be achieved.

How to build effective institutions for land-use governance

As fertile land becomes more limited due to climatic change and insufficient soil conservation, robust systems for land-use governance will become increasingly important. Senegal has pursued a policy of decentralisation, but this has not, for the most part, been effective. Security of tenure remains low, local control is still limited and agriculture is often pursued in an unsustainable manner.⁸¹ New legislation and institutions to protect, implement and enforce the rights of smallholders will be necessary to encourage investment and stewardship.

How to improve broader, enabling infrastructure for access to markets

Groundnut remains the most common crop in Senegal. With such a large proportion of the population dependent on a cash crop for much of their income, it is essential to provide the broader enabling infrastructure that gives access to markets. In particular, improved transport infrastructure is necessary throughout the country, but requires large capital investment as well as politically complex decisions on allocation.

8.3 The institutional decision-making framework

In this section, we discuss who makes long-lived decisions about the policy, management and infrastructure of agriculture in Senegal.

National level

- **President and Council of Ministers:** Despite the implementation of decentralisation policies, the federal executive remains powerful. The President, in particular, is an extremely powerful figure with strong control over policy. Key decisions are often pushed through using presidential decree, with little oversight from the National Assembly.
- **National Assembly:** This has oversight over federal policies, but remains relatively weak in comparison to the executive. For instance, it has separate lines of oversight to ensure investment is conducted along the lines determined in the Ministry of Agriculture's investment plan, the Accelerated Programme for Agriculture in Senegal.

- **Ministry of Economy and Finance:** This controls and allocates international climate finance, as well as directly controlling the budgets of line ministries. It is also responsible for the development and implementation of national development strategies, enjoying significant policy-making power. Finally, it exercises oversight over implementation of the national agricultural development programme.
- **Ministry of Agriculture:** This ministry is responsible for aspects of the design and implementation of key agricultural policies, particularly the Accelerated Programme for Agriculture in Senegal, which sets the high-level priorities for investment in agriculture.
- **Ministry of Environment and Sustainable Development:** This ministry is responsible for the coordination and implementation of policy related to sustainable development, but controls a relatively small budget. It often acts as a point of liaison with international donors and initiatives.

Local level

A range of local bodies wield considerable power in decisions on agriculture.

- **Rural councils:** These are elected locally and are responsible for land-use planning, land productivity standards, managing land allocations and the resolution of land disputes. Control over agricultural investment has also recently been decentralised, but capacity remains limited and major investment projects are still undertaken through central government cooperation with parastatals.
- **Sufi brotherhoods:** *Sufi* brotherhoods, in particular the *Tijaniyya* and the *Muridiyya*, act as brokers between the rural population and the Government. They appeared to be declining in power relative to the 1980s and 1990s, but are still very influential in local politics and land allocation, particularly in the groundnut basin.
- **Parastatal organisations and agencies:** Implementation of investment plans at the local level is often delegated to parastatal organisations. For instance, the Société Nationale d'Aménagement et d'Exploitation des Terres du Delta du fleuve Sénégal et de la falémé (SAED) is the parastatal responsible for the development of infrastructure investment along the Senegal River, working in cooperation with rural councils and associations of villages.

Finally, there are several international organisations heavily involved in agriculture in Senegal, particularly the World Bank, the AfDB and the Millennium Challenge Corporation.

8.4 Who is dominant in each domain?

The bodies in charge of policy, strategy and implementation vary depending on the long-lived decision that is under consideration. To illustrate how the system works in practice, it is useful to consider an example. Although the nature of agriculture in Senegal extends further than discussions around the rural land-allocation process, the unusually well-documented nature of land allocation can help us understand the larger decision-making structures.

Policy-making in Senegal is highly centralised, as the President is a dominant figure within the political system. The National Assembly has legislative power but, in effect, many decisions can be, and are, made through presidential decree. However, in the case of land use, much of the relevant legislation is long established. The Decentralization Law of 1996 established elected rural councils as the primary decision-making bodies with respect to the allocation of rural land rights and the establishment of productivity standards for land. The Constitution, particularly Articles 8 and 15, guarantees the right of property and prevents it from being infringed by the Government, except in cases of public necessity. Any changes to

the relevant legislation, such as the 2004 Framework for Agro-Sylvo-Pastoral Development, are likely to be led by the Government and by the relevant ministries.

Strategic choices related to land use are much more dispersed. Elected rural councils are responsible for land-use planning, including the creation of land-use standards, the management of allocation of unallocated land and the resolution of disputes. Although the Government has full authority over pioneer land, and is able to reclassify territorial land as pioneer land at will, rural councils still maintain significant control. This system allows the Government to strategically control land allocation and secure land for politically important projects.

Implementation rests largely with rural councils and powerful local elites. For instance, elected rural councils have the ability to grant or withdraw land rights on the basis of their judgement about the productivity of use. These standards are, in turn, based on land-use plans developed by the council, which allows significant discretion.

However, rural councils are often bound by local elites and operate within local customary law. In addition, the extent to which rural councils are fully functioning varies by location. In some areas they appear to be largely unrecognised by local elites and therefore have little ability to enforce decisions, which are governed entirely by customary systems. The election of members to the rural council is often strongly determined by the social standing of candidates and their endorsement by elites, which in turn shapes land-use allocation decisions. As a result, land allocations often mirror local power structures; rural councils have allocated significant land to the Mouride Brotherhood, which dominates the local groundnut industry.

Chapter 9. Ethiopia

Exploring the impact of climatic change on the management of dryland agriculture and grazing patterns

9.1 Outline of the adaptation challenge

Agriculture remains the most important sector in Ethiopia in terms of both employment and economic value added. In total, 79% of the population depend on agriculture as their main source of income; agriculture accounts for over two thirds of Ethiopia's GDP. The majority of this activity is subsistence in nature, with smallholder farmers raising rainfed crops and some limited livestock production. Increasing productivity in the agriculture sector is essential to achieving the ambitious economic growth targets that the Government has set, and improving crop and livestock production practices forms one of the four pillars of its Green Economy Strategy. While long-term economic development will require moving away from agriculture and towards industry and services, the Government is targeting a doubling of income from agriculture between 2015 and 2025, even as the workforce shrinks.

Coffee is the main export commodity, with a total export value of approximately US\$850 million per year. It is grown both commercially and by smallholder farmers. Other important crops include sesame seeds, beans and chickpeas, each of which has an export value of over US\$50 million per year. Export activity remains relatively limited, but has been growing rapidly; coffee exports, for instance, increased almost 700% between 2001 and 2011. Exports have become increasingly diversified, with revenues from the export of other crops now almost equalling the export value of coffee. Continued growth in exports will be necessary to ensure robust economic growth.

