Water Security and Climate Resilient Development

STRATEGIC FRAMEWORK

Investing in water security for growth and development

About AMCOW

The African Ministers' Council on Water (AMCOW) was formed in 2002, primarily to promote cooperation, security, social and economic development and poverty eradication among member states through the effective management of the continent's water resources and provision of water supply services. In 2008, at the 11th ordinary session of the African Union (AU) Assembly in Sharm el-Sheikh, Heads of States and Governments of the African Union agreed on commitments to accelerate the achievement of water and sanitation goals in Africa and mandated AMCOW to develop and follow up an implementation strategy for these commitments. AMCOW has also been accorded the status of a Specialised Technical Committee for Water and Sanitation in the African Union.

About CDKN

The Climate and Development Knowledge Network (CDKN) supports decision makers to design and deliver climate compatible development. It does this by combining research, advisory services and knowledge sharing to support locally owned and managed policy processes. CDKN works in partnership with decision makers in the public, private and non-governmental sectors nationally, regionally and globally. CDKN operates in Africa, Latin America and Asia and the African programme is managed by SouthSouthNorth.

About GWP

The Global Water Partnership is an intergovernmental organisation of 13 Regional Water Partnerships, 80 Country Water Partnerships and more than 2,500 Partner Organisations in 161 countries. Its vision is a water secure world. Its mission is to support the sustainable development and management of water resources at all levels through Integrated Water Resources Management (IWRM). IWRM is a process that promotes the coordinated development and management of water, land and related resources in order to maximise economic and social welfare in an equitable manner, without compromising the sustainability of vital ecosystems and the environment.

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Foreword

On behalf of the African Union, I welcome the development of the *Framework for Water Security and Climate Resilient Development* by the African Union Commission's Specialised Technical Committee on Water and Sanitation (AMCOW), and its partner the Global Water Partnership.

The framework is a key milestone towards the attainment of the Africa Water Vision 2025 of equity and sustainability in the use and management of water resources for poverty alleviation, socio-economic development, regional cooperation and the environment.

Promoting water security and climate resilient development reinforces actions that reflect the overarching messages and objectives of the upcoming Rio+20 and the recent Durban CoP17 outcomes emphasizing the Green Economy, sustainable development, meeting the Millennium Development Goals, and strengthening international climate action.

Water security contributes to job creation, gross domestic product (GDP) and development goals across most sectors – health, energy, agriculture, environment, mining, industry and social protection. It also supports climate change adaptation and disaster risk reduction, particularly floods and drought related disasters.

The African Union is aware that one of the key challenges facing policy- and decision-makers is to understand the current water resource situation and trends in the face of the increased uncertainties brought about by climate change.

Many member countries of the African Union experience cycles of drought, flooding and other extreme climatic events which derail African development causing damage, suffering and disruption to populations, particularly the most vulnerable and poor.

Aware of this challenge, the heads of state and government of the member countries of the African Union have been providing leadership in global climate change negotiations under the UNFCCC. In addition, the 2008 Sharm El-Sheikh Declaration on water and sanitation includes specific commitments on climate change adaptation and investment plans.

The African Union is pleased to note that, as part implementation of the Sharm El-Sheikh commitments, AMCOW has mobilised partners to develop this Framework. The Framework will assist countries' efforts to integrate water security and climate resilience into development planning, with a focus on prioritising 'no or low regrets' investments and financing strategies.

The Framework is an outcome of the AUC–AMCOW climate change programme titled the *Water, Climate and Development Programme*, implementation of which is spearheaded by the Global Water Partnership.

Ultimately, the Framework is a contribution towards the vision of the African Union for "*an integrated, prosperous and peaceful Africa, driven by its own citizens and representing a dynamic force in global arena.*"

We invite AU member states to work together with AMCOW and its partners and strive to achieve the vision of this Framework and make the necessary investments to ensure water security and climate resilient development, for sustainable jobs, economic growth and future economic and social development goals.

Mrs Rhoda Peace Tumusiime
Commissioner for Rural Economy and Agriculture, African Union Commission

Preface

The African Ministers' Council on Water's (AMCOW's) recognition of the importance of climate change and its potential impacts on water security can be traced back to the Africa Water Vision 2025 (2000) as well as high level commitments by African heads of state and governments.

The Framework for Water Security and Climate Resilient Development directly supports the aspirations of the Africa Water Vision. Promoting water security and climate resilient development reinforces actions that reflect the overarching messages and outcomes of the UNFCCC COP17 meeting in Durban (December 2011) and the Rio+20 meetings in June 2012. These messages stress the importance of the Green Economy, sustainable development, Millennium Development Goals (MDGs), and strengthened international climate action.

The Framework for Water Security and Climate Resilient Development has been formulated to support the implementation of climate change related commitments expressed by African heads of state in the 2008 Sharm el-Sheikh Declaration on water and sanitation. In particular, the Declaration calls for African countries to put in place adaptation measures and investment plans to improve the resilience of countries to the increasing threat of climate change and variability to water resources, and to enhance capacity to meet water and sanitation targets. Development of the Framework was also identified as the first milestone for AMCOW's climate change adaptation target presented at the 6th World Water Forum.

The Framework provides guidance to countries on how to integrate water security and climate resilience into development planning and investment decision-making processes. It outlines a phased approach to the development of 'no/low regrets' investments and financing strategies, as a starting point for embarking on water security for climate resilient growth and development.

The Framework has been developed as part of the Water, Climate and Development Programme (WACDEP), an AMCOW programme implemented by the Global Water Partnership. The milestones towards the development of the Framework were:

- Sharm el-Sheikh declaration on water and sanitation (2008)
- Formulation of the Water, Climate and Development Programme (WACDEP by AMCOW and GWP, 2010)
- Decision by AMCOW Executive Council of Ministers for GWP to operationalize the WACDEP (Nov 2010)
- WACDEP launch at Stockholm Water Week and Framework inception meeting (Aug 2012)
- Presentation of the Framework road map to AMCOW TAC Johannesburg (Oct 2011)
- GWP/AMCOW First Expert Panel review meeting for the Framework (Nov 2011)
- Southern Africa stakeholder consultation on the Framework at a COP17 side event in Durban, South Africa, during the launch of the SADC Climate Change Adaptation Strategy (Nov 2011)
- West Africa stakeholder consultation on the Framework at a sub-regional consultation workshop for implementing AMCOW West Africa work programme, held in Bamako, Mali (Dec 2011)
- Pan-African multi-stakeholder stakeholder consultation at the 6th World Water Forum Africa preparatory process regional validation workshop, held in Banjul, Gambia (Dec 2011)
- GWP/AMCOW second Expert Panel review meeting for the Framework (Feb 2012)
- Presentation of draft Framework as part of AMCOW's climate change target for the 6th WWF, Marseille (Mar 2012)
- Launch of the Framework by AMCOW during the 4th Africa Water Week, Cairo, Egypt (May 2012)

We hope that over the coming years the Framework will enable African countries to put in place measures that enhance water security and climate resilience for growth and development.

Bai Mass Taal
AMCOW Executive Secretary

Acknowledgements

AMCOW wishes to express its thanks to the Global Water Partnership (GWP) and Climate Development Knowledge Network (CDKN) who coordinated and supported the development of this Strategic Framework.

The Strategic Framework has evolved through a strong collaborative relationship between AMCOW and its Technical Advisory Committee, GWP and CDKN, who funded the work. AMCOW further wishes to acknowledge Austrian Development Cooperation for support to the Water Climate Development Programme, which set the basis for the Framework.

The Framework would not be where it is today without the unwavering guidance and direction of the following members of the GWP/AMCOW Expert Panel who provided technical guidance and inputs in the formulation process:

- Professor Torkil Jønch Claussen (Chair of EP, GWP Senior Advisor)
- Ms. Lindiwe Lusenga (AMCOW TAC, AMCOW President's office)
- Dr Mats Eriksson (Secretary to EP, Stockholm International Water Institute)
- Alan Hall (EU Water Initiative Finance Working Group)
- Ms. Belynda Petrie (Southern Africa)
- Professor Edward Kairu (Eastern Africa)
- Professor Michael Scoullos (Mediterranean and North Africa)
- Professor Mattias Fonteh (Central Africa)
- Professor Abel Afouda (West Africa)

Special thanks to Alex Simalabwi (GWP), Andrew Takawira (GWP) and Jo McDonnell (CDKN), who in addition to providing expert inputs also managed and coordinated the development of the Strategic Framework.

The work was undertaken by HR Wallingford in collaboration with other UK and African consultants and specialists including: Nigel Walmsley, George Woolhouse, Steven Wade and Geoff Pearce (HR Wallingford); Jim Winpenny; Kit Nicholson; Alan Nicol (Institute for Development Studies); Dustin Garrick (Oxford University Centre for the Environment); Chistophe Brachet (Office International de l'Eau); Mark New (Climate Systems Analysis Group, UCT); Marcela Tarazona (Oxford Policy Management); Bruce Lankford (Water Security Research Centre, UEA); and Themba Gumbo (CapNet).

Finally, we wish to thank the many other people and institutes that provided comments, suggestions and invaluable contributions during the stakeholder workshops such as representatives of the AMCOW Technical Advisory Committee, national governments, sector agencies, river basin organisations, regional economic commissions, NGOs and international agencies. These stakeholders made invaluable contributions on the needs and priorities for ensuring the relevance of the Strategic Framework.

1. ABOUT THE FRAMEWORK

1.1 Aim and scope

The sustainability of Africa's economic growth and development will depend on what happens to water resources on the continent. Water is a key input to economic growth sectors and contributes to employment, job creation and gross domestic product (GDP).

Climate change threatens the continent's water resources. To sustain jobs, employment, economic growth and social stability, African leaders of today and tomorrow must make investment decisions that promote water security and climate resilient growth and development.

