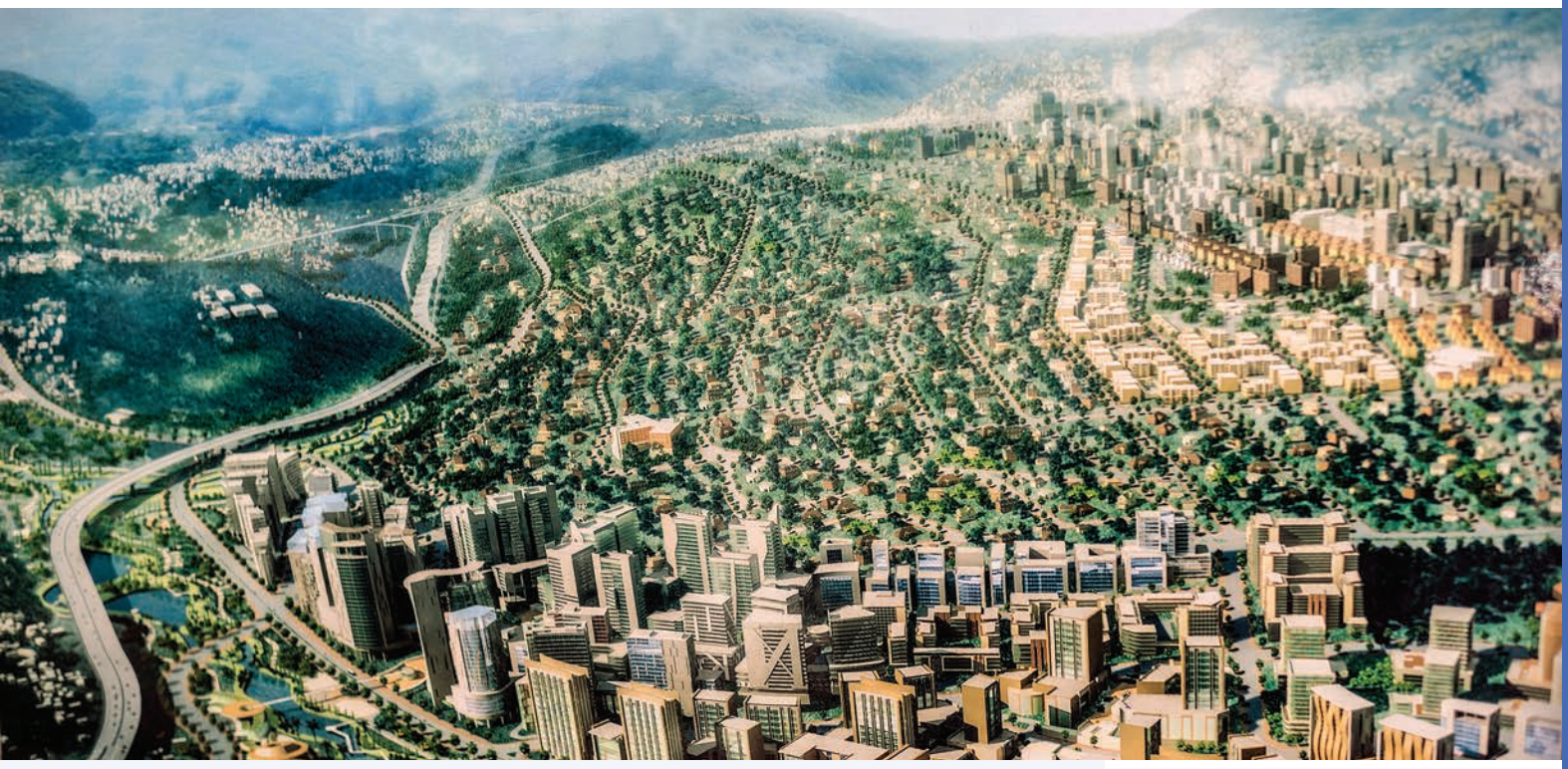
Promoting the use of climate information to achieve long-term development objectives in sub-Saharan Africa:

Results from the Future Climate For Africa scoping phase



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Front cover photo: A model of the future at the Kigali City Council's Urban planning department. The government has launched an ambitious Kigali development master plan which aims to turn the city into the 'Singapore of Africa'.

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Executive summary

While the impacts of climate change are being felt by people and communities now, many of the most severe impacts will be felt in the decades to come. This presents significant barriers to achieving long-term development objectives – particularly in sub-Saharan Africa, a region with low capacity to adapt to the future impacts of climate change. Factoring medium- to long-term climate information into investments and planning decisions is therefore an important component of climate-resilient development.

We know little about how climate information is used in Africa to make decisions with long-term consequences, or how effective it is. We know even less about the barriers to – and opportunities for – using climate information in decision-making. How, then, should governments, businesses and donors strive for climate information to achieve Africa's long-term development objectives?

The Future Climate For Africa (FCFA) programme explores these questions and seeks to challenge many of the assumptions that underlie them. To guide the programme, six case studies investigated how climate information was being used in decision-making in sub-Saharan Africa. These comprised four country case studies: Malawi, Rwanda, Zambia and a combined study of Accra, Ghana and Maputo, Mozambique; and two desk-based studies focused on long-lived infrastructure in the ports sector and the large hydropower sector. This report presents the results of the scoping phase.

How could climate information help African decision-makers achieve their long-term development objectives?

One important conclusion is that not every investment and planning decision needs to be taken on the basis of medium- to long-term climate information. Nevertheless, climate information helps to guide the sustainability and effectiveness of many long-term development objectives. Investments and planning activities in sub-Saharan Africa can generally be characterised as follows:

- **Short-term interventions with short-lived implications.** These interventions are typically focused on addressing immediate development needs; their impacts are largely limited to the project cycle – rarely extending beyond 5 years.
- **Short-term interventions with long-lived implications.** These interventions are focused on immediate, short-term development needs, but their impacts on infrastructure and livelihoods can be felt long after the programme ends – typically beyond 5 years.
- **Long-term interventions with long-lived implications.** These interventions focus on both short- and long-term development needs. Impacts on infrastructure and livelihoods extend over decades.

Many development activities in sub-Saharan Africa fall under the first category, but it is the second and third that have the strongest need for medium- and long-term climate information to be considered within the decision-making. Examples of this are large ports and dams, health care systems and school infrastructure.

School, Kigali, Rwanda

Why isn't climate information currently being used for long-term development planning?

The FCFA case studies find few examples of climate information being meaningfully integrated into the planning of long-term development objectives – despite the large number of decisions with long-lived implications. Why is this? There are many reasons, but three stand out:

1. The immediacy of short-term development challenges in many sub-Saharan African countries inevitably focuses decision-makers' attention on shorter timescales.
2. Medium- to long-term climate information is often ill-suited to informing the local economic, social and environmental considerations that dictate investment trade-offs in Africa, owing partly to uncertainties at high-spatial resolutions and a lack of integrated assessments of climate impacts, vulnerability and adaptation across much of Africa.
3. There is a communication mismatch between the producers and users of climate information. The information delivered to decision-makers is often overly technical, ill-suited to their needs, and can easily lead to a misunderstanding of the associated uncertainties. Likewise, decision-makers' needs are rarely fed back to science producers. A lack of effective boundary organisations to act as intermediaries among scientists, policy-makers and practitioners remains a clear gap.

What opportunities are there to support the greater use of climate information?

Targeted investments are needed to better integrate science into decision-making and support the capacity of African climate science, its researchers and its institutions. There are several ways to do this:

1. Support Africa's climate observation network and build the capacity of scientific institutions. Significant opportunities exist to increase the quality and quantity of Africa's observation networks and infrastructure, and digitise the large swathes of unarchived historical data that are currently inaccessible to many researchers. There are also opportunities to support the capacity of African climate scientists and relevant scientific institutions. Although some international and regional centres provide capacity support to a handful of regional scientific and meteorological centres, these investments are currently limited in scope and size.

2. Improve the usefulness and relevance of climate information. One of the clearest demands from the decision-makers consulted during the FCFA scoping phase was the need for sector-specific impact analyses that weigh up the implications of various policy options. Greater support for region-specific integrated assessment modelling and, where relevant, strengthening its use among decision-makers, may promote an evidence-based approach to long-term decision-making. Enhancing the accuracy and communication of near-term decadal climate predictions[1] may also offer advantages in providing information that can be acted upon within the timescales relevant to many decision-making processes. However, these tools should be used carefully, given the scientific and technical challenges that remain.

3. Recognise and overcome political and institutional barriers. Many of the biggest barriers to using climate information relate to institutional mandates, hierarchical structures and a lack of adequate incentives. Investing resources – time and money – to assess the local political context and engage with local partners can lead to more effective communication and better use of this information. This requires a shift away from short funding cycles,

Mine workers, Zambia

rigid targets and donor-driven agendas, towards longer-term partnerships that embed interventions within national policy processes.

4. Help decision-makers to make robust decisions despite uncertainty about the future climate. Despite considerable advances in our understanding of the climate system, large uncertainties are likely to remain, regardless of future investments in climate science. It is vital that there is more understanding about the limits of climate information. Helping decision-makers to select and use systematic, evidence-based approaches that acknowledge this uncertainty is important.

What can we learn from the approaches used by the FCFA teams?

The FCFA scoping phase provided insights into the ways in which scientists and policy-makers can be brought together to discuss climate information. The case study workshops highlighted several points, including:

1. Longer-term engagement among donors, knowledge brokers, and science users and producers is needed to achieve meaningful policy impacts. One-off activities such as workshops are a common approach to capacity building and knowledge-sharing, but they rarely lead to effective and sustained learning and action. To arrange and facilitate a workshop effectively, the organisers need to understand the local institutional and political contexts well.

2. Knowledge brokers should consider carefully whether a workshop is the optimal form of engagement. While traditional workshops can allow for effective discussions and the sharing of ideas, all six case studies showed that workshops must be well designed and facilitated to lead to meaningful engagement among different stakeholders. In addition, expectations of financial compensation for attendance can negatively affect who and how many people choose to attend.

What are the ethics of promoting medium- to long-term climate information in decision-making?