Because most agricultural crops are rainfed, current climate variability forms a major challenge to potential economic growth. Annual, seasonal and daily variability in rainfall can have significant effects on agricultural productivity. Droughts have also been a persistent problem over the past 20 years, affecting almost every part of the country at some point. Recent droughts are estimated to have reduced GDP by 1–4%. Floods are relatively common occurrences, with six major flood events occurring since 1988. Finally, soil erosion, driven by a combination of land use, rainfall, wind and steep slopes, is driving decreasing soil productivity, reducing GDP by up to 1%.

These problems are likely to worsen as a result of climate change. Average temperatures have increased by around 1°C over the past 50 years, and are likely to increase by another 0.5–2°C by the 2050s. This is particularly problematic for coffee production, as arabica coffee is a temperature-sensitive crop in terms of both yield and quality. Projected temperature increases are therefore likely to have a negative impact on the productivity of existing coffee plantations and, over the long term, to lead to changes in the areas of the country that are suitable for coffee production.

There is more uncertainty over the effect of climate change on rainfall. For instance, there is disagreement across the most prominent models over whether aggregate, annual quantity will increase or decrease. It does, however, seem to be the case that both droughts and floods are increasing. In addition, changes in the timing of rainfall are likely, which could lead to large decreases in the productivity of traditional agricultural practices.



9.2 Key long-lived economic decisions that need to be made

The issues discussed in the previous section are common across several export crops. However, here we will concentrate on coffee, as it is both the most important export crop in Ethiopia and one of the crops most exposed to negative effects from climate change. There are two major types of long-lived decision that are particularly relevant.

How to ensure the development of resilient coffee varieties that best contribute to GDP

If Ethiopia is to continue to generate significant export revenues through coffee, it will be necessary to develop improved varieties that are more resilient to increased temperatures. The lead time on these investments will be significant: it will take 25 years before investment in research and development feeds through to increased resilience in coffee yields. Thus it is not possible to wait until increased temperatures start to have significant negative effects on production. To respond effectively, it will be necessary to determine how much to invest in research and development, when it should be invested and how research will be directed. Once improved varieties are developed, it will be necessary to ensure they are widely available to the relevant smallholder and commercial farmers.

How to build long-term farming plans in light of climate-related changes

Temperature increases are likely to change the most suitable areas for coffee production. Yields are likely to decrease in areas where coffee production is currently widespread, whereas other areas will open up for increased production. Managing this transition will be a significant challenge for the current institutional structures for land-use planning and allocation, especially as coffee bushes take about five years to reach maturity. It will be necessary to proactively identify the areas that are most at risk, as well as those where potential future opportunities lie, and to take early action through strategic conservation of key areas. Monitoring should then enable early planting that pre-empts temperature increases as data begin to indicate drops in yields and quality.

9.3 The institutional decision-making framework

Political decision-making in Ethiopia is generally highly centralised. Bodies of importance to agricultural policy at the federal level include the following.

- **Ministry of Finance and Economic Development:** This is the most influential ministry, with direct control over the budgets of line ministries. The department was responsible for producing the first Growth and Transformation Plan, which set the policy framework for economic development strategy from 2010 to 2015.
- **National Planning Commission:** This sits side by side with the Prime Minister's Office and is responsible for producing the country's economic development strategy from 2015 onwards. Much of the economic analysis is carried out by individuals sitting in the Economic Policy Analysis Unit of the Economic Development Research Institute. Jointly, these two bodies exercise significant influence on the overall direction of policy, and feed directly into the sectoral strategies of relevant line ministries, including the Ministry of Agriculture.
- **Ministry of Agriculture:** This is directly responsible for producing the Agricultural Policy Investment Framework, which guides investment prioritisation and planning. It is composed of four key directorates: agricultural development, natural resources, disaster risk management and security, and women's affairs. Of these four directorates, agricultural development is the most influential and controls the majority of the budget.

- **Agricultural Transformation Agency:** This was established following the development of the first Growth and Transformation Plan to assist in increasing agricultural productivity. There is significant tension between this agency and the Ministry of Agriculture, with both bodies competing for influence on agricultural policy and strategy.

In addition, a number of international players are influential in the agricultural sector. In particular, the World Bank funds the flagship Productive Safety Nets Program, which accounts for over 50% of the agricultural budget. This programme is generally regarded as a significant success, playing a large part in preventing humanitarian disasters emerging as a result of recent droughts.

Chapter 10. Lake Victoria Basin

Exploring how climate change, in combination with prevailing socioeconomic trends, is expected to alter the productivity of the lake's fisheries

10.1 Outline of the adaptation challenge

Lake Victoria is the world's second-largest freshwater lake by area and has the world's largest freshwater fishery. Thanks largely to the introduction of Nile perch, the lake basin supports 30 million people from riparian countries. Threats facing the lake – eutrophication, overexploitation, introduced exotic species and climate change, among others – have strained both its biodiversity and those who depend on it for their livelihoods. Tackling these issues requires substantial cooperation among all the countries in the lake basin, but tension among the basin countries often runs high.

The lake basin is a hugely important economic and social resource for the communities around the lake. The lake is used as a source of food, energy, drinking and irrigation water, shelter and transport, and as a repository for human, agricultural and industrial waste. Over 70% of the population in the catchment area rely on the lake for agricultural production, predominantly for the small-scale farming of sugar, tea, coffee, maize, cotton, horticultural products and livestock. The lake supports the most productive freshwater fishery in the world, with 300,000 tonnes of fish per year, contributing US\$600 million annually to GDP.

The lake basin is also a critical support to the waterways in the area. It is the source of the White Nile River, making it hugely important for all countries within the Nile River Basin. The Owen Falls Dam, for example, has a hydroelectric power station that can provide up to 260 MW of power. The waters also support irrigated agricultural schemes in Egypt, ecological values in Sudan, tourism on the Nile River, and navigation and transport to the lower river.

The catchment area of Lake Victoria is slowly being degraded. Deforestation, soil erosion and growing human and livestock populations have caused an increase in nutrient loading to the lake from the rivers. Massive algal blooms, in particular the toxic blue-green variety, increasingly dominate the lake. Water hyacinth has also choked important waterways and landings in Kenya and Uganda (especially in the 1990s). Nutrient (phosphorus and nitrogen) inflows and atmospheric deposition have increased algal growth fivefold since the 1960s. The de-oxygenation of the water threatens the survival of deepwater fish species. Overfishing, non-native fish species and oxygen depletion all threaten both artisanal fisheries and biodiversity. Over 200 indigenous species are facing extinction.