Strategies, plans and investments that promote sound water resources management are a cost-effective way of delivering both immediate development benefits and of building resilience to longer term climate change. Improved water management can benefit many sectors – for example health, energy, agriculture and environment – whilst also contributing to development goals, climate change adaptation and disaster risk reduction, particularly floods and drought related disasters.

This Framework provides an approach for the development of 'no/low regrets' investments and financing strategies, as a starting point for embarking on climate resilient development in Africa. No/low regrets investments have the key characteristic of delivering benefits under any future climate scenario and building confidence in the long term sustainability of development activities. Fast-tracking these investments allows action to be taken now, despite the large uncertainties in the future climate. The Framework also promotes longer term actions to mainstream water security in development planning systems, and to influence resource allocation toward climate resilient development.

The Framework is not a completely new process, rather it strengthens and refines existing processes to build climate resilience into growth and development. The application of the Framework is split into four Phases (see Figure 1.1), and the generic nature of the cycle provides flexibility to allow application at sub-national, national and transboundary planning levels, and to accommodate the wide range of institutional contexts across Africa. Individual steps within each Phase of the application of the Framework are described in more detail in Chapters 4, 5, 6 and 7.

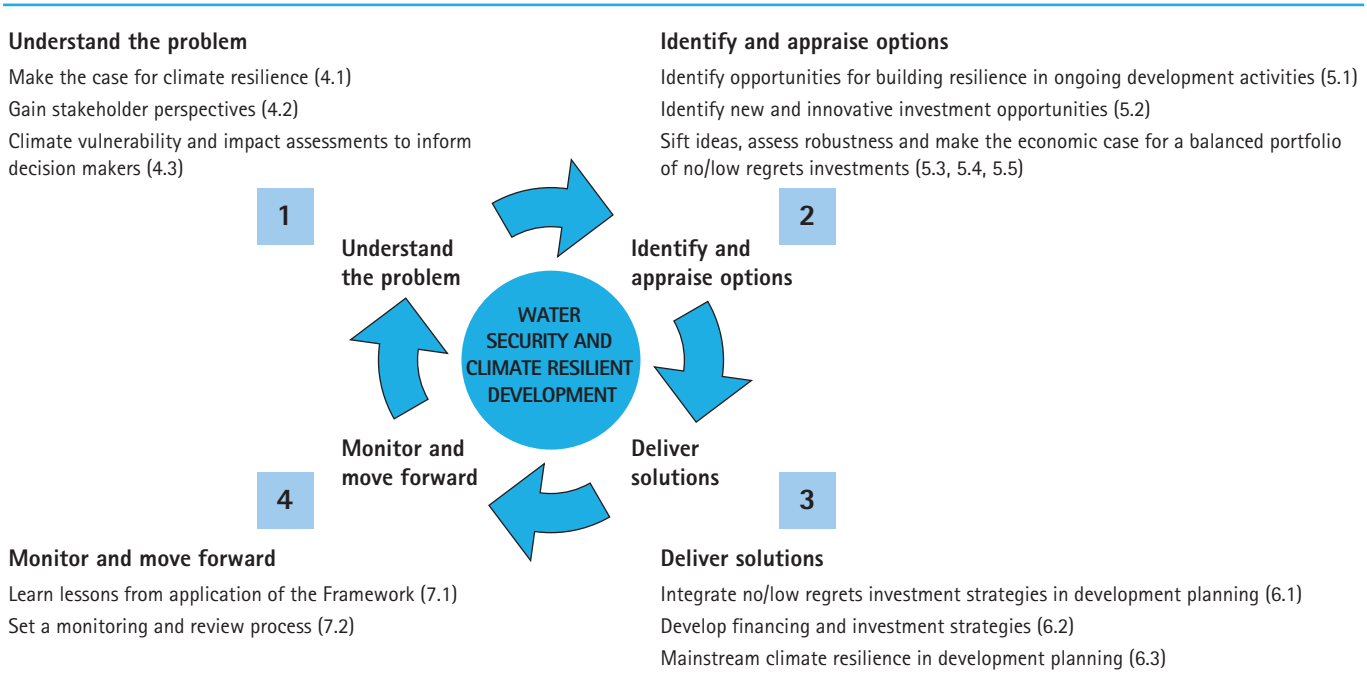


Figure 1.1 The Framework cycle.

1.2 Target audience

This Framework document is for senior professionals and decision makers who are responsible for making investment decisions, or may be influential to the integration of water security and climate resilience in national development planning, budgeting processes and investment planning. The target audience includes:

- ministerial advisors,
- senior policy-makers,
- senior development planners,
- sector specialists, and
- sector development corporation advisors and specialists.

The Framework is relevant to a wide range of water resource-dependent sectors including drinking water supply and sanitation, agricultural water management, energy, environment, health, tourism and others. It is also relevant for those who will be involved in the application of the Framework such as donors and international financial institutions (IFIs), non-government organisations (NGOs) and others engaged with national governments in the delivery of sustainable national development.

Box 1.1

Adaptation related commitments in the Sharm el-Sheikh declaration on water and sanitation

- Put in place adaptation measures to improve the resilience of countries to the increasing threat of climate change and variability to water resources and Africa's capacity to meet water and sanitation targets.
- Request the regional economic communities and the river and lake basin organisations to initiate regional dialogues on climate change and its impacts on the water sector with the aim of designing appropriate adaptation measures.
- Ensure the equitable and sustainable use, as well as promote integrated management and development, of national and shared water resources in Africa.
- Significantly increase domestic financial resources allocated for implementing national and regional water and sanitation development activities and call upon Ministers of Water and Ministers of Finance to develop appropriate investment plans.

1.3 Responding to identified needs and priorities

There is now widespread consensus on the urgent need for immediate action to tackle climate change through adaptation, and this has been reiterated at many African Regional and Global United Nations Framework Convention on Climate Change (UNFCCC) meetings. The preparation of the Framework has been guided by the commitments and principles emerging from a number of high level global and African policy instruments and declarations such as the UNFCCC, the Africa Water Vision 2025, African Union Heads of State commitments in the Sharm el-Sheikh Declaration on water and sanitation (see Box 1.1), the New Partnership for Africa's Development (NEPAD), and the Nairobi Statement on Land and Water Management for Adaptation to Climate Change.

The Framework reinforces the principles underlying these commitments. Its application and the implementation of the emerging investments will support a wide range of development needs and priorities by:

- identifying and developing no/low regret investments, and associated financing strategies for these investments, across a wide range of sectoral and sub-sectoral interests and aligned with national development goals and priorities;
- ensuring measures and investments take into account current and future climate conditions, socio-economic development pathways, and water use trends;
- promoting robust, practical adaptation investments that deliver benefits across a wide range of possible climatic and socio-economic futures;
- reinforcing development pathways that are firmly grounded in sustainable development, and that facilitate transitions toward the greening of economies;
- promoting increased investment in water security and climate resilience from a variety of domestic and international financing sources.

1.4 Supplementary information and resources

Although a standalone document, the Framework is part of a suite of outputs that together provide a range of knowledge products to promote and operationalise the integration of water security and climate resilience into development planning and decision-making processes. In particular, an associated *Technical Background Document* provides further details of tools and methodologies for application of the Framework.

2.
WATER, CLIMATE AND DEVELOPMENT

> *Africa is one of the most vulnerable continents to climate change and climate variability, a situation aggravated by the interaction of 'multiple stresses', occurring at various levels, and low adaptive capacity*
>
> – IPCC 4th Assessment Report[1]

2.1 Water security and climate resilient development

Investment is urgently needed to manage water resources and climate risks in order to secure Africa's macro-economic development. Drought in sub-Saharan Africa is a dominant climate risk. It destroys economic livelihoods and farmers' food sources and has a major negative effect on GDP growth in one-third of the countries[2]. Economy-wide models incorporating hydrological variability show that projections of average annual GDP growth rates in Ethiopia drop by as much as 38% as a consequence of this variability. A substantial infrastructure deficit is a major contributor to this vulnerability to hydrological variability, Ethiopia having less than 1% of the per capita water storage of North America[3].

Floods are also highly destructive to infrastructure and transportation, and hence flows of goods and services. They contaminate water supplies and increase the risk of epidemics of waterborne diseases such as cholera[4]. In Kenya, the 1997–98 floods caused a drop of 11% of GDP, and the drought of 1999–2000 a further drop of 16% of GDP[5]. Resilience, through investment in better water management and infrastructure, can reduce such negative impacts on GDP. The Africa Infrastructure Country Diagnosis (AICD) summarises the case:

"The [Africa] region's weak capacity to buffer the effects of hydrological variability and unpredictability in rainfall and runoff can encourage risk-averse behaviour at all levels of the economy. It discourages investment in land, advanced technologies, or agriculture. An unreliable water supply is also a significant disincentive to investments in industry and services."[6]

A lack of investment in water security in Africa has led to an adaptation deficit, that is, an inability to adequately manage existing climate risks and hydrological variability (see also Box 2.3). Climate change and rising populations will serve only to add further pressures and to widen the deficit gap. This lack of investment has been not only in assets and infrastructure but also in institutional policies, plans and systems to improve the integrated management of water resources (Box 2.1).

Projected climate and demographic changes reinforce the requirement for urgent investment in water security to improve Africa's resilience to climate change. The International Monetary Fund (IMF)[9] have warned that deteriorating climatic conditions could lower GDP growth due

Box 2.1

Integrated management across the water, energy and food security nexus

Water, energy and food security are inter-related and often rely on common use of scarce natural resources[7]. Resource limitations in all sectors require a shift towards increased resource use efficiency, demand management and more sustainable consumption patterns. Without such changes, current development trajectories may threaten to drive social–ecological systems at all scales towards critical thresholds.