Promoting the use of climate information in long-term decision-making raises important ethical questions. Experiences from the case studies indicate that prioritising long-term development perspectives is often at odds with addressing existing efforts to meet basic human needs and find pathways out of poverty. Even in the case of longer-lived infrastructural investments and plans (such as hydropower dams, or spatial design and urban planning), high discount rates, short political time-horizons and large uncertainties reduce the incentive for accounting for long-term climate change.

Should donors, governments and knowledge brokers be pushing for the inclusion of medium- to long-term information in development planning where decision-makers have expressed a clear desire to prioritise immediate development concerns? How should external actors engage with decision-makers in places where there is little knowledge of, or enthusiasm for, the inclusion of medium- to long-term climate information in planning? Sadly, few donors, development agencies or governments are willing to address these questions. Above all, the organisations and people responsible for developing and communicating climate information should be aware of the social value of the information they provide, and the legitimacy of the goals pursued by policy-makers. It is important that they adhere to principles of honesty, precision, transparency and relevance when communicating climate information.

Fishermen, Malawi

Part 1: Findings

Chapter 1. The FCFA scoping phase

Factoring climate information into the design and implementation of long-term investments and planning decisions is vital to climate-resilient development.[2] This is particularly true in sub-Saharan Africa, where the impacts of climate change on development outcomes are likely to be significant and long term.[3] Yet we know little about how climate information is used across the region to make decisions with long-term consequences, or how effective it is in guiding investment decisions. We know even less about the barriers to, and opportunities for, the uptake of climate information. It is these questions and assumptions that the FCFA programme aims to explore, test and challenge.

FCFA is a 5-year international research programme jointly funded by the UK's Department for International Development and Natural Environment Research Council.[4] The programme supports research and capacity-building activities that foster better understanding of climate variability and change across sub-Saharan Africa, and promote the use of long-term climate information in decision-making over different time frames (see Box 1).

FCFA works on the premise that producers of climate information must be supported in improving our understanding of sub-Saharan Africa's climate system. However, more accurate and precise climate information is unlikely to improve decision-making on its own. How climate information is communicated to, and used by, decision-makers will be of equal, if not greater, importance in making Africa's development more climate-resilient. Wider factors, including political-economy issues, governance arrangements, and responses to other drivers of development and environmental change, also need to be considered.

The programme's 18-month scoping phase investigated real-world adaptation challenges to explore how climate information is used. The country case studies examined were: Malawi, Rwanda and Zambia, and a combined urban case study in Accra, Ghana and Maputo, Mozambique. Two desk-based case studies focused on long-term infrastructure: ports and large hydropower. These studies tackled questions such as: what types of investments and planning decisions are likely to be affected by climate change in the longer term? Is climate information being considered in such decision-making processes,

Box 1. Time frames for climate information and decision-making

This report describes time frames in relation to decision-making and climate information. Neither has universally agreed definitions but to avoid confusion, we use the following:

- For decision-making by governments, civil society or non-governmental organisations (NGOs): 'short term' refers to a time frame of less than 1 year; 'medium term' refers to 1–5 years; and 'long term' refers to more than 6 years.
- For climate information: 'short term' refers to the seasonal characteristics of the climate up to one year in duration, typically associated with 3-month seasonal outlooks and El Niño Southern Oscillation forecasts; 'medium term' is 1–10 years in timescale and includes projections that fall under the remit of initialised decadal projections (although these are rarely useful for decision-making in sub-Saharan Africa); and 'long term' refers to multi-decadal climate information, typically associated with the Coupled Model Intercomparison Project Phase 5 (CMIP5) or long-term trends in historical observations.

and in what format? How can scientists and policy-makers be brought together to promote the better use of climate information, in policy and practice?

This report synthesises the key lessons from the scoping phase, reflects on the activities undertaken, and uncovers the opportunities and barriers to the effective use of climate information to achieve long-term development objectives in sub-Saharan Africa.

1.1 Case studies and methods

The six case studies in the FCFA scoping phase were selected to ensure a diverse range of geographical, political and economic contexts, as well as reflecting a wide variety of adaptation challenges (Figure 1).

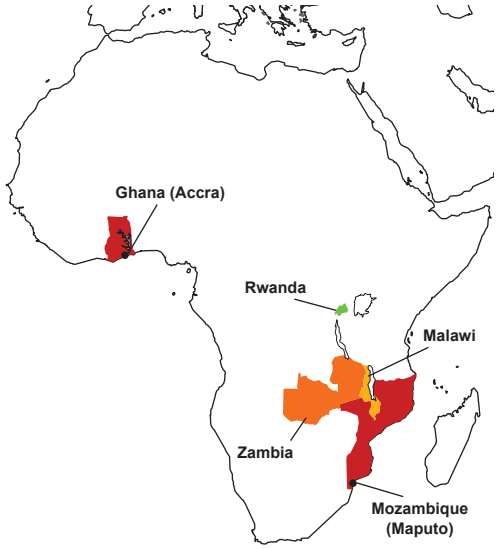
The research methods included semi-structured interviews, desktop research, and multi-stakeholder workshops and meetings. Each case study is briefly summarised below. For further information about the activities and research methods used, and the specific outcomes from each case study, please refer to the full technical reports.[5]

Urban adaptation: Accra and Maputo

Project coordinators: University of Cape Town, South Africa; START, USA; Stockholm Environment Institute, Sweden

This case study brought together groups from Accra, Ghana, and Maputo, Mozambique, in a participatory workshop held in Accra. Participants from both cities considered a common adaptation challenge: how can large coastal cities contend with increased flood risk? The team piloted a novel 'co-exploration' approach to adaptation decision-making, in which facilitators and participants collaborated to explore the vulnerability of a specific

Figure 1. Location of FCFA country case studies



place to various climate and non-climate stresses. This approach used responses to wider development issues, such as urban planning and drainage, and asked the participants to use information on climate impacts to narrow the options down so that they were climate-resilient. The assessment process was used to develop draft policy recommendations and city-specific messages on climate change adaptation.[6]

Food security, disaster risk management and social protection: Malawi

Project coordinators: Kulima Integrated Development Solutions, South Africa; University of Leeds, UK

This case study focused on food security, disaster risk management and social protection. Interviews with government and non-governmental stakeholders explored the current nature of decision-making processes and policy-making across these sectors. Alongside this, the team conducted an assessment of the use of climate information for long-term planning. A multi-stakeholder workshop used role-play and simulations of development situations to help participants identify the differing needs of farmers, planners, community workers and other information users, as well as new opportunities to work with them. A 'serious game' examined the role of uncertainty in climate predictions, with groups 'paying' for information with varying degrees of certainty within a disaster-management scenario. These activities encouraged participants to discuss how they make decisions in their current role, and raised questions about the climate information that is most relevant to them.[7]

Climate fund management, hydropower investment and social protection: Rwanda

Project coordinators: Global Climate Adaptation Partnership, UK; Met Office, UK

This case study looked at the adaptation challenges relating to the management of Rwanda's environment and climate change fund, hydropower investments and social protection activities. The approach differed from the others. Instead of a consultative workshop, bilateral meetings were held with key stakeholders in these sectors. The aim was to gain a deeper understanding of the needs of specific information users. A detailed assessment of existing literature and a review of Rwanda's information needs were conducted prior to these meetings to allow the team to identify the most relevant stakeholders.[8]

Transport infrastructure, health, agriculture and environment: Zambia

Project coordinators: Red Cross/Red Crescent Climate Centre, Netherlands; Met Office, UK

The Zambia case study promoted dialogue among and between decision-makers and climate scientists. Interactive workshops held in Livingstone provided a forum for stakeholders to present the adaptation decisions they confront in their work, and share ideas about the types of information that are most relevant and usable. During the first workshop, held in June 2014, participatory games helped attendees to understand medium-term climate projections. These were then used to define criteria, protocols and decision-support mechanisms for turning science-based information into recommended courses of action. A second workshop, in September 2014, sought to communicate these earlier results and match users' needs with information provided by the UK Met Office.[9]

Sogloulou dam, Cameroon

Long-lived infrastructure in Africa

Integrating climate information into the planning, implementation and maintenance of long-lived infrastructure (infrastructure built to last for a long time) is extremely important, particularly given the scale of financial investments and length of operational time frames for these projects (which often span decades). Through a review of existing literature and informal engagement with relevant experts, the scoping phase produced two reports on the use of climate information for ports[10] and large hydropower schemes in Africa.[11]

The main objective was to provide evidence of the risks and opportunities that climate change presents, and the use of climate services to inform decision-making with long-lived consequences in Africa (see Box 2).

1.2 Synthesising the lessons learned from the scoping phase

In order to compile, compare and synthesise the insights gathered during the scoping phase, the authors carried out a series of analyses. First, to learn from the case studies, we analysed the six technical reports from the case studies, as well as other written outputs from these. Second, we gathered qualitative information about the approaches used, based on semi-structured interviews and feedback from case study teams, as well as further interviews with the individuals consulted during the case studies and participant observations, both before and after the in-country activities. Third, preliminary assessments and lessons learned were presented at a validation workshop held in Cape Town, South Africa. Representatives from all four country teams attended this, gave their feedback and helped to identify the main lessons learned.[12]

The rest of this report presents the synthesised findings of these analyses, including key messages for scientists, decision-makers and climate-information users, in sub-Saharan Africa and beyond.

Box 2. Climate information and climate services

In this paper, we define 'climate information' as the collection and interpretation of climate-related data. Climate information can consist of the analysis of, among other data: historical observations of the past and current climate; future projections over multiple timescales, typically achieved through various climate- and earth-system models; and climate impacts, vulnerabilities and adaptation options, which require information and analysis from the fields of economics and other environmental, social and political sciences.

Making climate information accessible, timely and relevant can help countries cope with current climate variability and limit the economic and social damage caused by climate-related disasters. Climate services do this through the interpretation, communication and use of climate information to inform decision-making. Climate services ensure that the best available climate information is effectively communicated to people working in sectors such as agriculture, water and health, so that they can develop and evaluate mitigation and adaptation strategies. Climate services also allow communities to build their own resilience to future climate change and take advantage of opportunities provided by favourable climatic conditions. To be effective, climate services need information producers, interpreters and users to have technical capabilities and active channels for communication and exchange.

Chapter 2. How could climate information help African decision-makers achieve their long-term development objectives?