Industrial (breweries, tanning, fish processing, agro-processing and abattoirs) and domestic run-offs pollute the lake, particularly in urban areas. Small-scale gold mining in Tanzania could lead to mercury discharge into the lake water if not well contained. Unsustainable use of the major wetlands for agricultural and industrial activities will compromise their buffering capacity.

There is no agreed policy for the overall management of Lake Victoria. The national water resources, agricultural and livestock, and forestry policies of each of the three riparian countries do not speak to the issues of lake or transboundary water resource management. Although the East Africa Community (EAC) has been assigned management of the lake, with sectoral branches (i.e. fisheries) in charge of specific aspects, there is little coordination among sectors.



10.2 Key long-lived economic decisions that need to be made

There are two major sets of decisions that are relevant when considering management of the Lake Victoria Basin.

How to build a unified lake management policy and action plan that fits with national activities

At present, the management of the lake relies on sector-led initiatives or national governments. When a problem arises, from questions of fish catch distribution to biodiversity issues, decisions are made by default or not at all. The establishment of the Lake Victoria Basin Commission (LVBC) is an important step in streamlining an agreed vision, common goals, and national and transboundary action plans.

How to involve all countries in the catchment area

While most of the issues in the basin pertain to the three riparian countries of Kenya, Tanzania and Uganda, and are thus managed by the Commission, it is important to involve Rwanda and Burundi as well as other Nile Basin countries in managing the lake and its watershed. Moreover, local communities, in addition to national governments, must be involved in the management. There have been some successful community-led initiatives, such as the reduction of water hyacinth.

10.3 The institutional decision-making framework

In this section, we discuss who makes long-lived decisions about the management of Lake Victoria. Several regional organisations operate throughout the basin:

- The **EAC** represents Kenya, Tanzania and Uganda and serves as the main regional forum for discussing management issues in Lake Victoria. The three riparian countries have designated the Lake Victoria Basin as an economic growth zone that must be managed in a sustainable manner.
- As part of the protocol for Sustainable Development of the Lake Victoria Basin, the EAC established the **LVBC** to provide a more coordinated approach to lake management.
- The **Lake Victoria Fisheries Organization** is an institution of the EAC that is specifically responsible for promoting proper management and optimum utilisation of Lake Victoria's fishery resource. It is supported by the European Union (EU), FAO and GEF/World Bank. It also commissions coordinated studies to help determine the lake's fishing effort.
- Ten countries (Burundi, the Democratic Republic of the Congo, Egypt, Ethiopia, Kenya, Rwanda, South Sudan, Sudan, Tanzania and Uganda) make up the Nile River drainage basin. The **NBI** is an initiative of these countries that aims to promote the development potential of the Nile River so as to gain mutual benefits from development. Supported by the World Bank, Norway and Sweden, the **Nile Council of Ministries**, composed of ministers of water affairs from the Nile Basin riparian countries, is the NBI's highest decision-making body. The NBI's technical arm is the NBI Technical Advisory Committee and the execution of decisions is handled by the NBI Secretariat.
- The EAC and the governments of France, Norway and Sweden, as well as the World Bank and the East African Development Bank, joined together to form a long-term partnership on the promotion of sustainable development of the Lake Victoria Basin. Examples of **large-scale donor-funded projects** include:
 - the **Lake Victoria Environment Management Programme**, a US\$75 million GEF-funded project that seeks to maximise sustainable benefits to the riparian communities

from using resources within the basin to generate food, employment and income, and to supply safe water and conserve biodiversity

- the **Lake Victoria Fisheries Research Project**, an EU-supported project that began in 1997 to assist the Lake Victoria Fisheries Organization in developing a framework for the rational management of the lake’s fisheries. This training programme also assisted the research institutes operating in the basin to carry out lake-wide research covering both stock assessment and socioeconomic studies.

At the federal level, several organisations and governments play an important role.

- Traditionally, **national governments** have regulated the fisheries industry, as well as their portion of basin management. The Kenyan Government, for example, has funded ambitious fish farming programmes in Lake Victoria, the impacts of which have cascaded to local fish farmers.
- Over 40 **NGOs** in the lake region work directly on environmental issues. The strongest level of community involved is in the fisheries sector. One prominent NGO in the region is the **East African Communities Organisation for the Management of Lake Victoria**, which focuses on poverty and environmental issues. At present, there is no long-term mechanism that guides community-level involvement in lake-basin management.