Africa has developed only 10% of its hydropower potential, much less than other regions. The harnessing of Africa's waters could be used to drive development while contributing to climate change adaptation and mitigation. Those countries that rely on hydropower face outages during low flow periods. Coal-based energy generation places demands on water resources for cooling processes. The cultivation of biofuels puts large demands on water resources (10,000–100,000 litres/GJ energy)[8], which can conflict with other demands such as domestic food security.

There is potential to increase overall resource use efficiency and benefits in production and consumption though an integrated approach across sectors. Better integrated policy- and decision-making that account for external costs across sectors will have to complement conventional approaches aimed at only improving sectoral resource productivity. This can lead to improved overall resource use efficiency, sustainable resource management and equitable benefit sharing. In turn, institutions need to be flexible, adaptive, and enabled to cooperate with institutions representing other sectors.

Rather than creating new institutions or departments the aim should be to maximise the use of existing integrated frameworks. In recent years in Africa, considerable efforts have focused toward the implementation of integrated water resources management (IWRM) frameworks and plans. These provide a foundation to evolve partnerships with water-using sectors whose policies and strategies are governed by many factors outside the water sector.

to reductions in output and productivity, particularly in the least developed countries and in sectors such as agriculture, fisheries and tourism. For example climate impacts on Namibia's natural resources that would cause annual losses of 1 to 6% of GDP, of which livestock production, traditional agriculture, and fishing are expected to be hardest hit, with a combined loss of US$461–2,045 million per year by 2050[10].

Investments in water and sanitation services are beneficial for economic growth as well as reducing poverty and human suffering. The World Health Organisation (WHO) estimates[11] that for every US$1 invested in water supply and sanitation there is a potential benefit of US$3–34, mainly in time saving and welfare. These benefits could be put at risk by climatic factors affecting the supply of raw water, or which damage water infrastructure.

Preserving the ecosystems that sustain economic activities will secure livelihoods and provide sustainable local economies. The economic value of the known wetlands in Africa is estimated by the World Wide Fund for Nature (WWF) to be more than US$250 million per year in flood control, water filtering, materials and fuel wood amongst others. This figure may be up to 20 times higher if information on wetlands was more extensive[12]. Lake Victoria is an important source of freshwater fish in Eastern Africa and is of great importance to the region's economy as a major source of food, income and employment. Lake fisheries are worth an estimated US$600 million annually, with more than half from export earnings. Lake fisheries support almost 2 million people and meet the annual fish consumption needs of almost 22 million people in the region[13].

It is notable that Africa contributes only 3.8% of total greenhouse gas emissions, yet African countries and communities will likely suffer earliest and hardest because of their present low levels of resilience and reliance on climate-sensitive sectors like agriculture.

2.2 Development in an uncertain climate

Although there is a gathering consensus in the scientific community about the likelihood of future climate change there is inherent uncertainty in future projections. For example, the differences in the results from the projections of different Global Climate Models (GCMs) are shown in Figure 2.1 with respect to streamflow run-off across Africa. This uncertainty can present difficulties for policy-makers and can undermine investment decisions in water security. It is important to present uncertainties and the strength of evidence clearly and to provide decision making methods that can make use of this information effectively. Table 2.1 presents the headline climate change projections for Africa based on IPCC research.

2.3 Adapting to climate change

Adapting to climate change will benefit from the prioritisation of investments that perform well under a range of future climate scenarios, taking account of the uncertainties inherent in climate change projections. These investments are referred

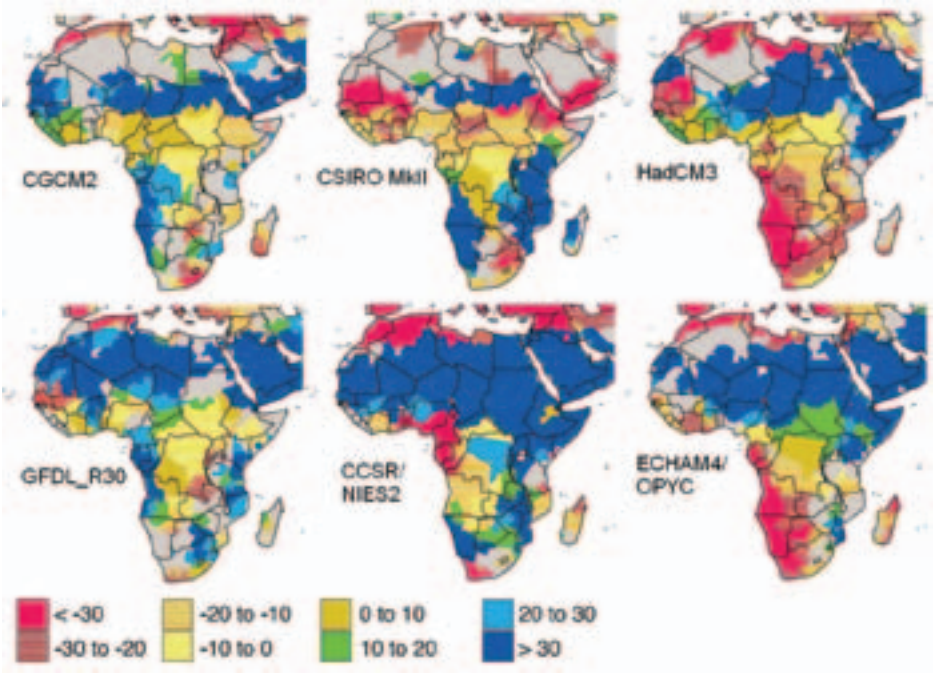


Figure 2.1 Projected climate change impacts on runoff in Africa by the 2050s under six different climate models (% change in average annual runoff by 2050 compared to 1961–1990 for the SRES-A2 emissions scenario) a change of less than one standard deviation is shown in grey[14].

Table 2.1 Headline climate change projections for Africa based on IPCC research

Climate variable	Summary of projected change
Temperature[15]	Warming in African continent is very likely to be 1.5 times higher than the global annual mean warming, in all seasons and over the entire continent. The IPCC[16] predicts that average temperatures in Africa will increase by 3 to 4°C by 2090 based on 1990 levels.
Rainfall[17]	Rainfall patterns will change with some regions seeing increasing rainfall (Eastern Africa and the Horn of Africa) and others decreasing rainfall (Southern Africa and African Mediterranean coast) although a high degree of uncertainty exists.
Sea level[18]	Increase in mean sea levels of between 0.28 and 0.43 metres (best estimate) depending on emissions scenario, based on change from 1990 to 2100, this will be exacerbated by more intense storms in terms of coastal flood hazard.
Climate extremes[19]	Storms, heavy rainfall and heatwaves are likely to become more intense, as are tropical cyclones. Heavy rainfall events that occur at present 1 in 20 years are likely to occur 1 in 5 to 1 in 15 years by 2090 relative to the late 20th century. The 1 in 20 year hottest day is likely to occur every 2 years by the end of the 21st century

to as no/low regret investments and are a key recommendation of IPCC research into climate risk management (see Box 2.2). Investing without consideration of climate change can lead to maladaptation. Investments to improve climate resilience and water security management will require a balanced portfolio of measures including infrastructure development, institutional strengthening and information services.

Building climate resilience into development activities is key to achieving long-term sustainability. Climate resilient development in Africa will benefit from both standard development activities and specific adaptation activities (see Box 2.3). To-date, the adaptation agenda has been largely driven outside of existing development planning processes. In order to avoid duplication and parallel processes, mainstreaming adaptation within existing national development planning processes and systems is desirable, and should include the integration of associated climate finance where available.

Adapting to climate change introduces additional costs. The World Bank estimates the infrastructure costs of adapting to climate change in Africa to be $US18 billion annual investment between 2010 and 2050[21]. The African Development Bank (AfDB) estimates that adaptation costs are between $US20 and 30 billion per year for the next 10 to 20 years[22]. This represents a significantly greater proportion of GDP in sub-Saharan Africa compared to other world regions (see Figure 2.2).

Box 2.2

Key recommendations from the IPCC special report "Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX)" [20]

The IPCC SREX report is a landmark research output that explores the challenge of understanding and managing the risks of climate extremes to advance climate change adaptation. In addition to presenting the evidence for changing climate extremes such as heavy rainfall and heatwaves, the report presents recommendations for managing climate extremes and disaster risk. The development of no/low regret investment strategies aligns closely with these recommendations while the SREX report provides a wealth of detailed information on disaster risk management and adaptation.

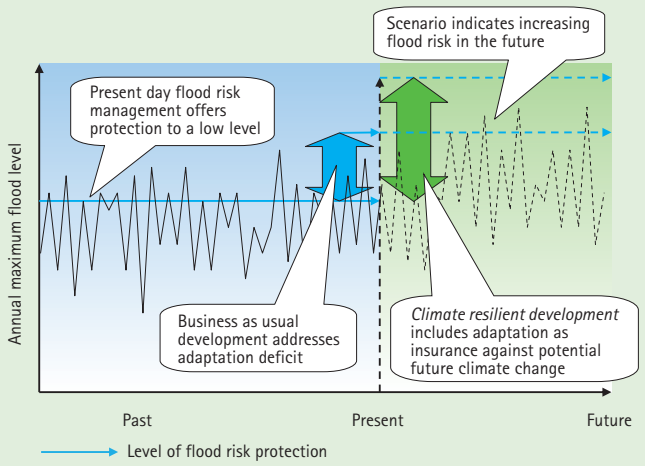
Key findings which align with the Framework objectives include:

- **Risk sharing** and transfer mechanisms at local, national, regional, and global scales can increase resilience to climate extremes.
- **National systems** are at the core of countries' capacity to meet the challenges of observed and projected trends in exposure, vulnerability, and weather and climate extremes.
- Measures that provide benefits under current climate and a range of future climate change scenarios, called **low-regrets measures**, are available starting points for addressing projected trends in exposure, vulnerability and climate extremes. They have the potential to offer benefits now and lay the foundation for addressing projected changes. Potential low-regrets measures include early warning systems; risk communication between decision makers and local citizens; sustainable land management, including land use planning; and ecosystem management and restoration. Other low-regrets measures include improvements to health surveillance, water supply, sanitation, and irrigation and drainage systems; climate-proofing of infrastructure; development and enforcement of building codes; and better education and awareness.
- Effective risk management generally involves a **portfolio of actions** to reduce and transfer risk and to respond to events and disasters, as opposed to a singular focus on any one action or type of action.
- **Integration of local knowledge** with additional scientific and technical knowledge can improve disaster risk reduction and climate change adaptation.
- An **iterative process** of monitoring, research, evaluation, learning and innovation can reduce disaster risk and promote adaptive management in the context of climate extremes.
- A prerequisite for sustainability in the context of climate change is **addressing the underlying causes of vulnerability**, including the structural inequalities that create and sustain poverty and constrain access to resources.
- The most effective adaptation and disaster risk reduction actions are those that offer **development benefits** in the relatively near term, as well as **reductions in vulnerability** over the longer term.
- Successfully addressing disaster risk, climate change and other stressors often involves embracing **broad participation in strategy development**, the capacity to combine multiple perspectives, and contrasting ways of organizing social relations.