Key messages

- Through the effective use of climate information, decision-makers can make investment and planning decisions that are proactive, durable and robust. Effective use of climate information also minimises the risk that decisions will adversely affect – or increase the vulnerability of – other systems, sectors or social groups.
- Long-term climate information is not necessary for every development initiative, but it will be crucial to the sustainability and effectiveness of many targeted investments and planning decisions (particularly long-term investments with long-lived implications).

This chapter examines the rationale for using climate information to make decisions about long-term investments and projects. Then, building on examples from the case studies, we look at different situations in which it is appropriate to use this information.

2.1 The rationale and guiding principles for using climate information in decision-making

The importance of using climate information to guide decision-making is founded on two issues related to the efficiency and effectiveness of planning and investment decisions. First, understanding climate change and its potential impacts enables projects to be planned and designed in such a way that they can adapt to these changing conditions in the future. By doing this, countries can minimise the losses that climate change might cause, and take full advantage of any opportunities it may offer. This helps to ensure the longer-term sustainability of investments or decisions, and avoids decision-makers choosing development paths that will limit future options. Second, using long-term climate information can protect countries from making decisions in one sector that might damage other systems, sectors or social groups, or increase the vulnerability of people and communities – a process known as 'maladaptation' (see Box 4, page 18).[13]

The World Resources Report in 2011[14] highlighted the importance of climate information for decision-making in the context of change and uncertainty, outlining a number of principles for its effective use. The report argues that for climate information to be relevant, it should be:

- user-driven, taking into account inter-cultural considerations, and therefore of practical application to communities, civil society, the private sector and other stakeholders
- sufficient in scope and scale to draw effective conclusions for plans and policies, and to make clear the uncertainties, limits and available opportunities
- accurate enough to support risk and vulnerability assessments, and help define what levels of risk can be accommodated
- accessible to those who need it to adjust their actions or behaviour
- supported over the long term and frequently updated, since many climate impacts will take place over decades
- cost-effective, given that limited resources are available to support information-management systems
- targeted to specific risks, vulnerable populations and ecosystems, in order to avoid information overload.

2.2 Decision-making timescales

A wide range of investments and planning activities take place across sub-Saharan Africa and these occur on different timescales. Decision-making relevant to the use of climate information can be thought of as a continuum (see Figure 2), which includes the following situations:

1. Short-term interventions that address immediate development needs. These interventions are typically focused on addressing immediate development needs, and impacts are largely limited to the project cycle. Rarely is climate change a specific objective of programmatic outcomes, although the intervention may contribute to reducing the impacts of current vulnerability and supporting the adaptive capacity of people and communities, such as the distribution of free mosquito nets or post-disaster humanitarian activities.

2. Short-term interventions with long-lived implications. These interventions are typically focused on immediate and short-term development needs. In some cases, infrastructure and impacts on livelihoods can be felt long after the programme, and extend well beyond 5 years. Given the prolonged impact, and implications for long-term adaptive capacity, climate change may affect the continued effectiveness of sustained activities. Examples include the development of 3–5 year national development plans, or social protection schemes that provide social safety nets (such as insurance) to vulnerable populations.

3. Long-term interventions with long-lived implications. These investments, and more importantly the infrastructure and planning decisions behind their delivery, are typically high in cost and targeted at addressing both immediate needs and long-term economic and social objectives. Examples include building a large port or hydropower dam. Given the long timescales for the investments and use of the infrastructure, climate change is likely to have an impact on the effectiveness of these interventions.

Many development interventions in sub-Saharan Africa fall under the first category – short-term interventions. Unsurprisingly, the FCFA scoping phase found few examples of medium- to long-term climate information guiding short-term interventions, as climate information is deemed unnecessary for the successful delivery of such projects. An example of this may be an intervention aiming to distribute food, mosquito nets and water purification tablets to combat the spread of an outbreak of malaria. Here, the short-lived nature of the support and infrastructure provided, and the immediacy of the problem at hand, mean that medium- to long-term climate information is unlikely to match the timescales and needs of the intervention. However, the case studies identified a range of contexts under categories 2 and 3 in which the integration of medium- to long-term climate information may be deemed appropriate (see Box 3, page 13).

Mombasa port, Kenya

Figure 2. The relevance of medium- to long-term climate information to different decisions

	Short-term interventions with short-lived implications	Short-term interventions with long-lived implications	Long-term interventions with long-lived implications
Potential to contribute to ineffective, failed or maladaptive strategies without effective use of climate information			
Primary focus	Addressing immediate development needs	Addressing immediate and short-term development needs	Addressing both short- and long-term development needs
Duration and impact of investments	Largely limited to project interventions. Core impacts rarely extend beyond 5 years	Infrastructure and impacts on livelihoods can be felt long after the programme, and typically extend well beyond 5 years	Infrastructure and impacts on livelihoods extend over multiple decades
Current use of long-term climate information	Low	Rarely incorporated into project design	Limited. Actions rarely translate from policy and design into implementation
Opportunities to promote uptake of climate information	Few opportunities. Most relevant for weather and short-term climate information	Modest opportunities. Medium- and long-term climate of pontential relevance given prolonged impact of interventions	Large opportunities. Investments overlap with the time horizons of multidecadal climate projections
Principal challenges for uptake of long-term climate information	Time horizons of medium- and long-term climate information rarely match the length of impact of interventions	Principally relevant to medium-term decadal forecasting, though scientific techniques and applicability to decision-making remain unproven. Institutional barriers, and not seen as a political priority	Uncertainty of long-term climate information, poor-quality historical observations, and challenges in integrating into decision-support tools. Institutional barriers, and not seen as a political priority

Labadi beach, Accra, Ghana

Box 3. In depth: How climate information can help achieve long-term development goals

Short-term interventions with long-lived implications

Many different activities fall under this category, including the strengthening of basic health-care systems and infrastructure, women's empowerment schemes and 3–5 year national development plans. While each is concerned with the delivery of services and support for people's immediate and short-term needs, the impacts of individual interventions on livelihoods and wellbeing (and the infrastructure they may leave behind) frequently continues for many more years.

Several of the FCFA case studies identified social protection programmes as an example of an intervention that falls within this category. Schemes such as Malawi's Regional Hunger and Vulnerability Programme, which distributes cash transfers to vulnerable members of the population, provide valuable and timely financial contributions during time of hardship, with significant potential to support people's adaptive capacity to climate change.[15] The contributions of social protection schemes, in their many different forms, can often be felt many years down the line, typically long after the scheme's completion.

However, the effectiveness of social protection programmes may be compromised by a changing climate either by damaging the long-term assets that people have built up (this is particularly the case for infrastructure built by large public works programmes), or by increasing the number of people who require support to cope with the changing frequency and intensity of climate-related shocks. Social protection may also inadvertently promote maladaptation by perpetuating livelihood activities that are unsustainable in the longer term due to changing risk profiles.[16]

Thus, medium- to long-term climate information can play an important role in guiding relevant elements of the design and implementation of social protection schemes, while still recognising the scheme's central objective of addressing immediate vulnerability to shocks and stresses. Indeed, Malawi's Ministry of Economic Planning and Development identifies weather and climate information as crucial to the delivery of the country's social protection schemes, given the high dependence on agriculture for livelihoods and the economy.[17] Despite this need, climate information has yet to feed into decision-making for, and the delivery of, social protection schemes in Malawi – a fate shared by many of the interventions in this category that were explored during the FCFA case studies (see Chapter 3).

Long-term development interventions with long-lived implications

Long-term development plans provide one of the clearest entry points for the uptake of medium- to long-term climate information. This is due to their strong role in determining the type, timescale and location of a country's investment decisions, in both the public and private sectors. Rwanda's 'National Strategy for Climate Change and Low Carbon Development' is one of Africa's most advanced efforts to integrate climate change into national, sectoral and district development plans and budgets, and includes an operational fund for climate-related activities, known as 'FONERWA'. Nevertheless, the integration of long-term climate information is hindered by decision-makers' lack of confidence in projections about future climate change, and the limited baseline knowledge regarding the impacts and risks of future climate change.[18]

Other relevant examples of long-term interventions include investments in large-scale infrastructure. Potential lifetimes range from 30 years for new irrigation projects, 45 years for major urban infrastructure, 60 years for large dams, through to 90+ years for bridges. As such, the use of climate information when planning these investments is of considerable relevance, particularly as efforts to retrofit infrastructure are often technically difficult and costly.[19] Not only that, but the period used to calculate financial returns on the investment are also more consistent with the timescales associated with multi-decadal projections.

Box 3 continued

The ability for medium- to long-term climate information to be of practical use in large-scale infrastructure projects is greatest during the planning phase, fading quickly during the design phase and becoming much more difficult during construction and operation. For example, in the last few years, Ghana has experienced severe energy shortages, according to Lumbroso (2014):[20] "These are largely a result of low water levels and capacity problems at the existing Akosombo Dam on the River Volta, which supplies around 60% of Ghana's electricity. To increase Ghana's generating capacity, the construction of the Bui Dam hydropower scheme (on the Black Volta River) commenced in 2007."

"The Chinese Government agreed to loan US$622 m. to cover the construction of the dam and power station. In April 2007, the Ghanaian Government signed an agreement with Sino-Hydro, the Chinese company that is constructing the 400 megawatt scheme. But the project's environmental analysis failed to consider the potential for climate change to reduce the dam's power output. The International Water Management Institute, in conjunction with the Ghana Dams Dialogue, proposed further assessments of the Bui project's impacts and the likely implications of future climate change on its operations. Despite this, owing to the delayed nature of the oversight and the pressures for completion that overshadowed the project, no amendments were made in progressing plans for the dam's construction."[21]

Inevitably, economic, political and social factors also play a considerable role in determining the use of climate information in guiding investment choices. These factors are explored in greater depth in the chapters that follow.

Fishermen in Jamestown, Accra, Ghana

Chapter 3. Why isn't climate information currently being used for long-term development planning?

Key messages

- The FCFA case studies identified very few long-term decision-making processes that currently use climate information to inform the planning and delivery of investments.
- Political and socioeconomic factors can play a major role in determining the uptake of climate information in decision-making with long-lived consequences. These include political cycles and political time horizons, institutional structures and vested interests among decision-makers.
- The use of long-term climate information in sub-Saharan Africa is often constrained by the low quality or limited accessibility of the data, as well as a lack of capacity to interpret and apply information to decision-making contexts.
- There is a clear gap between the capacity of climate scientists to produce policy-relevant information and decision-makers' need for such information in sub-Saharan Africa.
- The role of communicating climate information is usually given to formal scientific bodies, such as national meteorological agencies. However, the climate information that reaches end users is usually overly technical, ill-matched to their demands and easily leads to misunderstanding of the uncertainties associated with it.