Figure 13. Institutions involved in the Lake Victoria Basin

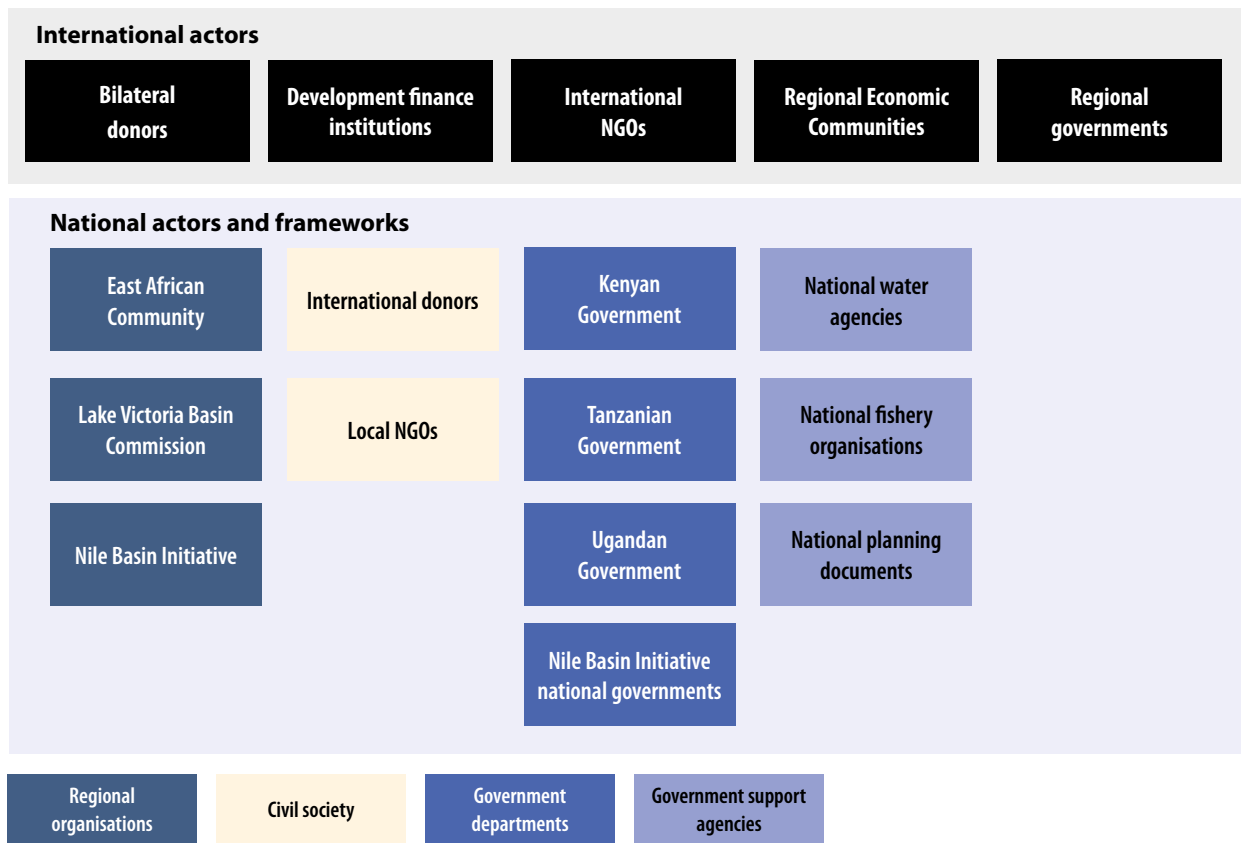
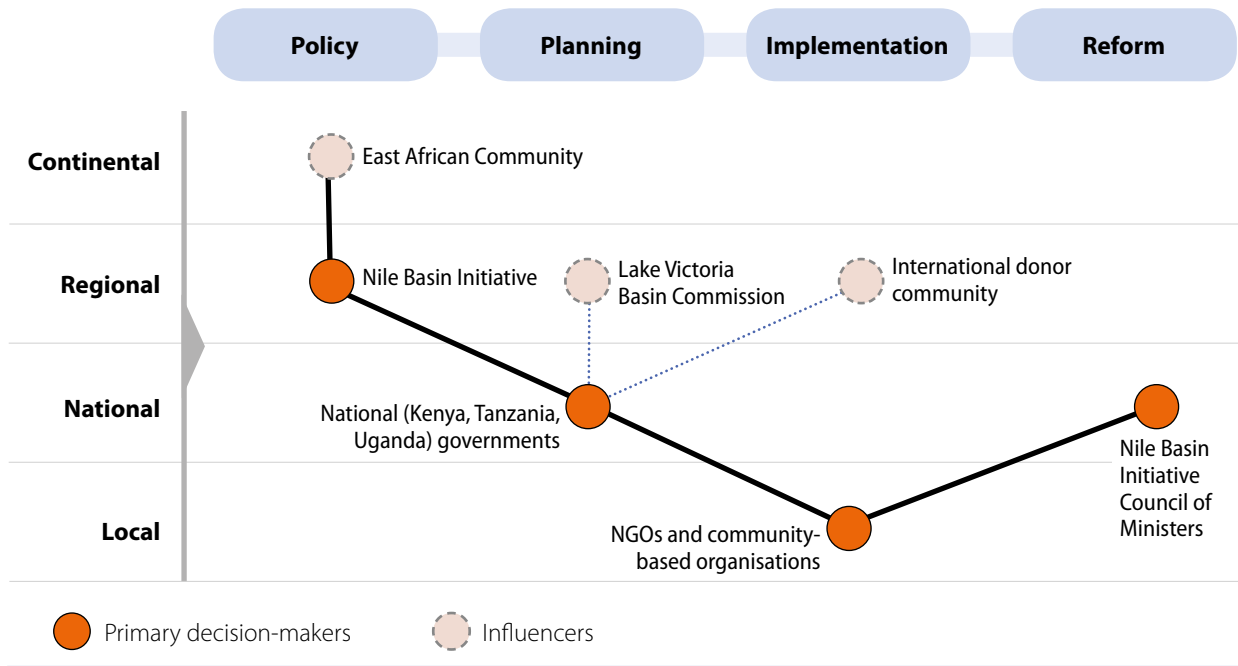


Figure 14. Key decision-makers and influencers in the Lake Victoria Basin



Chapter 11. Kenya

Exploring how water-sector reform is re-engineering and devolving the model of decision-making over water security and management infrastructure

11.1 Outline of the adaptation challenge

Kenya faces present-day water stress as a result of high population pressure, disparity in the spatial distribution of water resources, and seasonal and interannual variability in rainfall. Poor service delivery in the water sector arising from historical governance and funding deficiencies has also contributed to current levels of water stress. In a country that is already facing the challenge of reducing poverty and extending coverage of basic services to all of its people, the rising variability with climate change poses a major adaptation challenge. Overcoming these obstacles requires timely decision-making with a long-term view.

To climb the development ladder successfully, Kenya must extend its coverage of water and sanitation services, especially in rural areas. Access to basic services remains a luxury for many and a constant challenge for the state to provide.⁸² In 2012, approximately 62% of Kenya's population had access to an improved water source (55% in rural areas), and 30% to improved sanitation facilities, according to the World Bank.⁸³ There is a marked regional disparity in water and sanitation coverage in Kenya, with rural areas having negligible access to improved water supply, often resulting in women and children devoting time to water collection instead of education and productive activity.⁸⁴

Kenya's water demand exceeds its renewable freshwater resources, making it a water-scarce country. Of the various sectors, agriculture is the dominant water user, constituting nearly 80% of total water use in Kenya (as of 2007). Domestic use accounts for just over 17%, while industrial use accounts for around 3%. Between 1992 and 2007, water use by the agricultural and industrial sectors grew more than water use by domestic users.⁸⁵

In most Kenyan cities, reliable access to a networked water supply is limited. Even where they exist, municipal water supplies cannot be relied upon to provide for all the needs of its users, who typically also use informal supplementary sources such as water vendors and illegal connections. Economically marginalised areas of cities often do not have any public water supply, making low-income urban dwellers particularly vulnerable to water scarcity.⁸⁶ As a result, a slum dweller in Kenya may pay five to seven times what the average North American citizen pays for a litre of water.⁸⁷

Climate is likely to intensify this pressure on water resources, making achieving water security a vital adaptation challenge. Widespread warming has already been observed in Kenya (since 1960). Projections for a future influenced by climate change indicate an increase in heavy rainfall events, but do not suggest greater availability of water. In fact, uncertainty and variability are likely to rise.