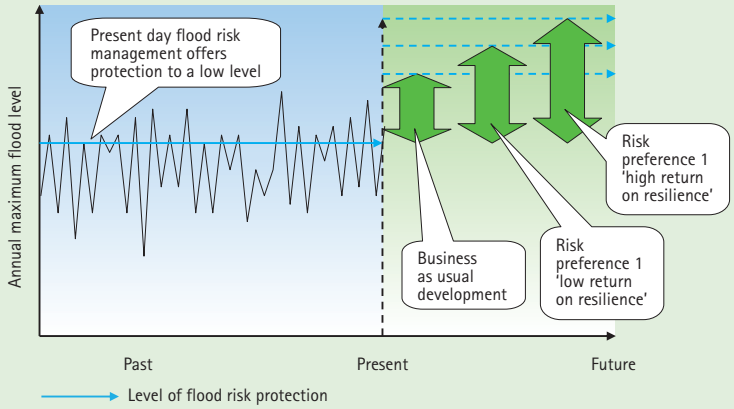
Box 2.3

Development, adaptation and risk preferences

Strong synergies exist between development and adaptation, illustrated in the hypothetical example below. In terms of flood risk, business-as-usual development may involve improving flood risk management to address existing climate variability and flooding problems. This addresses an *adaptation deficit*, that is, the backlog of investment needed to address existing climate risks to an acceptable level. Climate resilient development includes development with an element of adaptation, based on scenarios of potential future flood risk (dashed line). Climate resilience may be conferred by hard measures such as improving flood defences, or by soft measures such as flood event management and early warning.



Risk preferences describe the level of risk which decision makers are willing to adopt, and are often informed by Benefit Cost Analysis (BCA). In the flood risk example, the additional requirements to ensure an adequate level of future protection must be determined. On one hand the decision maker could accept the risk of future increases in flood risk, or could invest to bolster flood risk management against potential future increases. No/low regrets measures, such as flood warning, will deliver returns whether or not risk increases, whereas raising defences may not be required if climate change projections are inaccurate.



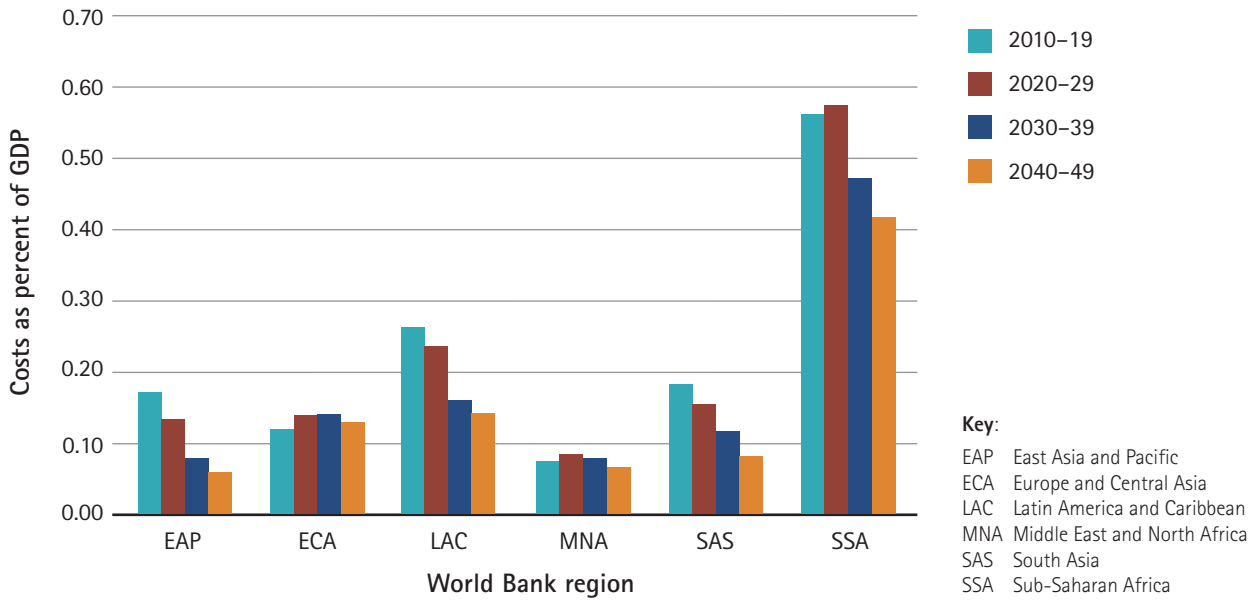


Figure 2.2 Total annual cost of adaptation as a percentage of GDP for world regions[23].

Strengthening adaptive capacity is also an important element for enhancing climate resilience. The degree to which planned adaptation is needed will depend on the amount of adaptation that will naturally occur as society and institutions adjust to changing circumstances. One focus of adaptive capacity is on the capacity of organisations to take decisions based on uncertain information about future climate change, and their ability to adjust appropriately over time to changing climate conditions. The current level of adaptive capacity of any institution therefore has a direct bearing on its own future adaptive capacity and hence vulnerability.

Broadly speaking, *high* adaptive capacity is used to signify that an organisation or sections of society are able to recognise and act appropriately for decisions or potential decisions with a long time horizon; and *low* adaptive capacity is used to signify that an organisation is weak at doing so. If adaptive capacity is low, maladaptation is more likely to occur, which may significantly increase future risks. For this reason, it is vitally important that the capacity of African organisations is raised.

Box 2.4

Water security and the Green Economy for Africa

In the African context, poverty reduction and economic growth form part of the main focus of the Green Economy debate. A large majority of African livelihoods are dependent on natural resources and a number of sectors with green economic potential are particularly important for the poor – such as agriculture, forestry and fisheries. All of these have the quality of a 'public good' and are highly dependent on good water management. Investing in greening these sectors is likely to benefit the poor by improving livelihoods and enhancing ecosystem services.

There are already 'success stories' of initiatives that contribute toward a transformation to a Green Economy in Africa, and both Rwanda and Ethiopia have launched low carbon strategies. However, there still remains much that could be achieved in most countries by focusing on the role better water management could play in 'greening' economies, The case for promoting early investments in water management and infrastructure is therefore strong.

2.4 Moving toward a Green Economy

Promoting water security and climate resilient development reinforces actions that reflect the overarching messages and objectives of the Durban COP17 and Rio+20 meetings. These messages stress the importance of the Green Economy, sustainable development, paying attention to the Millennium Development Goals (MDGs), and strengthened international climate action. In its simplest expression, a Green Economy is one that is low-carbon, resource efficient and socially inclusive.

Water is an important and strategic resource for driving a Green Economy through its contribution to agriculture, energy, fisheries, forestry, industrial production, and other uses. As African nations move towards 'greening' their economies (see Box 2.4), there is a strong case for early investments in water management and infrastructure that focus on the sustainable management and utilisation of resources, whilst also strengthening climate resilience.

2.5 Bridging the gender gap

Gender equality and women's empowerment goals are part of the cornerstones of the principles for improved water security and climate resilient development. Women are the most likely to suffer from climate change impacts such as floods and drought, but they are also the most capable of creating change and adaptation within their communities. Women play a pivotal role in the provision, management and safeguarding of water and these roles need to be reflected in policy and institutional, arrangements for the development and management of water resources. AMCOW has provided leadership and commitment in this area through its Policy and Strategy for Mainstreaming Gender in Africa's Water Sector. Application of the Framework to enhance regional and national water security and climate resilience in Africa should incorporate the aspirations of the AMCOW gender strategy, as well as other existing national gender policy frameworks, to ensure that the different activities that are implemented mainstream gender concerns.

3.
USING THE FRAMEWORK

3.1 A phased approach

The Framework describes a process which is aimed towards identifying and developing no/low regrets investment strategies, integrating these into economic development planning processes, and influencing future development planning activities to become more resilient to climate change and variability.

There are four Phases to the Framework and these are described in detail in Sections 4–7:

- Phase 1 - Understand the problem
- Phase 2 - Identify and appraise options
- Phase 3 – Deliver solutions
- Phase 4 – Monitor and review

The user should bear in mind that this is not a manual. The emphasis is to avoid prescription, and instead to facilitate a questioning mode of approach in which different country and institutional contexts can be accommodated. The Framework highlights a number of analytical tools to assist in the process.

Key pointers on the process of applying the Framework

The Framework can be applied at a number of planning levels, including transboundary, national and sub-national levels. The steps required are intended to be generic, but stakeholder roles and responsibilities, and outcomes of the process, will be different under each Phase of the application of the Framework.