After 18 months of literature reviews, workshops, bilateral meetings and reports, what lessons can be learned from the FCFA scoping phase? What did the FCFA scoping phase find to be the barriers to the use of long-term climate information in decision-making? More importantly, what can be done to overcome the barriers, and improve communication between climate scientists and policy-makers? Using core findings from the six FCFA case studies, this chapter identifies the common challenges relating to the generation, dissemination and uptake of climate information in sub-Saharan Africa.

First, the studies found that very few of the decision-making processes investigated currently use climate information to inform the planning and delivery of long-term development initiatives. This conclusion rings true across all sectors, whether social protection plans, disaster risk management or agricultural investments. While a number of planning processes refer to multi-decadal climate projections, primarily to make the business case for action (i.e. why it would be good for businesses to prepare for climate change), the case studies found little evidence of climate information being meaningfully used in the design and, more importantly, the implementation of planned activities.

To some extent, this is not surprising. Many decision-makers in sub-Saharan Africa prioritise the delivery of shorter-term development objectives. However, the case studies observed similar deficiencies in informational uptake, even for investments that are traditionally associated with multi-decadal timescales and climate impacts, such as large-scale infrastructure and long-term development plans.

Why is this the case? Two reasons stand out. The first relates to the political economy of climate change and long-term decision-making. The second revolves around how science is produced and communicated, its links with policy and practice, and the challenges of making decisions under considerable uncertainty. In the rest of this chapter, we explore both of these reasons and provide specific examples.

3.1 The political economy of climate change and decision-making

Political and socioeconomic factors can play a major role in determining the uptake of climate information in long-term decision-making.[22] Political cycles and time horizons (i.e. the length of time politicians are in power), institutional structures within governments, and vested interests among decision-makers all influence the process of integrating science into policy. However, these are rarely acknowledged or addressed by climate-related actors.

Three themes stand out from the findings from the FCFA scoping phase: i) a need to recognise the interactions between climate change and wider drivers of environmental and development change; ii) the ability to identify which types of decision should take climate information into account, and which need not; and iii) the influence of power, politics and timing.

Recognising the interactions among climate change and wider drivers of environmental and developmental change

Many sub-Saharan African countries are undergoing significant social, economic and demographic changes. Climate change is likely to directly influence these, but its impacts will often affect wider drivers of development indirectly (e.g. in the form of rising food prices or enhanced competition for scarce natural resources). More importantly, high vulnerability to current climate stresses in many countries mean that decision-makers focus primarily on the immediate impacts of climate change, as well as other immediate development needs (as explained in Chapter 2). This inevitably pushes long-term climate change down the policy agenda – and with it the use of climate information for decisions with long-term consequences.

Despite this, many initiatives aimed at promoting socioeconomic development can, whether intentionally or not, play a central role in tackling the root causes of vulnerability to climate change. For example, in Zambia the National Climate Change Secretariat and the 'Pilot Project for Climate Resilience' are seen as the most prominent actors driving the climate agenda forward. Yet other initiatives and investments, by a wide range of civil society and private sector entities in Zambia (most notably mining and real estate developers), are playing a central role in determining the vulnerability and ability to adapt to climate change of different social groups. Such companies' activities are overlooked in high-profile national climate change planning.[23] With this mind, any consideration of climate information in long-term decision-making has to recognise the role and interplay of climate change with wider drivers of development.

Urban adaptation challenges also highlight the interrelationships between climate and non-climate stresses. Alongside rising sea levels and temperatures, Accra and Maputo both face challenges including rapid population growth, expanding areas of unplanned settlement, and increased pressure on critical infrastructure (particularly drainage systems). For long-term climate information to be of use, climate change must be tackled in an integrated way alongside these broader development challenges.

Jamestown, Accra, Ghana

Projections of future climate trends alone will not serve decision-makers' needs. Rather, multi-sectoral and integrated assessments, which show how climate, socioeconomic and environmental factors are likely to interact, can add considerable value to the information provided and be used to inform decision-making processes.

Climate information is not needed for all decisions

Evidence from FCFA's scoping phase demonstrates that, with regard to climate information, decision-makers are mostly interested in weather and seasonal forecasting. This is largely due to the perceived utility of this short-term information for achieving immediate development objectives, such as agricultural extension services and national early warning systems. Where

longer-term climate information is in use, it tends to be in relation to understanding historic trends and the impacts of short-term climate variability on decision-making in coming years (typically on 1–5-year time frames).

In the Rwanda case study, we explored the use of climate information in five sectoral activities: social protection programmes; the national climate fund; hydropower investments; national agricultural planning; and urban planning. In nearly all cases, the climate information used to guide decision-making was extremely basic and presented as qualitative narratives that rationalised action on climate change adaptation. For instance, climate change will lead to future increases in the incidence and intensity of floods and droughts; therefore, investments are needed in water storage and resource management. Often a single emissions scenario (a projection of future climate change, depending on different levels of greenhouse gas emissions and changing social and economic factors in the coming years) was used, with little consideration of alternatives and uncertainties. This is partly due to limited available resources and constraints with regard to the technical capacities needed to understand, apply and disseminate such information among and between scientists and policy-makers. The principal issue, however, is that most projects focus on reducing existing vulnerabilities, rather than dealing with future risks.[24]

The immediacy of development challenges in many sub-Saharan countries inevitably forces the attention of decision-makers to think and act in shorter-term time frames. Indeed, it is the case that not every development decision requires long-term climate information to be taken into account. As long as development investments are reducing vulnerability and supporting poor people's capacity to adapt to current climate variability, there are few incentives to take long-term climate change into account.

This is even the case for some infrastructure investments. Returning to the Rwanda case study, the team found that the incentives for considering medium- and long-term time frames are low for micro-hydropower schemes, largely due to the short payback time of the investment; typically, schemes will provide a return on investments in less than 10 years.[25] While there is more potential for considering long-term climate change in larger schemes (i.e. those greater than 50 megawatt capacity), even here there is a trade-off. Decision-makers must weigh up increases in the immediate capital costs needed to 'climate proof' a scheme against the reduced benefits of the scheme if climate change reduces its effectiveness. Increased upfront costs for climate-proofing will yield future benefits towards the end of the scheme's economic lifetime (the period for which the scheme costs the country money), although such benefits are well within the technical lifetime, and the calculus is hampered by the uncertainty around future climate change.[26]

The fact that climate information is not currently embedded into all decision-making processes does not diminish the importance of promoting its use in relevant investments and plans. Indeed, all six FCFA case studies highlighted investment decisions that did require planning on longer time frames, such as urban planning, service delivery and long-term growth strategies. A failure to adequately incorporate climate information into the design and delivery of these runs a clear risk of maladaptation and 'lock-in' (see Box 4).

Power, politics and timing

The prominence of climate change in, and the uptake of climate information into, national planning and decision-making in sub-Saharan Africa, is dependent on three interrelated areas of political economy: i) support from powerful actors and stakeholders; ii) the structure of governance arrangements and institutional incentives; and iii) the ability to take advantage of appropriate windows of opportunity.

Box 4. Understanding maladaptation and 'lock-in'

'Maladaptation' refers to a process that results in increased vulnerability to climate variability and change, directly or indirectly, and/or significantly undermines capacities or opportunities for present and future adaptation.[27] This is of particular concern with regard to investments that reduce people's vulnerability in the short term, but ultimately increase their vulnerability in the long term, for example if investments are no longer suitable to future conditions and exacerbate resource scarcities, or increase exposure to climate risks.

'Lock-in' is a particular feature of maladaptation in which the wrong types of intervention today can 'lock' societies into a development path that makes them vulnerable for decades to come. For example, an intervention that promotes water-intensive agriculture would be detrimental if the climate becomes drier over time, but it could be difficult to reverse, for example if indigenous knowledge and technologies were lost. Similarly, an intervention that encourages people to migrate to coastal cities could put more people at risk from coastal flooding.[28]

With regard to the first point, action on climate change within national policy and programming in sub-Saharan Africa has mostly been coordinated through ministries of environment and natural resources management, or their equivalents. While this may be logical given their thematic relevance and formal mandates, in practice these ministries are often weak and under-resourced.

Indeed, the case studies highlighted that effective national action on climate change, and the uptake of climate information into decision-making, is often dependent on more powerful ministries being mandated and given incentives to act on climate change. In Rwanda, climate change was adopted into core development priorities at an early stage, primarily driven by the enthusiasm of a powerful champion: President Paul Kagame. Under his leadership, the country has initiated its own high-level strategy, the 'National Strategy for Climate Change and Low Carbon Development', and has recognised climate change as a key cross-cutting issue in national economic development planning and subsequently sector plans. President Kagame's enthusiasm has also facilitated a strong role for senior – and therefore powerful – ministries, such as the Ministry of Finance and Economic Planning.[29]

Timing is also central to the uptake of climate information in long-term decision-making. Long-term planning, by its nature, seeks to address the needs and objectives of people and investments over many years. Thus, ensuring that planned activities are informed about potential future risks and opportunities from the outset helps to ensure the sustainability of planned outcomes and prevent maladaptation in development trajectories.[30] This is particularly true for the longer-term impacts of climate change, given the uncertainties associated with future projections and the slow onset of many climate impacts.[31]

With this in mind, emphasis is often placed on long-term planning to ensure processes of reflective learning and to take a cyclical, iterative approach to decision-making.[32] However, the long-term development plans identified in the FCFA case studies had limited windows of opportunity for consultation during their design and implementation. Most importantly, firm targets are often set at the start, with little room for changing these during the project cycle. In Malawi, the longest time frame for government decision-making is 10–15 years, through its 'Vision 2020'. Although this document alludes to climate change objectives, long-term climate information is currently not used to guide

projects and policies. The case study also found no evidence of ministries using longer-term climate information in current decision-making.[33] Since the current Vision is nearing its end, the development of its successor is under way. This presents an opportunity to embed climate information into an influential long-term development strategy. If this is missed, there is a risk of coming up against considerable institutional barriers in encouraging uptake later on.