In the context of the water sector, national-scale (Kenya-specific) studies indicate the growing importance of increasing water storage, in order to better equip the country's agriculture sector to cope with the impact of climate change on crops.⁸⁸ While several studies point to greater variability in rainfall, none conclusively suggests that water stress in Kenya will be exacerbated by climate change this century. Yet model simulations suggest that flood frequency and magnitude are likely to increase in the future in Kenya as a consequence of climate change.



11.2 Key long-lived economic decisions that need to be made

Decisions in Kenya about climate adaptation in the water sector, with long-lived implications, must focus on the following priority areas.

Improved management of existing water resources

One factor contributing to current water stress is land degradation. Even with the potential of increased rainfall in Kenya as a result of climate change, this is not expected to lead to an increase in availability of water, mainly due to increased run-off. In light of this, it seems imperative that Kenya increase its focus today on catchment management so as to reduce run-off and improve the absorptive capacity of land to replenish aquifers.

Creation of more water storage infrastructure

Relative to other aspects of rural and urban water supply, water storage seems to have received less attention. This issue becomes even more critical in light of future climate change, which is expected to exacerbate the unevenness of water distribution across Kenya and lead to more run-off from heavy rainfall events without increasing availability. The storage problem has been identified as a significant challenge for urban water supply in particular. In 2011, it was estimated that an additional US\$150 million a year is required to urgently develop additional water storage and transfer infrastructure.⁸⁹

Creation and support of policies that encourage groundwater management

According to the World Bank, Kenya does not have policies, laws and institutions dedicated specifically to the management of groundwater. While the approach to groundwater is subsumed under broader natural resources policy and land-use planning, there is a need for a dedicated approach to groundwater management.

11.3 The institutional decision-making framework

In this section we discuss who makes long-lived decisions about the allocation and management of water, and the delivery of water-security infrastructure in Kenya.

The water sector has been undergoing reform in Kenya for over a decade, starting with the Water Act of 2002. Under reforms instituted since 2002, Water Services Regulatory Boards in many areas entered into performance contracts with water companies or utilities to provide water supply services. By mid-2013 there were 100 independently and professionally run water service provider companies: 65 in urban areas and 35 in rural areas. In rural areas, various community and state-run water schemes and initiatives also play the role that water companies do, filling gaps in rural water supply.

In 2010, Kenya adopted a new Constitution, which recognised access to safe and sufficient water as a basic human right. The Constitution created 47 counties and devolved the responsibility for water supply and provision to the counties. While the initial plan was for powers to transfer to counties when they could demonstrate adequate capacity, the Government elected in 2013 decided to accelerate the transition and started allocating funding to the counties for water supply and delivery. Under the new system, and pursuant to the County Government Act, counties have the responsibility for preparing investment plans and budgets that provide adequate financing for the recurring and development costs of water service provision, including personnel and maintenance costs.⁹⁰

This transition in water governance has resulted in several institutional challenges. There are concerns about the lack of definitional clarity regarding terms used in the Constitution in relation to the water sector. These include “national public works”, “county public works” and “public investment”. There has also been confusion about whether counties have the power to charge other counties for the export of water.

Currently, there are efforts to align national level legislation such as the Water Act of 2002 with the changes brought about by the Constitution. A Water Bill was tabled before the national legislature in 2014. The draft bill proposes that the national regulator will directly enter into licensing agreements with water service providers in counties, making the role of the county governments, as well as the role of the Water Service Boards, somewhat unclear. Several stakeholder groups have raised opposition to the draft bill, stating that it does not adequately streamline water sector governance.⁹¹

Kenya developed a National Climate Change Action Plan in 2012 under the aegis of the Ministry of Environment and Mineral Resources. This plan is a high-level document and does not contain provisions that affect decision-making in the water sector. The plan articulated the need for adaptation in different sectors including the water and sanitation sector, and recommended the creation of a climate change institution at the national level to coordinate climate adaptation across all the sector ministries. In pursuance of this directive, the Kenyan Climate Change Authority Bill was passed by Parliament in 2012, and in May 2016 Kenya became one of the first countries in Africa to pass a Climate Change Act. The Act establishes a National Climate Change Council, chaired by the President, and provides an overarching national climate change coordination mechanism.⁹²

11.4 Who is dominant in each domain?

Even with the ongoing reforms and the relative lack of clarity on many aspects of water governance in Kenya, it is possible to identify a few key features of institutional responsibility in decision-making.

- **Ministry of Water and Irrigation:** The Ministry is responsible for conserving, managing and protecting water resources for socioeconomic development. It retains responsibility for developing and overseeing national sector policy and legislation; supporting counties in the provision of water services; facilitating funding for the sector (capitalised and subsidies); and overseeing sector coordination, strategy and planning. Even with devolution, the national Government (through the nodal ministry) will ‘own’ all water resources. The Government is the primary decision-maker when it comes to financing in the water sector, but it often does so in consultation with development partners (see note on Donors, below).⁹³
- **Water Services Regulatory Board:** This Government entity performs a regulatory function. It sets minimum national standards and monitors the allocation of funding to the sector and effective use of funds; adherence to minimum standards by water service providers; and provision of water services in the service area, and thereby progress towards the Constitutional right to water. In short, the Board issues licences to water service providers in each Water Services Board region. Irrespective of how future licensing arrangements take place, the national regulator will play a critical role in monitoring the sector and service provider performance.
- **Water Resources Management Authority:** This body operates in the strategy domain, formulating national strategy for water resources management. It also has regional offices, which are advised by Catchment Area Advisory Committees on issues related to water

conservation, apportionment and use; the adjustment or cancellation of permits; and other matters related to water resources management. It has the authority to cancel permits issued by the Water Services Regulatory Board.