A mandate from, and cooperation with, high-level national officials such as ministers and departmental directors is required for successful application of the Framework. This is true whether the Framework is being applied at transboundary or sub-national level. Gaining a mandate for applying the Framework will require a strong case to be made for its application and the opportunities which climate resilience can deliver for development.

Facilitation of dialogue across existing silos of thinking and planning is needed in order to identify opportunities for building resilience through integrated management of land and water. Most national governments already have stakeholder platforms that they engage – for disaster risk management, IWRM planning, national development planning and for climate change coordination – and the aim should be to ensure that these communities are brought together in applying the Framework. Similarly, if the Framework is to be applied to identify opportunities to enhance water security and climate resilience in food security, it may be owned by the Department of Agriculture but would build dialogue with a diverse range of stakeholders (other sectors or civil society for example) to develop innovative solutions. Figure 3.1 gives a high level overview of the landscape in which dialogues may occur although the scale at which the Framework is to be applied will influence where the these dialogues are centred.

Access to an interdisciplinary team with diverse skill sets is required. The Framework requires skills ranging from networking, in order to access a wide range of information sources (both recorded and institutional), to analysis of data (financial and environmental) and communication of risks for decision makers. Capacity building as well as working with appropriate expertise

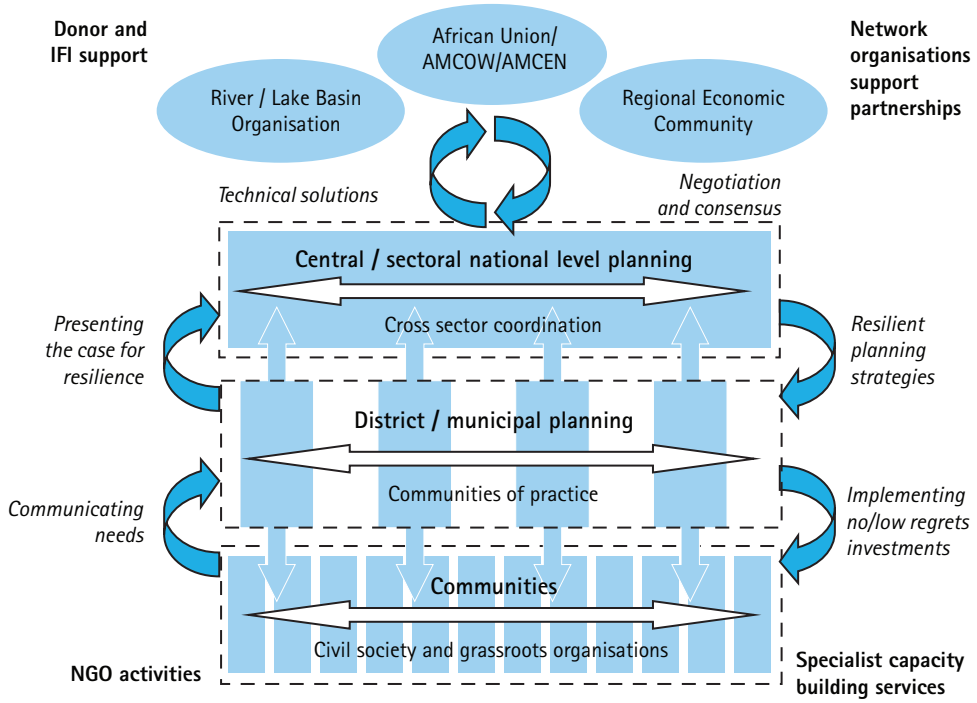


Figure 3.1 Conceptualisation of the dialogues across sectors and scales advocated in the Framework.

will be needed to apply the Framework and build resilience into planning systems in the medium term.

Applying the Framework should target short-term investments to enhance climate resilience for immediate implementation as well as medium- to long-term actions to influence future plans and higher level strategy preparation. A twin track approach of measurable-on-the-ground actions, combined with elements to shape future strategies will help to build resilience in the short and medium terms.

Box 3.1

Examples of potential scenarios for application of the Framework

At a **transboundary level** the Framework can be applied to identify investment opportunities for building climate resilient water and land management practices. Regional Economic Communities (RECs) and River/ Lake Basin Organisations (RLBOs) would be key players in applying the Framework and coordinating the various national and sector interests.

At a **national level** the Framework can be applied to identify investment opportunities for addressing climate risks to economic development. Key players will be national/central planners and policy-makers, sector specialists, business leaders and disaster risk reduction specialists.

At a **sector level** (for example agriculture or energy) within a basin or nationally, the Framework can be applied to identify investment opportunities to increase the resilience of sector activities. Key players will include national central planners in order to coordinate, sector planners and technical specialists and stakeholders from within the sector (business to livelihoods) and from other related areas.

At a **municipal level** the Framework can be applied to identify cross-cutting investments to improve the resilience of urban planning and development systems to climate change. Key players will include central policy-makers, municipal planners, infrastructure planners, disaster and climate specialists and civil society organisations.

At **district, or internal river basin level** the Framework can be applied to identify investments that will improve the resilience of communities and livelihoods to climate change. This may involve a national hotspot analysis to target the districts or basins for applying the Framework. Key players will include district level administrations, local community representatives and sector representatives from central government.

3.2 Examples of levels of application

Transboundary opportunities for climate resilient investment

Shared river basins in Africa account for 61% of the continent, 77% of the population, and over 90% of the total available water. Transboundary waters are therefore a critical consideration in regional and national economic development. Applying the Framework at transboundary basin level presents a unique opportunity for addressing climate change and water insecurity through the identification of near-term investments in improved basin management, allocation and resource efficiency, whilst also identifying longer term regional and basin strategies to enhance resilience.

Transboundary basins hold tremendous potential for hydropower generation, large scale multi-country irrigation, inter and intra country navigation, flood risk management, inland fisheries, tourism and recreation, and water resources for domestic, industrial and mining operations. Integrated and well coordinated development and management of the natural resources of these river/lake basins will not only contribute significantly to the socio-economic development of millions of Africans living in the basin areas, they are also vital to inter-country cooperation. Application of the Framework offers the potential to investigate opportunities for climate resilient development and identifying no/low regrets basin wide investments such as:

- joint planning and flexible management to help ensure that developments in one part of the basin do not adversely affect climate vulnerability elsewhere;
- effective management of natural and manmade infrastructure to help reduce water related risks such as floods and droughts;
- improved data and information sharing to improve planning and management of transboundary waters, and to foster collective goodwill and collaborative efforts;
- enhancing benefit-sharing among riparian countries in the face of uncertain climate futures;
- strengthening the capacity of RLBOs to develop the technical solutions needed to effectively and efficiently share water resources between nations and users (human and environmental).

National level opportunities for climate resilient investment

The Framework can be applied at the national level to identify priority investments for water security and climate resilience and also to influence the incorporation of water security and climate resilience into development planning processes themselves. National level application offers the benefit of engagement with the institutions that set the policy and regulatory landscape under which development is implemented.

Applying the Framework at the national level will highlight the importance of building sound water and land management practice across all related sectors. The cross-cutting nature of water requires individual sector specialists to work with other sectors to identify cross-linkages and to ensure efficient and effective use of the resource. Building on the foundations of IWRM policies and plans is a valuable starting point, whilst also placing emphasis on the river basin as a core planning unit (Box 3.2).

The Framework can be used at a national level to investigate the many opportunities for addressing challenges in water security and climate resilience such as:

- identifying no/low regrets investments, and integrating these into national development plans, strategies (e.g. poverty reduction strategy papers (PRSPs)), and budget processes;
- designing and formulating strategies for National Adaptation Plans (NAPs) as part of the UNFCCC process, and updating National Communications Reports to the UNFCCC;
- capitalising on Green Economy opportunities to promote innovative climate resilient development pathways;
- improving the climate resilience of water-related sectoral activities such as agriculture, water supply and sanitation and energy (through investing in IWRM for example);
- managing natural hazards through disaster risk reduction and insurance to reduce expensive and damaging risks to which Africa is likely to become increasingly exposed with climate change;
- identifying opportunities for policy reform and strategy formulation that will provide an enabling environment for climate resilient development;
- strengthening adaptive capacity of institutions involved in water-related planning to improve long-term resilience of planning processes.

Municipal, district and basin level opportunities for climate resilient investment

Application of the Framework at a sub-national level is important for reaching those who are directly vulnerable to and disadvantaged by present climate variability and who will be most impacted by climate change. The Framework can be applied at sub-national levels to identify investment opportunities that will translate into grounded actions to improve climate resilience amongst communities, their livelihoods and businesses.

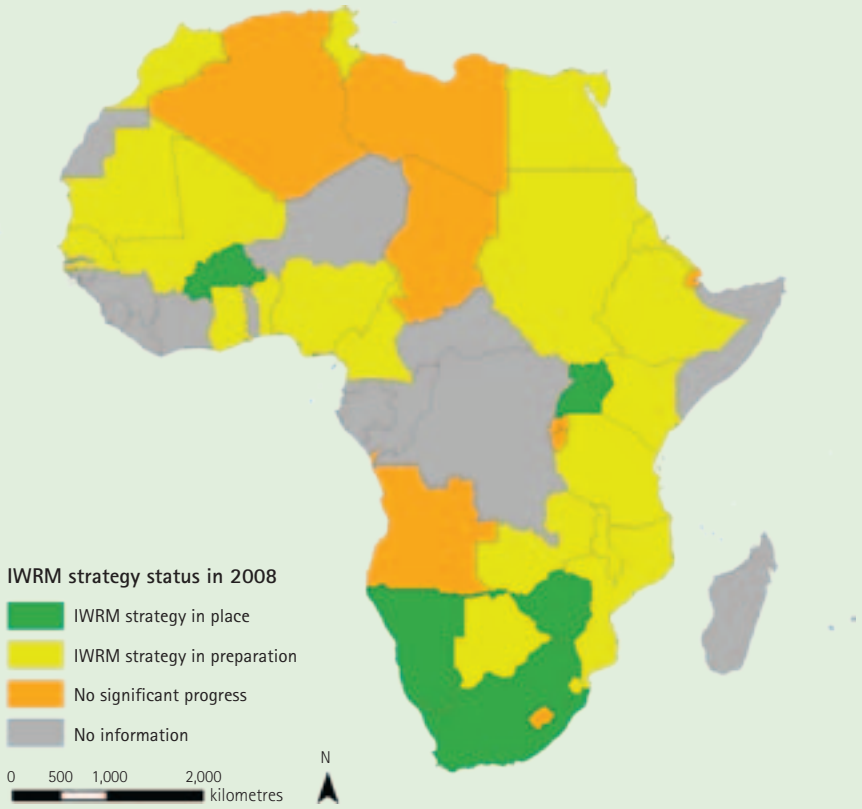
The Framework can be rolled out at district level across an entire country, or for selected hotspots of vulnerability. In order to achieve political traction for sub-national application of the framework, buy-in will be required from central government. This may comprise a review of vulnerability assessments to target those areas at most climate risk.