3.2 The limitations of climate information

The FCFA scoping phase highlighted a clear mismatch between the capacity of climate scientists to produce policy-relevant information, and decision-makers' unrealistic expectations about the information they could receive. This is a fundamental constraint to the use of climate information in long-term decision-making. Coupled with this is a lack of effective communication and engagement between the users and producers of climate information, which leads to misunderstandings about the merits and limitations of its use.

The quality and accessibility of data

Overall, sub-Saharan Africa's climate observation networks and systems are poor, particularly compared to Europe and North America's. Where networks and infrastructure do exist, many are in relative decline due to a lack of national and international leadership, investment and technical capacity.[34]

Participants in each of the four country case studies cited sparse data coverage and temporal gaps as reasons why climate information was not more widely used for decision-making with long-term consequences. In some locations, time series data (observations made regularly over a period of time) have been, and continue to be, disrupted by natural disasters and conflict. Accurate observations are crucial for assessing the validity of the outputs from climate models, particularly at high spatial resolutions.

An inability to access data is another significant barrier, as highlighted in both the initial scoping workshops and the literature reviews. Since the 1980s, meteorological agencies in sub-Saharan Africa have been encouraged to sell their data to raise the revenue needed to maintain their observational networks. As a result, many are still reluctant to make data freely available for non-commercial purposes such as public policies for climate change adaptation.[35]

There are several reasons for the limitations in capacity of African climate science. The development and refinement of climate models typically take place outside Africa. Africa does have internationally renowned centres for climate analysis and modelling, such as the University of Cape Town's Climate Systems Analysis Group (CSAG) and the Council for Scientific and Industrial Research (CSIR), both in South Africa, the Africa Centre for Meteorological Applications for Development in Niger, and the IGAD Climate Prediction and Application Center in Kenya, among a handful of others. But only CSAG and CSIR have the capacity and funding to support regional modelling of long-term climate change, with many of the others focusing predominantly on weather and seasonal forecasting. A representative from the Department of Disaster Management Affairs in Malawi stated that the country's decision-makers do not use long-term climate scenarios in their long-term planning due to resource constraints. According to the Ministry of Irrigation and Water Development, there is no advance forecasting capability within the country's Department for Climate Change and Meteorological Services.[36]

Terraced fields, Rwanda

Capacity to interpret and apply climate information

In addition to the insufficient quality of climate data, case study informants also cited a lack of capacity and willingness among potential users to access, understand, process and act upon available climate information. This is partly due to resources and technical constraints within key decision-making bodies (such as local governments and national-level ministries), but also reflects the fact that the majority of policy interventions are focused on immediate needs and few decision-makers see the value of accounting for medium- to long-term climate information in investment and planning processes. This confirms the need for climate information to be available in forms that are useful and relevant to end users.

In Malawi, for example, the existing national structures to coordinate weather and climate information between the Malawi Meteorological Service and other line ministries function well. But case study informants noted the need for a better understanding of climate change generally among decision-makers, and the risks it poses. Various departments reported limited capacity to understand weather and climate information, identifying a need for capacity building and training on climate change and its potential impacts, as well as how to integrate medium- to long-term information into existing policies and decision-making processes. There was no evidence of ministries using longer-term climate projections or climate scenarios in current decision-making, even though regionally downscaled climate scenarios were available.[37] The implication is that only limited climate information is being used to build the case for particular government investments and actions, rather than being informed by all the available information. The Rwanda case study also revealed a tendency among decision-makers to avoid considering uncertainty, even where this information is provided – this was often dismissed by decision-makers as "too complex".[38]

Decision-making in light of uncertainty

Projections of future climate inherently come with uncertainties. Decision-makers often use these as a basis for disregarding potential future risks, or for delaying decision-making. The scale of the climate data available can be a factor in this uncertainty. Many case study participants emphasised the need for higher-resolution climate projections at local scales (known as downscaling), to provide information specific to a particular district, or even a town or city. Many model projections are currently available at relatively low resolutions. For example, most general circulation models (GCMs), such as those used in the CMIP5 model, generally operate at a horizontal resolution of 100 km or greater. While coarse resolution is useful in exploring longer-term feedbacks, understanding localised impacts, trends in extreme events and better projections on decadal time frames will require the downscaling of GCMs to resolutions in the region of 25–50 km. These are the geographical scales of interest to decision-makers, and providing climate information on regional or country levels could increase its use in policy processes.

Makola market, Accra, Ghana

However, downscaling is a complex process. Projections at the local, subnational and national levels are generally more uncertain than global projections. Projections of climate change in Rwanda, for example, are hampered by the high heterogeneity in terrain and climate, as well as the lack of long-term data to validate model outputs. Much research is already underway to improve the quality and availability of downscaled projections for sub-Saharan Africa, but the time and resources involved should not be underestimated. The challenge will be to focus efforts on the geographical areas and processes that matter most. Also, without improvements to, and better validation of, the global models that feed into these downscaled models, the robustness of downscaled projections is limited.

Despite the high demand for downscaled data, there is little appreciation among decision-makers about the increased levels of uncertainty associated with these projections. This

highlights the need for a better understanding of the uncertainty inherent in different types of climate information. For example, the Rwanda case study found that in almost all the cases examined, very few end users made use of medium- to long-term climate information. Where it was used, the information was basic and ignored uncertainty in both scenarios and climate models. A common theme mentioned in case study interviews and documents was that climate change will increase droughts, but the original sources highlighted that future drought patterns were unclear – uncertainty that had been lost during the communication process. When questioned about why this uncertainty was omitted, most users made reference to time, resource and capacity constraints. Many also stressed that including uncertainty was too complex and detracted from being able to make concrete policy recommendations.

Uncertainty is unavoidable when dealing with climate projections on decadal timescales, and decision-makers need greater support and tools for making decisions under this uncertainty. In general, observations of increasing temperature are relatively consistent but projected changes in precipitation are more uncertain. Projections of changing rainfall patterns are of particular interest to decision-makers in countries that are dependent on natural resources, agriculture and tourism. In several regions of sub-Saharan Africa, notably East Africa, there are discrepancies between recent observations – which show a clear drying trend in 'long rains' – and models that predict a steady increase in precipitation.[39] While these differences require further investigation, such uncertainties can have major implications for adaptation decisions. This demonstrates a significant challenge in communicating the complexity of climate science and building confidence in modelling data.

Plenty of tools exist to support robust decision-making in the face of this uncertainty, but many of these are heavily conceptual, providing few recommendations that decision-makers can act upon.[40] As acknowledged at the Accra–Maputo workshop, there are limits to applying climate model data in a way that recognises the chaotic nature of making real-life decisions about risk management and future planning. Tailoring these tools to suit the needs of decision-makers in sub-Saharan Africa, and finding ways to clearly communicate long-term climate information, including uncertainty, will be a useful step forward. Equally important will be finding ways to better understand the drivers behind uncertainties in models, and helping decision-makers to understand that inaction in the face of large uncertainties is often ineffective and costly. Several participants in the Malawi workshop highlighted the importance of indigenous knowledge and the potential to link this with scientific forecasts, as a way to validate information and provide more socially acceptable information.

Chapter 4. What opportunities are there to support the greater use of climate information?

Key messages

- There are opportunities to increase the quality and quantity of climate observation networks and infrastructure in sub-Saharan Africa. One of the most achievable tasks is to recover the large swathes of unarchived historical data that are not yet digitised and therefore inaccessible to many researchers.
- Climate scientists and national scientific institutions in sub-Saharan Africa need support to disseminate their long-term climate information, and to develop robust tools to identify the investments and decisions that are likely to need screening for risks from climate change.
- Barriers to the uptake of climate information include institutional mandates, hierarchical structures and a lack of adequate incentives. A clear understanding of local political contexts is needed to make the communication and use of climate information more effective.
- Embedding climate information into important development decisions often boils down to creating the right 'sales pitch': promoting the usefulness of climate information in the quantities that decision-makers value most.
- There is a need to help decision-makers understand what climate information should and should not be used for, and to encourage more systematic and evidence-based approaches to decision-making under uncertainty.

The scientific and political barriers to the more effective use of climate information in long-term decision-making appear great, but few are insurmountable. In investigating adaptation challenges in different sectors, the six FCFA case study teams considered how to make the use of climate information more effective. How can climate information be more embedded in targeted investments and planning decisions? What tools and processes can be used to bring science producers, science users and decision-makers together for more effective and meaningful dialogue?

This chapter explores these questions in relation to the case studies and reflects on entry points for promoting the uptake of climate information in sub-Saharan Africa more widely. Opportunities are categorised under the following headings: investing in sub-Saharan Africa's ability to generate, understand and use climate information; improving decision-support tools and methods; and developing the mandate and capacity of 'boundary agents' and knowledge brokers (i.e. the institutions that act as intermediaries among scientists, decision-makers and practitioners).

4.1 Investing in the ability to generate, understand and use climate information in sub-Saharan Africa

Targeted investments are needed to support climate science in sub-Saharan Africa. This includes building the capacity of climate scientists and institutions, and improving channels for science to be integrated into decision-making. To begin with, the coverage of climate observation data networks across much of sub-Saharan Africa is poor, particularly when compared to Europe and North America (see Section 3.2). This presents a significant opportunity to increase the quality and quantity of observation networks and infrastructure, as well as recovering large swathes of unarchived historical data that has not been digitised and is inaccessible to many researchers. Institutes in sub-Saharan Africa are also making

progress in the use of satellite and remote sensing data to complement, correct and fill in gaps where necessary.

Not only will these investments help to establish robust baseline data for past and current climates, they are also essential for validating the outputs from climate models and correcting for systematic biases – one of the key factors limiting the use of climate projections in African decision-making. Indeed, the Malawi case study highlighted that high-resolution climate projections (i.e. downscaled regional climate models) are what decision-makers desire most, as these relate to the geographic scale of the majority of decision-making processes, such as a community, city or sub-region (see Chapter 3).

This demand for data generation creates opportunities to support the capacity of climate scientists and relevant scientific institutions in sub-Saharan Africa. Technical and financial support to strengthen the capacity of national scientific institutions to interpret and disseminate medium- to long-term climate information is provided by several international and African organisations, such as the UK's Met Office and the University of Cape Town in South Africa, but these investments are limited. Far greater engagement and support are needed (see Section 3.2).