- **Water Services Boards:** The responsibility for planning and investing (investment planning) in water is delegated to eight regional Water Services Boards, which hold the water services assets. These boards are supposed to arrange the financing and funding of assets for water and sanitation providers. However, in practice their performance on the financing and investment side has been very weak.⁹⁴ These boards could be dissolved in the course of harmonising the water sector's institutional structure with the 2010 Constitution (through the draft Water Bill).
- **Treasury:** The Treasury department created a Public Private Partnership unit to help source funding for a range of infrastructure projects. The majority of the 56 projects identified are in the transportation and energy sectors, but the list includes a few water-sector projects as well.
- **Donors:** Development funders have funded the bulk of capital investment in the water sector in Kenya since 2002 (followed by the Government and contributions from users). Development partners typically enter into agreements with the Government project by project, and this money is then lent onwards to the regional Water Services Boards (which are responsible for investment planning and the actual contracting for design and construction of urban water services).
- **National Water and Conservation Pipeline Commission:** This Commission invests in water resources delivery infrastructure. The organisation's activities have been fairly opaque, with poor governance and accountability for its assets, investments and operational performance. It is under investigation for corruption.⁹⁵
- **National Land Commission:** This Commission is supposed to guide and advise the Government on the issue of natural resources as they pertain to national policies on water.
- **County governments:** The primary responsibility of county governments is to maintain water systems and to ensure that persons living within their jurisdiction have access to water. Counties do not have the right to charge a price for water exported to other counties.⁹⁶ The Constitution envisions that counties will have authority over "county level public works" such as local water supply infrastructure and storm-water systems. Per the 2010 Constitution (and draft Water Bill), rural water supplies will be managed locally by communities and supported by County Water and Sanitation Forums. Under the new regime, County Water Service Providers will be responsible for urban (networked) water supply and sanitation services that are fully ring-fenced (in terms of revenues) and autonomously managed.⁹⁷

11.5 Insights into key decision-making dynamics

As is the case in many countries, policy and strategy decisions are in the domain of national-level decision-makers. In this case, the Ministry of Environment, Water and Natural Resources (nominally through the Ministry of Water and Irrigation and as the Water Resources Management Authority) provides guidance on policy and goal-setting. In terms of the overall decision-making landscape about climate adaptation in Kenya's water sector, the dominant decision-maker, including for long-term decisions, is the Ministry of Environment, Water and Natural Resources (in the form of the Ministry of Water and Irrigation).⁹⁸

Additionally, the authority to grant permission (in the form of licences) to service providers of water supply also rests with a national-level decision-maker – the Water Services Regulatory Board.



Funding and lending organisations and donor countries also play an influential role. These include AfDB, the French Development Agency, the EU, Finland, Germany, the International Fund for Agricultural Development, Italy, Japan International Cooperation Agency, Swedish International Development Cooperation Agency, SNV (Netherlands), UN-Habitat, UNICEF (with the Government of the Netherlands), USAID and the World Bank (International Development Association).⁹⁹

Unsurprisingly, implementation-level decisions rest at the local level. In the case of Kenya, this means the county governments that are, especially within the new system of devolution of powers, responsible for water supply provision (including budgetary decisions).

Note that some of these insights may need to be modified based on the manner in which the devolution of powers actually plays out, including the final form of the draft Water Bill of 2014.

Figure 15. Institutions involved in Kenya

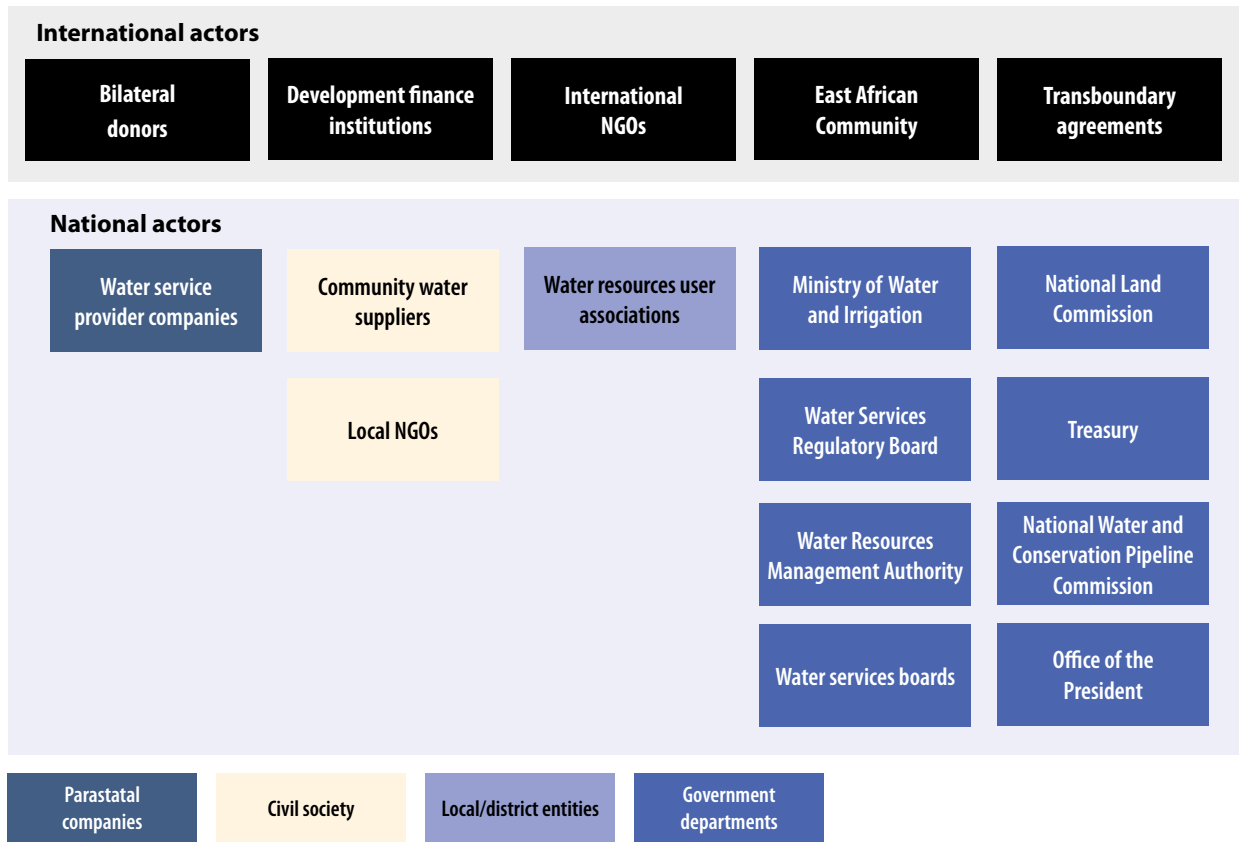
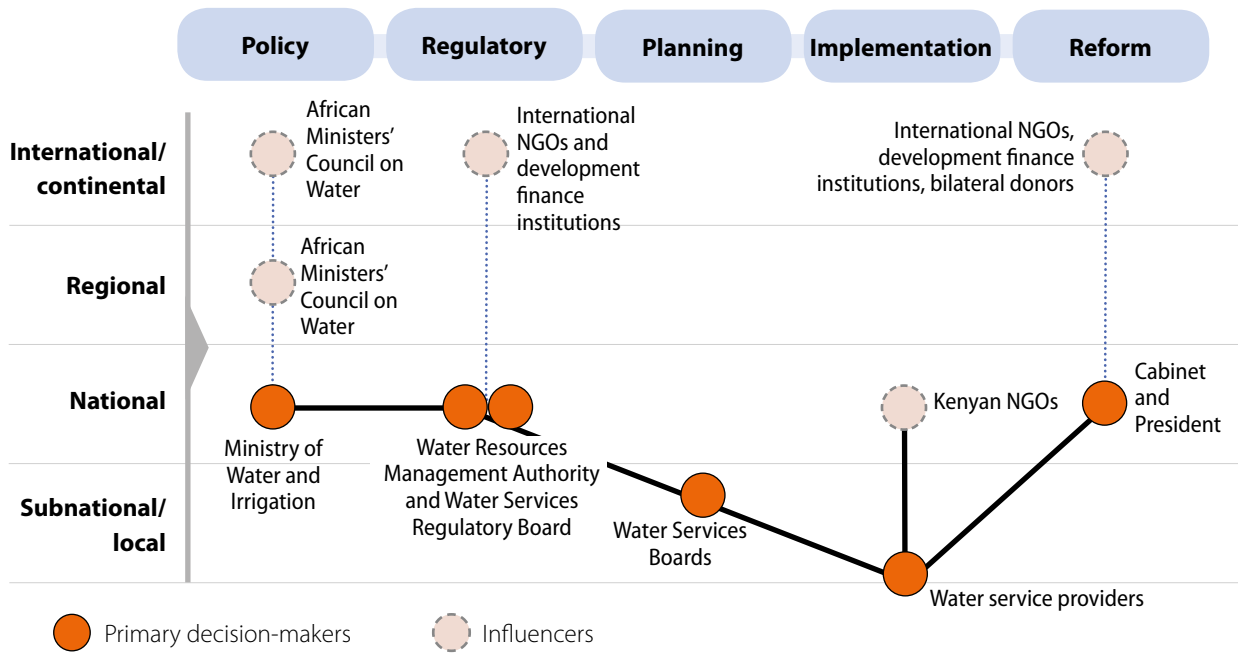