The sub-national level gives the greatest opportunity for inclusion of local knowledge and experience of climate-related

Box 3.2

Building on the foundations of IWRM

As with water, climate change does not respect geographical or sectoral boundaries and coordinated responses to strengthen climate resilience are essential. It follows that water should not be seen as single sector issue, and nor should adaptation to climate change. The World Summit on Sustainable Development (WSSD) in Johannesburg 2002 included a commitment for all member countries to prepare IWRM plans by 2005. This map shows the progress of these IWRM plans across Africa. Many of the lessons learned from initiatives to increase the priority of IWRM are equally valid for mainstreaming climate resilience.



Progress in developing IWRM plans[24] (as of 2008).

hazards and of water and land management problems that require addressing. The integration of bottom-up with top-down approaches, and the involvement of multi-stakeholder platforms for consultation and engagement bring together local and national perspectives. Solutions at the local level will likely benefit from indigenous knowledge – both on strategies to cope with current climate variability and as a means to strengthen adaptive capacity for future climate change.

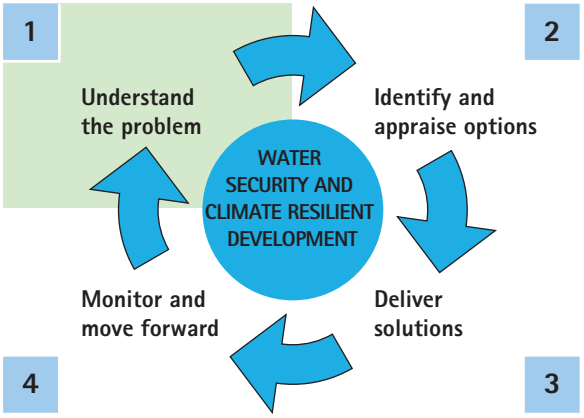
The rapid pace of urbanisation in Africa, and its associated changing social and demographic landscapes, highlight the importance of identifying opportunities for improving urban resilience. The urban population in Africa is projected to treble from 2010 to 2050 from 413 million to 1231 million. In contrast, the rural population will increase by just 24% from 620 million to 767 million. The stresses on water and food resources presented by this urban growth will be significant. The population of Lagos is projected to increase from 10.6 to 15.8 million and that of Kinshasa from 8.8 to 15.0 million from 2010 to 2025. With many coastal cities making up the major urban centres, the on-set of sea-level rise will increase vulnerability to flood and other climate induced risks.

Natural infrastructure and ecosystems approaches at the local level can provide alternative means to manage water-related risk and to enhance climate resilience. There is a vital two-way link between water resources and ecosystem services. Almost all ecosystem services depend in some way on water and thus on water security. On the other hand ecosystem services such as soils and natural vegetation help control water flows from upland catchment areas for flood risk management, and wetlands provide purification of polluted waters.

Applying the Framework through case study river basins, districts or urban municipalities will help to identify a wealth of potential investments to improve resilience that can be piloted and rolled out to other areas. Potential opportunities to investigate include:

- addressing climate risks associated with livelihood activities in rural settings through identifying risks and applying local knowledge and innovative best practice in building resilience;
- identifying opportunities to invest in improving the sustainability of land and water management through ecosystems approaches and appropriate technology;
- identifying management options for integrating national objectives with sustainable management of land and water resources at the local level;
- assessing the institutional barriers to climate resilience and presenting investment options to address these barriers.

4.
PHASE 1 – UNDERSTAND THE PROBLEM



This involves the preparatory steps that pave the way for the analytical work in Phase 2.

The aim of Phase 1 is to produce a case for investing in water security for climate resilient development, to identify stakeholders along with their roles in subsequent stages, and to identify studies and evidence for review in Phase 2.

This can be achieved through:

- making the case for an investment strategy for climate resilience through reviewing existing climate impact and vulnerability information and aligning with high level national development objectives and priorities;
- identifying stakeholder groups and their interests, to recognise champions and to strengthen existing multi-stakeholder platforms for developing no/low regrets priorities in Phase 2;
- using institutional mapping to build a picture of how development planning institutions work at present and how coordination can be maximised for application of the Framework;
- identifying existing climate vulnerability and impact assessments and other evidence for review in phase 2.

4.1 Make the case for climate resilience

A succinct and well-argued case for improving climate resilience helps to ensure buy-in for new investment strategies within planning departments and among high level officials. This case should be informed by a review of the existing knowledge base on climate related vulnerabilities and impacts and aligned with high level development priorities. National Communications and National Adaptation Programmes of Action (NAPAs) produced for the UNFCCC provide a starting point for identifying the policy framework and ongoing adaptation initiatives underway at a national level (see Box 4.1).

Key considerations to reflect on when making the case for developing an investment strategy for climate resilience include:

- The cost to the economy, government revenue, GDP and jobs if no action is taken to invest in water security and climate resilient development.

Box 4.1

Using UNFCCC National Communications to identify climate impact assessments and ongoing adaptation activities

National Communications are the mechanism by which Parties report on the activities undertaken to implement the Convention as well as information on emissions and removals of greenhouse gases. African countries are all Non-Annex 1 Parties, meaning that timetables for submission of reports are not fixed and countries submit reports based on the date of entry into force of the Convention for the Party and the availability of financial resources (except for the LDCs, who may do so at their discretion).

Most African nations have submitted their first National Communication and many have completed their second, or are in the process of completing it. National Communications provide a credible overview of adaptation including elements such as:

- overview of the policy framework for adaptation and activities for mainstreaming climate change into strategic planning;
- synthesis of high level climate vulnerability and impacts assessments;
- ongoing adaptation initiatives;
- gaps and needs assessments for adaptation.

National Communications are submitted periodically, hence some Parties' Communications may be more up to date than others, therefore they may not capture recent activities. LDCs may have submitted a NAPA more recently.

- To what extent is water security climate resilience considered in development planning systems at present, and what initiatives are ongoing for integrating and mainstreaming climate considerations?
- How would climate resilient development enhance and contribute to key development goals and objectives, at regional, national or sub-national levels?
- Have any comprehensive studies on climate vulnerability and climate change been completed (as part of the NAPA process for example)? What are the key findings?

Economic arguments should present the case for action clearly and in terms that high level officials can readily relate to (see Box 4.2). Macro-economic links between climate and GDP variability are frequently presented as an argument to invest in climate resilient development. Arguments also need to be made for the cost of inaction in the face of climate change (see Stern Review on the Economics of Climate Change[25]). This should include a valuation of the social and environmental costs of climate variability and change, as well as direct economic impacts, although this is inherently uncertain.

Box 4.2

Hypothetical example in making the case for climate resilience at the municipal level

A hypothetical municipality is seeking to apply the Framework to generate an investment strategy to improve climate resilience. In order to ensure that national level policy makers and financial planners are fully supportive, a case will be required to demonstrate the need for climate resilient development. A rapid review is undertaken in consultation with key municipal planning stakeholders and climate experts to identify challenges and to communicate the benefits of applying the Framework. Key benefits identified might include:

- Alignment with strategic goals – The Framework can be used to improve the resilience of strategic goals for water and climate risk management, which are identified in the country's NAPA, PRSP and IWRM plans. In addition the Framework can be used to raise the profile of water for influencing the national development strategy, which is due for renewal.
- Addressing urgent climate risks – The municipality suffers regularly from flooding and poor water service provision. The Framework can be used to develop investment strategies to manage flood risk, and to reduce damage costs. In addition, the Framework can address a lack of coordination in the management of water resources that will allow more effective use of resources across sector demands, addressing outages and attracting investment to the municipality.

This short document could be circulated to high level officials to raise awareness and to reinforce the case for investment in climate resilience.

4.2 Gain stakeholder perspectives

Stakeholder perspectives on the urgent concerns over water security and climate risk vary depending on their roles and remits. Water insecurity can undermine economic growth and is a concern for high level development planners. Lack of investment in water storage may be a concern for both central planners as well as rural subsistence farmers. Involving a broad stakeholder base will capture different drivers operating at different levels, different scales and involving different actors.

Stakeholder analysis is a widely practised technique to identify relevant parties and their interests (Box 4.3). In the context of applying the Framework it can be used to:

- identify established stakeholder platforms which are already widely accepted and have influence within their sector, examples might include platforms for disaster risk reduction, GWP country water partnerships, sector advisory groups;

Box 4.3

Stakeholder analysis to identify capacity building and partnership needs

Stakeholder analysis is a methodology used to facilitate institutional and policy reform processes by accounting for and often incorporating the needs of those who have a 'stake' or an interest in the reforms under consideration. Information on stakeholders, their interests and their capacity to influence outcomes will help to assure processes of change are politically realistic and sustainable[26].