Coupled with these investments is a need to improve the usefulness and relevance of climate information across sub-Saharan Africa. As discussed previously, the FCFA end users clearly articulated the need to improve the development of, and for greater access to, sector-specific impact analyses that weigh up the implications of various policy options. Such integrated assessment models (IAMs) combine: the social and economic factors that drive the emission of greenhouse gases; the bio-geochemical cycles and the atmospheric chemistry that determine how those emissions affect the climate; and the resultant effects of greenhouse gas emissions on our climate, ecosystems and human welfare.[41] Although IAMs are commonly used to inform policy in other regions, few are tailored specifically to sub-Saharan Africa. This is a gap: regionally specific IAMs for Africa are needed alongside a strengthening of the capacity of decision-makers to integrate IAMs and other scientific decision-making tools into investment and planning decisions. This must be done carefully, though, as there are inherent uncertainties and limitations to sector-specific impact analyses. Decision-makers must be aware of this when drawing concrete conclusions, particularly for adaptation policies at the local level.[42]

A second opportunity identified through the case studies is the potential utility of consistent and standardised national projections of climate change that can guide policy actions across a range of national bodies – government, civil society and the private sector. An example of where this has worked effectively is the UK Climate Projection models (such as UKCP02 and UKCP09). These create tailored impact- and adaptation-related scenarios and adaptation toolkits for decision-makers in the UK, covering a range of possible outcomes. The Malawi and Rwanda case studies suggest that, while an African equivalent at the same scale and technical level is not currently feasible, such tools could (if tailored to the national context as well as decision-makers' needs) enhance countries' capacity to build and analyse relevant scenarios and strengthen links with boundary agents (see Section 4.3).

Another interesting area of opportunity relates to near-term decadal forecasting. The magnitude of internal and decadal climate variability may rival that of anthropogenic climate change at regional scales over the course of the next 10–30 years.[43] As a result, initialised decadal predictions could provide important information for many management and adaptation decisions – particularly those that fall under the categories of short-term investments with long-lived implications and long-term investments with long-lived

Maputo harbour, Mozambique

implications.[44] Enhancing the accuracy of decadal climate predictions may therefore help to provide information that can be acted upon within the timescales relevant to many decision-making processes in sub-Saharan Africa.[45]

In particular, the Malawi and Zambia case studies show that there is considerable demand from decision-makers for products that can inform decisions on 1–10-year timescales, particularly for informing the various long-term development strategies adopted by many sub-Saharan African countries (such as Malawi's 'Vision' documents). However, we must be cautious when expanding the use and communication of decadal projections given the scientific and technical challenges that limit this new field of research.[46]

Investing in a better understanding of political and institutional contexts

Promoting the uptake and use of climate information is not just about improving the quality, coverage and dissemination of climate science. Alongside the knowledge and capacity gaps that exist, many of the barriers to its uptake relate to institutional mandates, hierarchical structures and a lack of adequate incentives.

The FCFA hydropower case study illustrates this clearly. The location of hydropower dams is an example of a long-term infrastructure decision that ought to benefit from incorporating long-term climate information. However, in practice, the siting of dams in sub-Saharan Africa "is often a process dominated by political and fiscal considerations, lobbying, corruption and compromise".[47] Isolated external efforts to promote the uptake of climate information are unlikely to succeed without meaningful and sustained relationships among knowledge brokers, science producers, and users and decision-makers at all scales. In contrast, spending time and resources on understanding the local political context, and engaging with local partners, can help funders and knowledge brokers to communicate climate information more effectively and embed their activities within ongoing local and national policy processes.

The effectiveness of climate information is also largely dependent on the bottom-up demand for and – where possible – national ownership of available climate services. This may require a rethink of current approaches to funding climate-related programmes in sub-Saharan Africa and keeping them in operation: shifting away from short funding cycles, rigid structures and targets, and donor-driven agendas, and moving towards longer-term partnerships between international and national partners.

The need for political champions to promote the usefulness of climate information

An understanding of the political and institutional contexts within which decisions are made is key to supporting the uptake of climate information in national development objectives. Although each country is different, there are always ways to capitalise on political windows of opportunity.

Boys fishing, Malawi

First, high-level 'champions' can play an important role in driving the climate agenda forward. Such champions are often vital in gaining legitimacy for climate change discussions and overcoming political obstacles to the use of climate information. The Rwanda case study highlights how President Kagame's strong backing for national action of climate change, alongside involvement from relevant ministries, led to climate change being at the heart of the country's development planning processes (see Section 3.1).[48] Few sub-Saharan African countries have similar champions, unfortunately.

Second, the engagement of high-level champions often boils down to creating the right 'sales pitch': promoting the usefulness of the uptake of climate information in terms of quantities that decision-makers value most. For example, a sales pitch could demonstrate

how climate information will increase decision-makers' understanding of how certain long-term investments will affect their country's economic growth, productivity, and the protection and creation of livelihood opportunities.

Climate scientists cannot deliver this information alone. As mentioned previously, there needs to be a multidisciplinary approach that engages economics, social and environmental sciences. While such integrated assessments inevitably bring even larger uncertainties with them, and can dilute the business case for action, they will help to make the information more relevant to the immediate interests of decision-makers in sub-Saharan Africa.

Mainstreaming climate information into the policies and plans that matter

Mainstreaming climate information has been, and continues to be, the mainstay of national action on climate adaptation.[49] Mainstreaming efforts have concentrated on supporting adaptation through large, internationally guided initiatives, such as the 'National Adaptation Programmes of Action' and the 'Pilot Project for Climate Resilience'. While these initiatives may raise the profile of climate issues nationally, they are largely targeted at attracting international finance from multilateral funds for adaptation priorities. Few have gone on to ensure that adaptation, and with it the uptake of climate information, is embedded into core development planning.

For the most part, adaptation still falls under the mandate of weaker line ministries, such as those responsible for the environment and natural resources management. Experience across the six FCFA case studies suggests that it is only when influential line ministries, such as those for economic growth and development, have the incentive and responsibility to act on climate-related issues that effective national action occurs.

Yet this is seldom the case. Those with the requisite influence and technical capacity to set national agendas are largely disengaged, or lack the capacity to integrate climate information and climate impact assessments within planning decisions. For example, the Malawi case study highlighted that the longest time frame for political decision-making is 10–15 years. Led by the Ministry of Planning and Economic Development, planning under the country's 'Vision 2020' informs the country's long-term development priorities. However, as noted in Section 3.2, during interviews, planners from this Ministry stressed that they "don't yet use climate change information for timescales of 5 years or more when appraising new projects or policies".[50] They are, though, accustomed to economic modelling over a 10–15-year time period, using scenarios of population growth, and see the potential for incorporating climate change projections into these models to identify where climate change could limit long-term economic growth. This could help to prioritise investment decisions.[51]

It is precisely these 'Visions' and long-term growth strategies, alongside the 3–5-year development plans that feed into them, that are the best opportunities for promoting the uptake of climate information into the planning decisions that matter most. These planning processes are central to national development objectives, and set targets and indicators for sectoral activities and investments. As a result, they can be used to create the incentives needed to promote the effective use of climate information in long-term decision-making.

4.2 Improving decision-support tools and methods

Across each of the various FCFA case studies, participants cited the high levels of uncertainty about climate projections and impact modelling as one of the principal obstacles to the uptake of climate information. Despite considerable advances in our understanding of the

drivers of the climate system and its various components, these uncertainties are likely to remain, regardless of future investments – and may even increase as we seek to develop products that capture the more complex elements of, and feedbacks between, the natural and human systems.[52] It is imperative that decision-makers understand what climate information should be used for, and what it should not, to foster more systematic and evidence-based approaches to decision-making under uncertainty. This requires simple tools that help them in making their decisions.

Simple tools for decision-making under uncertainty

There is a range of decision-support tools already in operation. These include the following economic decision support tools: cost-benefit analysis, real-option analysis and iterative management. Each has its own uses, tailored to particular problems and levels of uncertainty. For example, for short-term investments (especially those with high upfront capital investments) where there is an existing adaptation deficit, real-option analysis is potentially useful. For long-term investments in conditions of low adaptation deficit, iterative risk management may be more applicable. Cost–benefit analysis, a tool commonly used to assess the merits and limitations of different policy options, requires climate risk probabilities to be well known, as well as good data for many of the economic valuations that it ascribes.[53] Indeed, each decision-support tool requires climate information tailored to its specific needs.

Decision-makers need to understand which tool to use in which contexts. However, extensive training for decision-makers in this regard is not always feasible given constraints on their resources, capacity and time. For all but the largest infrastructure projects, donor-driven interventions and national planning projects, the technical, financial and time requirements are simply not available or not commensurate to the perceived benefits. Indeed, even simple sensitivity testing may be too challenging or time-consuming for many end users.

It is therefore clear that greater support in using and selecting appropriate decision-support tools will be an important step for promoting the greater use of climate information among stakeholders, such as influential line ministries with a mandate to decide on trade-offs for large, long-term investments. Understanding the context, size and type of investment decisions will be important in such a selection process, and will help to determine the level of time and financial resources required.[54]

Low-regret options and risk screening

Perhaps the main finding from the FCFA case studies is that not every investment and decision needs to be based on long-term climate information. This may even be the case for many medium- and long-term investment decisions in sub-Saharan Africa, given the immediacy of other development priorities and high discount rates. This is not to say that climate information should not be considered in decision-making, or that investments in promoting the uptake of climate information into long-term decision-making are futile. Far from it: climate information should be integrated into any investment or plan where the implications and/or secondary impacts are likely to span decadal timescales (whether during the lifetime of the project or subsequent to its completion).

What this points to is the need for robust and easily applicable tools that can identify the types of investments and decisions that are likely to require considerable risk screening. These needs to span the three distinct types of activities and investments: i) short-term interventions that address immediate development needs; ii) short-term interventions with long-lived implications; and iii) long-term interventions with long-lived implications (see Chapter 2). All three types of activity require different decision-support tools and carry different risks associated with a failure to effectively consider long-term climate risks.