Figure 16. Key decision-makers and influencers in Kenya





Part 3: Conclusions and recommendations

Chapter 12. High-level findings

While the specific institutions that hold decision-making power differ depending on the country and issue being considered, it is important to consider **who is making the decisions, who is influencing them, and who might act as a veto player or barrier to decisions.**

Based on the case study analysis, we have identified a set of insights into commonly encountered decision-making dynamics. These insights are important to consider as stakeholders construct their own analyses of the political economy associated with issues of specific interest to them. Our analysis suggests that it is important to do the following.

12.1 Identify the strength of national planning bodies

National planning bodies can play an important role in shaping national development and economic strategy.¹⁰⁰ However, it is important to understand the extent of this influence, particularly in the context of the country being considered. In some instances, these institutions have the power to forge a national vision and promote decisions about trade-offs in the allocation of resources between sectors.¹⁰¹ In other instances, their role extends only to compiling individual sector plans developed by more powerful ministries. In these cases, they are unlikely to challenge potentially conflicting strategic plans or call into question resource requests.

Research Consortia should understand the role of these institutions and the strength of regional bodies as they suggest different strategies for influence. If a strong national planning body is in place and a planning cycle is due to end, it is critical to influence the body's design process for the next two- or five-year plan. If a new planning cycle has just started, then it may be more effective to engage with those institutions that are more closely involved in the implementation of decisions to advocate for changes. If the planning body is weak, then it may be unwise to invest time influencing a strategy that will have limited impact.

In the Maputo case study, for example, it is critical to understand how well bodies that appear to have responsibility for a key issue are integrated into the national planning processes.

12.2 Understand the power dynamics between ministries

Government departments and ministries have different levels of influence and power. The ability to raise revenue, disburse funding or manage access to critical resources (energy, land, water) can influence the relative power of ministries and make some effectively more senior and influential. Understanding which ministry has the power to take decisive decisions, which needs to be supportive, and which can act as a blocker or veto player is often important in establishing influence.

In the Ethiopia case study, for example, it is important to recognise that different parts of the same ministry can wield different levels of influence. In the Zambia case study, on the other hand, it is important to recognise the power struggle that plays out within different teams within the same ministry.



12.3 Recognise how money flows at a national level

National treasuries and ministries of finance often play a critical role when it comes to implementing decisions. Line ministries, with responsibility for management of resources and services, will often have to secure the support of the treasury in order to access funding for implementation. While sector strategies often exist on paper, the elements that are realised often depend on access to finance. This gap can lead to instances where, between donors and the national treasury, stakeholders have observed that projects are cherry-picked. It is important to appreciate the role of the treasury as a potential veto player and as an institution that may need to be persuaded to ensure capital expenditure is mobilised to support key decisions. In other instances, where funds are earmarked or protected from annual (re)allocation, this role may be less important.¹⁰²

12.4 Understand the institutions involved in local-level planning and implementation

Major elements of economic strategy are typically set at the national level. However, local institutions such as district councils and local government authorities are often expected to play a central role in implementation, local budget allocation, and decisions over where and how infrastructure is delivered. As a result of this devolution of responsibility, local institutions can have a significant influence over the final form in which services and infrastructure are delivered. In some instances, this suggests that decisions about the technical design and spatial location of infrastructure may be best addressed from the local rather than the national level.

12.5 Understand the role of donors

Donors exercise varying degrees of influence in supporting national planning and economic decision-making. The contribution of ODA to African countries' GNI certainly differs.¹⁰³ However, countries also operate with differing degrees of autonomy and manage relationships with donors differently. Some keep donors at arm's length as funders. In other instances, donors work directly with government and provide focused and technical support to the development of policy, strategy and infrastructure design (e.g. GIZ is working to prepare water sector plans in Zambia). Donors can then operate as effective influencers or initiators of long-lived economic decisions in some cases, while in others their role may be marginal.