The makeup of the stakeholder groups targeted will depend on the level at which the Framework is being applied and the specific institutional contexts. Whatever the level, the stakeholder groups should attempt to bridge levels across international, central and community governance and to bridge established 'silos' of thinking, which typically focus around sector specialisms.

Some of the key stakeholders to be considered, for example, may include:

- Supra-national bodies such as the African Union (AU) and AMCOW
- RECs and their water resources and climate change coordination units
- River/Lake Basin Organisations
- International organisations such as the UNDP, UNEP, UNCCD and UNFCCC
- Donors and IFIs
- Climate fund representatives
- Ministry of Finance – BSP and MTEF representatives
- Ministerial advisors, policy makers and development planners from central government
- Focal points within government for ongoing initiatives such as IWRM planning, NAPA and NAP development and PRSP development
- Local government officials (municipality, state and district levels)
- Decentralised planning and local development agencies
- Networking and capacity building organisations such as GWP and Cap-Net
- Civil society representatives (business, environment, society) and NGOs
- Sector specialists and implementation bodies (such as water suppliers)
- Climate and disaster risk specialists
- Finance technical specialists
- Technical institutes (universities, research centres)

- identify potential gaps in stakeholder representation in the context of the framework application –stakeholders outside existing networks may bring additional skills and innovation;
- identify potential areas which may require championing and leadership in carrying out the Framework activities;
- identify leaders and champions for the Framework process who are able to drive its application forward;
- identify the objectives and influence of stakeholders with respect to water management, climate risks and change.

The results of the stakeholder analysis can be used to inform the participatory approaches to identifying investment opportunities under Phase 2 of the Framework.

Institutional mapping may also provide a valuable tool for clarifying the roles and relationships between the key agencies, government and external, which have an interest in water and land management. For example, bringing together planners and actors from different spheres of interest such as national development planning, disaster risk reduction, and climate change coordination is likely to be required.

4.3 Climate impact and vulnerability assessments to inform decision makers

Informed decisions need informed decision makers. Information and evidence is key to making a strong case for action. Technical information on environmental conditions, social indicators and climate change projections are required by programme planners, and high level planners and policy makers will require them in a synthesised form. .

A gap analysis of the existing information base will highlight geographical areas and sectors that are lacking baseline evidence on vulnerability to climate or the potential impacts of climate change. Filling these knowledge gaps is a prerequisite for identifying no/low regret investments.

Two levels of action/detail are recommended for using vulnerability and impact assessments to inform strategy development:

- *Level 1 – Rapid review of existing studies, expert elicitation and stakeholder engagement* to provide a qualitative overview of the current climate impacts and vulnerabilities that should be included as priorities in strategy formulation.
- *Level 2 – Commissioning of detailed impact assessment studies* at a sector, basin or district level using quantitative modelling where appropriate. Detailed studies should provide more confidence in climate impacts and the appraisal of policy options to enhance resilience.

It is important to ensure that evidence is generated using both bottom up techniques (such as community vulnerability assessments) and engagement with sub-national stakeholders, as well as top-down studies such as sector wide climate impact studies. Box 4.4 provides an overview of the purposes of vulnerability and impact assessments.

Box 4.4

Climate vulnerability and impact assessments

Vulnerability Assessment considers climate variability and the potential climate change impacts coupled with adaptive capacity. Vulnerability assessments typically take a 'bottom-up' approach, starting with an understanding of sensitivities to current climate and the social, economic and environmental factors that influence sensitivity to climate.

Climate Impact Assessment is the practice of identifying and evaluating the detrimental and beneficial consequences of climate change on natural and human systems[27]. Impact assessments typically take a 'top-down' perspective, starting with potential climate change and biophysical impacts and then identifying the consequences for society, the environment and economy.

More recently, assessments have moved towards combining these approaches and disaster risk reduction (DRR) techniques to develop a comprehensive view of potential damages and losses related to climate variability and change.

Vulnerability and impact assessments use a range of approaches, models and tools depending on the requirements. Measures of vulnerability or impact may be quantitative, qualitative, and may be indicator based. These assessments require a range of evidence including quantitative data (environmental, social and economic) that is often difficult to obtain in Africa. Therefore a prerequisite to improving these assessments is the collection and access to vital data for technical staff and researchers to utilise. Potential purposes for vulnerability and impact assessments include:

- *National or basin wide assessment of climate risks.* This would compile studies from a number of key sectors to provide an overview of impacts for high level planners. Such assessments often focus on macro-economic impacts or qualitative appraisals of potential future scenarios.
- *Sector specific impacts of climate risks.* These assessments often make use of specialist tools developed by sector specialists, such as water resources models or agro-economic models, which represent complexities of climate interactions with sector activities.
- *Vulnerability and impact mapping.* Studies that compile spatial data on climate change and social or environmental indicators can be used to map hotspots to target more detailed study or interventions.
- *Community and livelihoods vulnerability assessments.* Typically these assessments focus on accessing the wealth of information that is not formally recorded, and which resides within local communities. It includes information on climate stressors and coping mechanisms.

The river basin is a logical unit for assessing climate change impact, be it at transboundary or sub-national level. Increasingly, RECs are cooperating with RLBOs and national governments to carry out high level impact assessments for development planning. Box 4.5 outlines the work the Southern African Development Community (SADC) is doing to inform resilient development strategies.

Box 4.5

Climate and demographic stresses on transboundary resources in SADC[28]

The Regional Climate Change Programme (RCCP) is a programme of work with SADC partners on the impacts of climate change, with the broad objectives of increasing regional participation in globally funded adaptation projects and improving resilience. The RCCP has four outputs, of which the first focuses on the scientific basis for understanding climate change impacts in southern Africa. Output 1 supports the RCCP through its development of the scientific understanding of how climate change affects human wellbeing.

The study objectives were to;

- better understand climate and water-related impacts and risks associated with change in transboundary basins throughout the region;
- highlight regional vulnerabilities in the ability of countries, river basins and the region to adapt to these emerging risks and potential climate change;
- explore approaches to evaluating these impacts, based on the characteristics of these basins, typical availability of information and inherent uncertainty around change.

The approach that was developed for this assessment was built around three fundamental elements: qualitative assessment, scenario analysis and representative basin case studies. Three river basins, the Okavango, Zambezi and Limpopo, were assessed, using the following key criteria: geographic spread (reflecting different climatic, hydrological and institutional conditions), inclusion of a diversity of climate-and-water stories, strategic relevance and climate vulnerability from a regional perspective, and information availability.

The study identified two climate change scenarios and two development scenarios, giving a matrix of four plausible future scenarios. Themes of climate change impact on water resources were developed using: i) baseline assessment of current conditions; ii) syntheses of basin development plans; and iii) identification of significant climate water stories or scenarios. This qualitative analysis explored the key challenges facing these transboundary basins in SADC and presented lessons for the development of national and regional climate resilience.

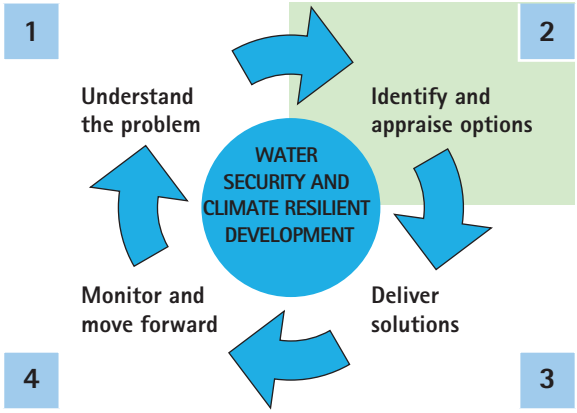
Box 4.6

Hypothetical example of using impact assessment to build the information base

A country is interested in applying the Framework to identify hotspots at a sub-national level and to develop pilot investment strategies for improving climate resilience. A two phase approach is taken to identifying climate change and vulnerability risks:

- Phase 1 – A review of already completed national level climate change vulnerability and impact studies is completed, including vulnerability assessments used in NAPA development, national communication to the UNFCCC, and other research outputs by international agencies and academic bodies. This assessment identifies hot spots and the activities, sectors and/or ecosystems most at risk from climate change.
- Phase 2 – Detailed bottom-up vulnerability assessments are commissioned for the hot spots identified so that the nature of the vulnerabilities and key actors can be understood.

5.
PHASE 2 – IDENTIFY AND APPRAISE OPTIONS



The process of identifying and appraising investment options should be guided by the understanding of the problem gained in Phase 1.

The aim of Phase 2 is to identify and develop a balanced portfolio of investment options to enhance water security, to prioritise no/low regret options and to make a clear economic case for investment.

This can be achieved through:

- Screening current and planned water-related government programmes and investments, and identifying options for improving resilience.
- Strengthening multi-stakeholder platforms to identify innovative no/low regrets investment options through dialogue across sectors, levels of governance and actors involved with planning in climate sensitive activities. Options should also be aligned with high level development priorities in order to gain political traction.
- Appraising long lists of options for climate resilience using Robust Decision Making (RDM) to identify no/low regrets for investment.
- Making the economic case for no/low regrets using economic analysis including the valuation of ecosystems services where possible, using multi-criteria analysis where necessary.
- Prioritisation of a balanced portfolio of investments, for subsequent integration into existing development planning processes in Phase 3.

5.1 Identify opportunities for building resilience in ongoing development activities

Opportunities exist for enhancing the climate resilience of existing water and climate-dependent or climate-influenced programmes and systems that contribute to water security, as well as development programmes that are in the planning phase. Seeking out these opportunities gives the dual benefits of boosting the resilience of development activities, and building the capacity of planners through 'learning by doing' in the integration of climate risks as projects and programmes are planned.

Any development projects and programmes which are likely to be sensitive to water resources and climate, directly or indirectly, would benefit from risk screening.