The first category is generally the mainstay of development activities in sub-Saharan Africa, requiring little more than 'low-regret' measures and basic risk screening. The most relevant climate information for these activities relates to weather and shorter-term seasonal climate information. While long-term climate information may be relevant to certain investments and activities, it is not the primary focus. The latter two types of activity are of most relevance to the FCFA programme, given its emphasis on long-term climate information (5–40+ years). Here, it is evident that some sort of screening criteria are required – perhaps building on the tools listed in Section 4.1.

However, it may be that some long-term investments are unlikely to require significant redesigns or the re-evaluation of planning decisions. Returning to hydropower in Rwanda (see Section 3.1), the case study team found that in most cases, even medium-scale schemes, the optimum solution to prepare for climate risks in the future is simple low- or zero-cost over-design. This recognises that future benefits will be accrued towards the end of the economic lifetime of the scheme, which is also when there is the highest future uncertainty.[55] The clearest need for action on climate information comes in the third type of activity. Unquestionably, more complex support tools are required for large-scale, long-term hydropower investments, and where considerable changes in rainfall are projected under the lifetime of the investment – or where the risks of maladaptation are high.

4.3 Developing the mandate and capacity of boundary agents and knowledge brokers

The task of communicating climate information to decision-makers is made more difficult by the growing emphasis on communicating the uncertainties associated with climate science.[56] Often, producers of climate information lack the skills, support and incentives to communicate their outputs directly to decision-makers and the public. Therefore, this role should rest not only with the producers of climate information, but also with 'boundary agents' – institutions that act as intermediaries between scientists, policy-makers and practitioners.

There are few organisations in sub-Saharan Africa with either the skills or the mandate to play this role. The FCFA case studies showed that the role of communicating climate information at the national level is typically mandated to formal science institutions, such as national meteorological agencies. These tend to have weak capacity and few resources, constraining their ability to collect, analyse and disseminate climate data, which is often raw and disjointed (see Section 3.2). At the same time, many existing international boundary agents (such as think tanks or international NGOs based in developing countries) often lack the necessary understanding of local social and cultural contexts, particularly how perceptions of risk differ across sub-Saharan Africa, or the level of trust required for their information to be acted upon.[57]

Participants across the case studies noted that the information passed to end users – whether at local or national levels – often arrives in a form that is overly technical, ill-matched with decision-makers' needs, and prone to misunderstanding of the uncertainties associated with it. In Malawi, for instance, officials from various ministries noted that the Department for Climate Change and Meteorological Services was unable to collect and communicate relevant long-term climate information in an easily accessible manner (see Section 3.2). The Zambia case study highlighted a clear need for primary climate information to be turned into 'adaptation-ready' information and guidance in a format that decision-makers can act upon.

Clogged drain, Zambia

These examples demonstrate the need for developing these countries' capacities to use more analytically rigorous adaptation planning tools, such as considering alternative scenarios and information from quantitative models. This will make more complex climate information accessible to decision-makers. As previously stated, in nearly all the cases where climate information was used at all, it was extremely basic, usually centred on a qualitative narrative of future climate change, and often employing only basic, secondary sources of information (e.g. national communications to the United Nations Framework Convention on Climate Change). Country-based boundary organisations should be given a clear institutional mandate to provide climate information and ensure the most up-to-date information is being used.

Akosombo dam, Ghana

Part 2: Lessons

Chapter 5. What can we learn from the approaches used in the FCFA case studies?

Key messages

- The four FCFA country case studies trialled a number of different tools that bring together producers and users of climate information. Insights from the application of these may be of considerable use to future knowledge brokers – both climate and non-climate related.
- Workshops are limited in their use. Stakeholders wishing to promote greater dialogue between science producers and users should consider at the start if a workshop is the best way to engage with them.
- Knowledge brokers need: a detailed understanding of the political context they are working in and of their end users' needs; awareness of the advantages and limitations of different engagement methods; and a willingness to respond to evolving needs during the engagement process.
- Processes to engage scientists, policy-makers and practitioners around the uptake of climate information into long-term decision-making should be flexible and respond to stakeholders' changing needs.
- It is not possible to have a significant policy impact, raise awareness or build capacity through isolated interventions. Longer-term engagement is needed to have a meaningful impact.

Although the primary intention of the FCFA case studies was to understand barriers and opportunities to the uptake of climate information, the scoping phase also provided insights into how scientists and policy-makers can be brought together to discuss the use of climate information in difficult adaptation decisions. The case study teams used a range of different tools to elicit knowledge of the role of climate information in long-term decision-making, from 'serious games' in the case of Malawi and Zambia to participatory co-exploration in Accra and bilateral meetings in Rwanda. This chapter reflects on the merits and limitations of different engagement processes from the four country case studies, with recommendations aimed at guiding future science–policy dialogues. It is hoped that these findings will be of use to knowledge brokers and producers and users of scientific information both within the climate adaptation community and beyond.

5.1 Traditional workshop approaches have limitations

When designed well, workshops can enable discussion and the sharing of ideas, helping to highlight similarities and differences between participants from various backgrounds. This is crucial for discussing cross-sectoral issues including adaptation and long-term decision-making. Because of their short duration, workshops are also seen as flexible and cost-effective; they can be easily designed or modified to meet the needs of different groups and organisations.[58]

However, all four country case studies showed that the way workshops are designed and facilitated is crucial to meaningfully engaging with different stakeholders. Most workshops operate a one-way flow of information: knowledge is held by one group and communicated to recipients (often in the form of presentations), thus building recipients' capacities. Yet these models often fail to stimulate effective learning and

knowledge-sharing. Efforts to promote two-way communication, which enables the co-production and sharing of knowledge, can lead to much greater engagement among participants. This is particularly true when different stakeholders are brought together, as the Accra–Maputo and Zambia case study teams found in piloting their respective co-exploration and 'serious games' approaches.

The case study teams encountered other challenges with workshops as a method for engaging stakeholders. For two of the case study workshops, fewer than half of the expected participants attended, despite extensive preparation by the organisers and confirmations from the targeted decision-makers. A combination of a 'per diem' or 'daily subsistence allowance' culture – an expectation of financial compensation for attendance – and 'workshop fatigue' – competition from other workshops – may be partly to blame. Experience from one case study highlighted how these factors can negatively affect both the number and type of attendee.

In some sectors, donors and workshop organisers are competing for a limited pool of attendees. This creates perverse incentives, for example discouraging people from attending workshops where financial incentives – per diems or a daily subsistence fee – are not provided. Indeed, feedback from the case study teams highlighted that participants experienced workshop fatigue – spending too much time at such events, leading to disengagement and tiredness – and saw payments as the main incentive for attending. This runs the risk of participants being motivated to attend for the wrong reasons, as well as making it difficult to target the people who will benefit the most from – and make the most useful contributions to – discussions.

Navigating these challenges is a difficult, yet necessary, process to ensure the desired level of attendance, engagement and outcomes from a workshop. Even if these factors can be partly overcome, they are still likely to limit the usefulness of workshops. At the start of a programme or project, organisers need to decide whether a workshop is the best way to engage with their target participants.

The variety of different approaches adopted by the FCFA case studies highlights that there is often more than one effective method of engaging. The Rwanda case study team chose not to host a workshop at all, instead opting for a series of bilateral stakeholder meetings. The primary aim of the scoping exercise was to elicit knowledge of the barriers and entry points to the effective uptake of climate information, which did not require extensive capacity-building elements. This method proved to be more than capable of doing this; in fact, it allowed participants to delve into details across a range of different sectors, while providing opportunities to probe and triangulate the main political economy drivers behind long-term decision-making in Rwanda. This would have been difficult in an open workshop.

5.2 Focusing on a specific adaptation challenge is important

Another challenge the FCFA case study teams faced was narrowing down the focus of their projects to particular adaptation challenges. In designing their approaches, each chose to address issues across a number of different sectors and decision-making contexts. This was partly in response to the difficulties experienced in finding examples of climate information being used to inform current long-term decision-making processes in the case study countries. It also reflected the desire of many of the case study teams to engage with a wide range of stakeholders.

Maputo harbour, Mozambique

While this allowed case study participants to more readily engage with the content of the workshops and meetings, and relate problems to their day-to-day activities, it made it difficult for the case study teams to delve deeper into specific barriers to the effective uptake of climate information in each sector, time frame (see Figure 2, page 12) or stakeholder group. While choosing the appropriate level of contextual detail inevitably requires trade-offs, lessons from the scoping phase suggest that it may be easier to limit the focus to a small number of case studies (even a single case study) and adaptation challenges.

5.3 Engagement processes have to be flexible and responsive

One of the most important lessons learned from conducting the FCFA case studies was the need for engagement processes to be flexible and responsive to changing needs. To begin with, the case studies sought to uncover examples of where climate information had been embedded directly into long-term decision-making. However, early on in the process, it became clear that such examples were not easy to identify, and in some countries non-existent. Thus, in some places the case study teams placed greater emphasis on exploring future development scenarios and generating hypothetical examples for different sectors. This allowed the teams to break down different elements of the decision-making process, and encouraged participants to reflect on their roles and information needs with regard to existing decisions.

The models of experiential learning used in the Accra–Maputo, Malawi and Zambia case studies were designed to allow a safe space for open and frank discussion. This is particularly important when different stakeholders are collectively discussing weaknesses and failures within the science and policy systems. In general, the case study teams found these models of stakeholder engagement useful in helping stakeholders from very different backgrounds to understand the needs and interests of others. In addition, such two-way engagement processes can help to communicate the uses and, more importantly, the limitations of climate information in guiding future investments.

Post-workshop feedback suggested that there are limitations, though. In some contexts, the use of hypothetical examples and scenarios restricts the ability of users to relate directly to their day-to-day decision-making roles. This is especially true when multiple sectors and time frames are used, as this restricts the ability to delve into technical details relating to the use of climate information, and encourages generalisations. Researchers need to take care to ensure that examples and scenarios match real-world adaptation challenges. Engagement workshops also require considerable time and resources to plan and prepare, not to mention skilful facilitators; these are often over and above those associated with traditional knowledge-sharing workshops and bilateral stakeholder consultations.

However, these challenges are largely outweighed by the ability to engage a diverse range of workshop participants and break down complex issues with a non-expert audience, such as the uncertainties associated with multi-decadal climate modelling. Above all, the case studies demonstrated the need to carefully consider the end objective and envisage outputs before selecting an appropriate engagement method. Not all science–policy dialogues require participatory engagement, such as serious games. On the other hand, not all knowledge-sharing and capacity-building objectives can be delivered through bilateral meetings.