It is also worth examining how donors allocate their funding. Some donors choose to provide general budget support while others prefer to give directly to line ministries, as they are more likely to influence policy decisions through the latter mode of giving. Moreover, it is important to understand that large donor organisations such as GIZ may be hugely influential in one country but not in others. This varying degree of influence can reflect both donor priorities and bilateral relations between donor and country.

Chapter 13. Recommendations and support for Research Consortium partners

Having explored the institutional dynamics associated with long-lived economic decision-making, we can draw some tentative recommendations to help FCFA focus its research efforts. These recommendations are provisional and not intended to be exhaustive. They reflect insights from case study analysis and the project team's engagement with decision-makers across the continent. As the FCFA programme advances, and support for RCs becomes more practical and focused on specific decisions, it is expected that lessons learned from country engagements can be used to enrich recommendations. As part of a maturing FCFA programme, it is suggested that the RCs consider how research can be constructed to achieve the following aims.

13.1 Understand the capabilities, interests and motivation of the intended audience

This report demonstrates the need for researchers to take a considered approach to understanding who is making important, long-lived economic decisions. The logical extension of understanding who is involved is to explore their *level of engagement* with scientific insights on climate change.

Evidence demonstrates that the simple information-deficit model is an insufficient basis for improving the communication and utilisation of scientific insight. In engaging with decision-makers, researchers need to consider their audience's technical background when expecting them to readily understand and digest scientific advice. They also need to be aware of the extent to which scientific insight is interpreted and sometimes reinforced by existing cultural biases.¹⁰⁴ These considerations are important in designing stakeholder consultation and engagement workshops, as well as informing the analytical outputs and the strategy for disseminating research.

13.2 Consider the motivations of decision-makers

A major implicit argument of this Framework Report is that it is vital to understand the politics that sit behind, and often create incentives for, institutional decisions in Africa. Clearly, decision-makers do not act solely to maximise utility in an economic sense. Policy-makers, bureaucrats, donors and the private sector operate in a political context. While scientific research should not be dictated by political considerations, the way it is targeted should reflect a nuanced understanding of the issues that have political traction and those areas where resistance will be encountered. Having understood this, it is possible to develop effective strategies for influencing policy. Experience suggests, for example, that formulating advice for policy-makers can gain traction when it is focused explicitly on ensuring the delivery of political and sector strategies. Positioning the building of climate adaptation can become more politically compelling when seen as a means to deliver primary economic objectives.

13.3 Help policy-makers develop the tools to deal with uncertainty

In designing research, it is important to help policy-makers develop the tools and heuristics that allow them to deal with the profound uncertainty around climate impacts. FCFA's

scoping phase identified that often policy-makers feel insufficient certainty is provided over the likely outcomes of climatic change, making the justification for one action over another difficult. These uncertainties have different origins. In some cases, insufficient data are available to estimate the probability of an event occurring. This can be overcome through effective compilation of data and distribution of probabilities. In other cases, there may be reflexive uncertainty, a result of the interaction and feedbacks between climate and socioeconomic processes (sometimes called deep uncertainty). Whatever the causes, clearly this is limiting the incorporation of scientific insights into decision-making. In Tanzania, for example, uncertainty over changing precipitation rates and environmental flows is affecting decisions over the location and operation of hydropower infrastructure. Similarly, in the Limpopo Basin, decision-makers are struggling to interpret the outputs of different downscaled general circulation models for the locations of major dams. Water planners and engineers need a level of certainty to design a project; attempting to respond to a range of climate uncertainties becomes technically challenging and financially demanding if projections are unclear.

13.4 Understand the heuristics used by decision-makers

Effective decision-support tools have yet to be widely adopted, and understanding the heuristics used by decision-makers can be valuable. Bureaucrats and managers are often accustomed to operating in stationary environments and under a logic of efficiency. These models typically centre on approaches that ask stakeholders to reduce uncertainties (by forecasting future conditions) and then analyse potential options.¹⁰⁵ Switching to a model of decision-making that needs to reflect uncertainty and build functional redundancy as part of resilience is clearly a challenge to some mental and operational models. Often, it will require an inversion of decision-making approaches. New and more adaptive decision-making models will often need to start with strategy¹⁰⁶ and explore which decisions are resilient/ attractive even under multiple scenarios.

Robust decision-making approaches can be useful in this context, as can qualitative scenario-based approaches to exploring the conditions under which different economic decisions are vulnerable or resilient. However, while these are useful tools, they are technically complex and costly to deliver. This has contributed to limited application of such tools in Africa.

Even with applied approaches such as robust decision-making, real option analysis carries a risk of failing to inform the institutions that are actively making decisions. For this reason, there is a compelling argument for starting with an analysis of the management decision-making tools and data being used by established institutions, and then working backwards to establish how climate considerations can be integrated within them. For instance, understanding how financial managers might look at infrastructure investments might suggest there is an opportunity to find simple tools that help communicate the uncertainty.

13.5 Be mindful of communicators' roles and approaches to disseminating knowledge

It is important to be mindful of the role of communicators and convenors, and approaches to disseminating knowledge. The role of communicators and boundary organisations should be considered: it is important to understand who is communicating, as well as what is being communicated. The role of science–policy intermediaries and ‘trusted messengers’ needs to be explored and appropriate approaches identified that show practical benefits.



Experience suggests that there are opportunities for new research to inform and gain legitimacy from collaborating with existing convening platforms. In some instances the pressure to hold fresh stakeholder consultations is significant. However, on a national and regional basis, efforts should be made to identify opportunities for collaboration with existing platforms to promote knowledge sharing.

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101. This can be as a result of their power to approve budget allocations, or as a result of the political legitimacy they have established (for instance, South Africa's National Development Plan).
102. This is true in cases where donors provide funds for specific objectives through earmarked facilities/funds/sector baskets that are protected from reallocation by the treasury. Even here, the treasury often has the ability to influence the timing of disbursement.
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About FCFA

Future Climate for Africa (FCFA) aims to generate fundamentally new climate science focused on Africa, and to ensure that this science has an impact on human development across the continent.

About Pegasys

Pegasys is an advisory group focusing on development impact in emerging economies.

About CDKN

The Climate and Development Knowledge Network (CDKN) aims to deliver climate compatible development. We do this by providing demand-led research and technical assistance, and channelling the best available knowledge on climate change and development to support policy processes at country and international levels. CDKN is managed by an alliance of six organisations that brings together a wide range of expertise and experience.

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