Jamestown, Accra, Ghana

5.4 Long-term engagement is needed to have meaningful impact

Little happens through isolated workshops. Restricting engagement to one-off activities is a common approach to capacity building and knowledge-sharing. Single workshops, such as those conducted under the FCFA scoping phase, provide a useful mechanism for investigating the drivers of vulnerability and testing potential approaches to addressing them. Yet they rarely translate into effective and sustained learning and action.

This was clearly underlined by the case studies. All four teams highlighted that the short time frame of the scoping phase, and the limited mandate for follow-up activities, hampered their ability to meaningfully engage with respondents. Feedback from the Accra–Maputo case study, as well as the difficulties experienced in coordinating the Malawi and Zambia workshops, showed that sustained engagement processes build relationships of trust within a network of decision-makers over a longer time period. These relationships are necessary for sharing knowledge and developing meaningful partnerships for real decision-making processes.

In thinking through and designing engagement processes, it is crucial to consider how different activities are likely to affect change. If the objective is to build capacity, share knowledge or inform real development or adaptation decisions, then one-off workshops or meetings are unlikely to result in meaningful change. But moving to more meaningful forms of stakeholder engagement will not be easy. The responsibility for this lies as much with donors as it does with the stakeholders – NGOs, academic institutions and private sector entities – who typically run the workshops. All too often, projects are only funded for a short time frame, and stretched budgets put pressure to deliver on predefined project outcomes.

Clear knowledge and understanding of the institutional and political contexts that participants operate in is also needed among project coordinators. In particular, this helps to ensure that the objectives from any intervention – such as promoting the greater uptake of climate information in long-term decision-making – are well situated within ongoing national and local initiatives. Above all, longer-term engagements require considerable time and resources; leaving engagement processes to the very end of a project will seldom have an impact.

Chapter 6. What are the ethics of promoting the use of climate information in decision-making?

Key messages

- Decision-making processes and needs in sub-Saharan Africa are different to those elsewhere, especially Western Europe or North America. Transposing a model developed in the latter regions may create ethical challenges, as well as practical ones.
- When promoting a shift to decisions based on climate information, donors and knowledge brokers must explain and justify the moral reasons for taking action on longer-term decisions, especially when there are trade-offs against short-term gains.
- The people and organisations responsible for communicating climate science should be aware of the social value of the information they provide, and the legitimacy of the goals pursued by policy-makers. They must adhere to principles of honesty, precision, transparency and relevance when communicating climate information.
- Notwithstanding the need for awareness-raising, consideration should be given as to whether efforts to promote medium- to long-term climate information in places where there is little to no demand from decision-makers are appropriate and ethically defensible.

A number of ethics-related challenges arose during the process of implementing the FCFA scoping phase. While this was never a primary objective of the FCFA programme, findings from the case studies pose relevant questions of ongoing activities to promote the uptake of medium- and long-term climate information: questions that many within the donor and scientific communities have yet to reflect on openly.

This chapter examines these ethical questions and those arising from the programme's wider objectives. It starts by outlining the wider perspectives around development ethics, before considering ethics in relation to decision-making in sub-Saharan Africa and the generation and translation of scientific information.

6.1 Ethics and decision-making contexts

For the FCFA programme, the central question about development ethics is: to what extent is it justifiable to push for the consideration of a longer-term development agenda in places where attending to current concerns and crises is a higher priority? Just as importantly, should we be pushing a long-term agenda where there is little immediate appetite or demand from local and national stakeholders?

On the one hand, there is a strong case for saying that adaptation to climate change is a crucial aspect in the sustainability of any short-term development gains. There is growing empirical evidence that a failure to consider adaptation will constrain countries' economic growth and that, without an integrated approach to climate adaptation, the costs of meeting basic needs and human development targets will be far higher. Estimating the additional costs for adaptation in order to make the Millennium Development Goals resilient to future climate change, Fankhauser and Schmidt-Traub[59] concluded that Africa would require international assistance of around US$100 bn a year over the period 2010–2020, including US$11–21 bn for adaptation investments, above the US$82 bn needed in 'baseline' official development assistance.

On the other hand, experiences from the case studies help to challenge the presumption that including long-term climate information is necessary. From an ethical perspective, it asks whether prioritising long-term development perspectives might be at odds with the serious existing deficits in meeting basic human needs and finding pathways out of poverty. We might ask, therefore, whether donors, producers and users of climate information, knowledge brokers and other intermediates should instead prioritise shorter-term actions and investments that enhance broader adaptive capacity, which in turn will increase the capacity and resources to be able to retrofit decisions later (i.e. addressing the adaptation deficit).

An economic perspective might reinforce this view, as there may be significant opportunity costs and trade-offs in long-term decision-making. Given our tendency to accept heavy discount rates for future benefits, how do we justify the costs of present-day actions that have benefits spread across much longer time horizons? This is a particularly pertinent question when considering potentially maladaptive actions, as actions with high opportunity costs are one of the pathways to maladaptation in the future.[60]

Nonetheless, there are cases where not accounting for climate change today may lead to greater and irreversible costs or risks in the longer term. For example, urban planning or infrastructure investments that do not consider climate change may become locked-in to the maladaptive pathways, limiting future options and exposing societies to greater threats in the future.[61] This is a real concern in sub-Saharan Africa, where rates of economic growth and urbanisation are high.[62]

It is precisely this immediacy of development challenges that has led adaptation approaches away from their initial emphasis on longer-term, impact-focused models and towards shorter-term, vulnerability-based approaches (see Box 5). A vulnerability-led approach may not be incompatible with longer-term considerations, but the FCFA scoping phase activities demonstrate the ethical importance of linking future decision-making to existing development priorities and short-term benefits.[63]

6.2 Addressing ethical challenges

It is clearly important that the interactions between climate change and wider development pressures are recognised in promoting the use and uptake of climate information. This is particularly true when considering long-term decisions, because there

Box 5. Vulnerability-led approaches and shorter-term development timescales

Vulnerability-led approaches are underpinned by an awareness that, in many places, deficiencies in adaptive capacity are matched by a limited ability to manage and respond to existing climate variability, even before future climate change is considered. In such cases, improving the capacity of individuals, communities, companies and governments to deal with current climate variability is seen as building the foundation for tackling future climate change.

For example, managing water resources more efficiently and equitably today is necessary because of the poor management and the increasing demands for water in many regions – regardless of the future impacts of climate change on water availability. By tackling these existing challenges, water managers will be in a much better position to plan for a changing climate. Approaches that deliver immediate development benefits at the same time as enhancing wider adaptive capacity underpin the 'no-regrets' approach to adaptation.

may be trade-offs and opportunity costs that can increase exposure to climate risks or diminish development opportunities if they are not factored in properly at the outset. Often, donors and international agencies do not coordinate activities sufficiently, placing conflicting pressures on decision-makers to address different development priorities at the same time.[64]

Investments and activities should enhance the uptake of science for decision-making in sub-Saharan Africa. These should be African-led as far as possible, responding to the demands of the region's policy-makers and the needs of end users. Notwithstanding the need for awareness-raising, consideration should be given as to whether efforts to promote medium- to long-term climate information in places where there is no appetite or demand from decision-makers are appropriate and ethically defensible. As several of the case studies recognised, the importance of local and traditional knowledge should also not be overlooked in favour of externally generated scientific information. Indeed, local partnerships are important for understanding local contexts and overcoming the political barriers that affect uptake.

Keohane and colleagues[65] propose five principles for the communication of science to decision-makers and policy-makers where uncertainty and risk are high. These principles especially relevant to donors, producers and users of climate information, knowledge brokers and intermediaries in their efforts to promote the use of medium- to long-term climate information in long-term development objectives in sub-Saharan Africa:

- be honest: specifically, do not intentionally mislead or deceive the audience to manipulate policy outcomes
- be precise in the description of scientific information
- make it relevant: communicate only the information that is pertinent to the audience and has implications for policy
- be transparent about how the information was produced and reviewed, so that the audience can evaluate the science for themselves
- be specific about the uncertainty in any conclusions.

As well as being demand-led, the generation of climate information should draw on scientific establishments in sub-Saharan Africa as much as possible. In practice, the current lack of collaboration between these should be addressed, for example through digital infrastructure to allow institutions to store and share climate-related data and knowledge.[66] This would require investment in better computers to expand existing databases or build new ones.

Resources are needed to support young scientists in sub-Saharan Africa and provide employment opportunities to encourage their involvement in developing climate data. Where gaps in scientific capacity exist, strategic partnerships with the international community can help. For example, the Coordinated Regional Downscaling Experiment (CORDEX) in Africa is an initiative launched under the World Climate Research Programme to advance knowledge of regional responses to climate change and feed this into research and policy. CORDEX also offers training, outreach and communications.[67] Opportunities may exist for similar collaborations with related scientific fields, such as refining the economics of adaptation and multidisciplinary research on the drivers of vulnerability.

Above all, there is a need to invest in meaningful relationships with all stakeholders if the barriers to uptake of climate information – and ethical issues surrounding this – are to be overcome. Building trust is a large part of co-producing climate information.

Container ship, Tanzania

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About FCFA

Future Climate for Africa (FCFA) is a new 5-year international research programme jointly funded by the UK's Department for International Development (DFID) and the Natural Environment Research Council (NERC). The Programme will support research to better understand climate variability and change across sub-Saharan Africa. More information is available at www.futureclimateafrica.org

The programme will focus on advancing scientific knowledge, understanding and prediction of African climate variability and change on 5–40-year timescales, together with support for better integration of science into longer-term decision-making. CDKN is responsible for coordinating the FCFA scoping phase – an 18-month exercise using six case studies in sub-Saharan Africa to evaluate the needs of science users in the context of the capabilities and limitations of current science.

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.

About ODI

The Overseas Development Institute (ODI) is the UK's leading independent think tank on international development and humanitarian issues.

About SouthSouthNorth

SouthSouthNorth is a non-profit company based in Cape Town, South Africa. It specialises in developing evidence-based, locally tailored solutions to climate and development challenges in partnership with a network of leading international organisations.

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Climate & Development Knowledge Network

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