Screening climate risks can be applied to existing water assets, systems and infrastructure, as well as planned projects and programmes. The approach helps to identify existing climate risks and potential future risks. It then identifies projects and programmes with low climate risks, and opportunities to reduce risks in remaining programmes (for example improving resilience of a planned infrastructure upgrade). The outputs of the screening exercise are carried forward as investment opportunities that will directly influence and benefit ongoing activities. Screening will result in a broad range of ideas and options for no/low regrets investments and risk reduction measures.

Box 5.1

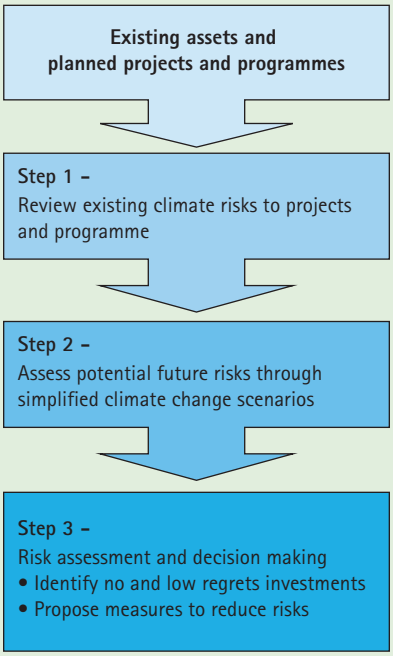
Screening for, and reducing, climate risks in existing and planned projects and programmes.

Screening is used to classify projects and programmes according to their climate risks. No/low regret projects and programmes, and risk reduction measures are then prioritised.

No/low regret programmes are not affected by climate change or will give acceptable returns whichever climate change scenario materialises.

Climate change justified programmes do not give acceptable returns unless some degree of climate change materialises. This includes all mitigation and adaptation programmes.

Climate change risky programmes give good returns without taking climate change into account, but give low returns if climate change materialises. Proposals to reduce climate risk under all climate change scenarios are a key output from the screening.



The following principles for reducing climate risks identified through screening are proposed:

Reduce uncertainties

- Can the uncertainties of climate change impacts be reduced? High cost projects and those which show substantial climate risk may benefit from detailed modelling studies of the impact of climate change.

Do things differently

- Can the design be altered to reduce risks and what is the benefit/cost ratio of doing this? Examples might include over-specification of flood defences to manage uncertainty.
- Can the programme/project be implemented in stages to test the impact of climate on the success of the programme/project? Phased approaches to implementation give more opportunity to pilot and trial systems, building flexibility into designs allows later stages to be adapted as conditions change in the future. Adaptive management of existing or planned systems can improve resilience through providing the flexibility to learn from experience and adapt to changing climate and non-climate drivers.

Do different things

- Are there alternative ways of achieving the programme or project goals with lower climate risks? This might take the form of using ecosystems approaches, changing financial incentives, management practice or the introduction of innovative technology to achieve more with less resource.
- Use of innovative technologies and approaches to improve water management that are aligned to Green Economy principles and practices.

Bear the climate change risk

- The remaining course of action is to simply understand and plan to minimise the climate change risks rather than fundamentally altering the proposal. This may be an acceptable strategy if it can be demonstrated that the immediate benefits are sufficiently important to render climate change of secondary importance.

Box 5.2

Hypothetical example of screening for climate risks in national level planning processes

The Framework is being applied at a national level and climate change risks to ongoing and planned development activities are under consideration using a screening approach. Screening is applied to nationally significant projects, government regulated water related service provision and central planning policies. The following climate risk reduction measures are identified:

The regulatory framework for infrastructure planning and design does not currently require the consideration of climate change scenarios. This may result in projects that are not sustainable in the long term. Updating government regulation and design standards to ensure climate change is an explicit item to consider in feasibility studies is a potential risk reduction measure for infrastructure development.

Nationally significant investment programmes in agriculture, water resources, energy and water supply and sanitation are at risk to varying degrees from climate change. Modifications to these programmes to improve their resilience are identified to enhance climate resilience.

Table 5.1 Examples of programme classification

Development Budget Categories	Programme classification
Energy	• No/low regret: hydro power that provides good benefits regardless of trends in rainfall levels and variability • Climate change justified: dam heightening in anticipation of reductions in river flow due to climate change • Climate change risky: cooling water off-takes on rivers projected to dry under climate change. Dams sited in catchments where substantial reduction in river flows are projected
Water and sanitation	• No/low regret: water supply with benefits regardless of climate change, and water resource management information systems • Climate change justified: expanding drainage capacity to deal with higher storm flows with climate change • Climate change risky: latrines in areas prone to increased flooding
Agriculture	• No/low regrets: efficient on farm water management • Climate change justified: planting drought tolerant tree species in areas of projected future drying • Climate change risky: supporting production in areas with evolving water shortages
Forest	• No/low regret: good forest governance improving productivity regardless of climate change • Climate change justified: investment in expensive reforestation that is justified only if benefits from mitigation are included • Climate change risky: planting trees (e.g. eucalyptus) that compete with other water uses
Fisheries	• No/low regret: improving sustainable productivity based on better adaptive management of stocks • Climate change justified: investing in infrastructure in anticipation of changing fish species distribution • Climate change risky: maintaining fixed quotas or subsidies which assume equilibrium fish stocks
Environment	• No/low regret: biodiversity protection of endangered species • Climate change justified: pollution controls that respond to expected change in water supply • Climate change risky: eco-tourism in areas that may become too fragile to accept visitors
Local government	• No/low regret: enacting laws to manage the use of natural resources during times of climate stress • Climate change justified: strengthening local planning to be more aware of possible impact of climate change; improving specifications of roads etc to deal with possible climate change threats • Climate change risky: expanding settlement in flood prone areas

5.2 Identify new and innovative investment opportunities

In addition to screening existing systems, new opportunities for climate resilience can be identified and developed. Partnerships across sectors or levels can result in dialogues, innovation and ideas that would otherwise remain hidden in independent silos of thinking. Focus should remain on using and strengthening established stakeholder platforms where these exist, although tailoring stakeholder platforms may be required for the specific context of the Framework application.

Grounding the identification of new opportunities in existing development priorities, such as national / sector strategies and PRSPs, means they are more likely to be relevant to high level decision makers and less contentious. Partnerships to identify new opportunities could include:

- **Revisiting IWRM plans, NAPAs and other plans** to catalyse no/low regret strategic priorities into actionable investments.
- **Working across sectors** to identify climate resilient investments which acknowledge the cross cutting issue of water in many sectors.
- Bringing **research organisations** together with government to improve applied research for decision making.
- Bringing **RECs and RLBOs** together to work in partnership with **government central and line ministries** to realise the benefits in shared water resources systems (see Box 5.3).
- Using **local knowledge** to identify strategies for local adaptation measures through consultation with NGOs and civil society organisations.
- Including **communities of practice** in stakeholder platforms can identify best practice in water management and climate resilience, for example in technology transfer and regulatory frameworks.

In identifying new and innovative no/low regrets investments, the following cross cutting principles may be helpful:

- Resilience can be enhanced through **sound water and land management practices**. These increase the sustainability of resource management and increase the capacity to adapt to and deal with climatic variability and change.
- Increasing the **adaptive capacity** of institutions, businesses, livelihoods and civil society at all levels. One of the primary drivers of adaptive capacity at a community level is the eradication of poverty, hence closely linking strategic goals for poverty reduction with climate change adaptation.
- **Collecting data, conducting research and presenting evidence** for decision-making is a no regrets strategy for increasing confidence for decision makers. The use of simplified climate change scenarios for dissemination and awareness-raising is an example of filtering highly technical information through to decision makers.
- **Innovation and appropriate technology** can improve the efficiency of water management systems enhancing

Box 5.3

Activities of RECs in promoting water security and climate resilience

SADC has a wide range of plans and policies related to water security and climate resilience, including: a Regional Indicative Development Plan; a Regional Water Policy and Strategy; a Protocol on Shared Watercourses; various river basin agreements; the 3rd phase of the Regional Strategy Action Plan on Integrated Water Resources Development and Management; and the Climate Change Adaptation Strategy for the Water Sector (CCASWS).

The recent SADC CCASWS reviews the range of scenarios, risks and socioeconomic impacts. It identifies the main no/low regret measures and hence gives additional support to national initiatives that are consistent with CCASWS. It defines three types of support (governance, investment and management) and 15 programmes, to be implemented with funding from the regional plan, including donor support through SADC and 10% funding from Member States. It emphasises the importance of IWRM at basin level, including research, monitoring and management systems.

The East African Community (EAC) has a long history of engagement in environmental and water related policy. EAC supports a Climate Change Resource Centre.

The Economic Community of West African States (ECOWAS) is still at an early stage in contributing to climate resilience. In 2010, ECOWAS initiated a sub-regional programme to reduce vulnerability through: strengthening scientific and technical capacity; promoting climate mainstreaming in development planning; and developing new programmes and projects at sub-regional and national levels. This work is ongoing. Workshops have been held and further programmes are being prepared, including adaptation programmes and Nationally Appropriate Mitigation Actions (NAMAs).

'productivity per drop', but requires both new ways of thinking and progressive policies to incentivise change.

- **Flexible management of transboundary resources** at a basin rather than national level will be essential as climate change and development put pressure on resources.
- Making use of **'soft' or 'natural' infrastructure** such as ecosystems services, sustainable land management, policy, legislation and institutional reform which are often more resilient to climate impacts than investment in 'hard' engineered infrastructure solutions which may in the long term be at risk from climate change. This does not preclude closing Africa's infrastructure gap, but means that selecting the type of infrastructure will require consideration of climate risks.
- **Managing existing variability** in climate is a priority action as this offers benefits in the short term and may also help in addressing longer term changes in extremes.
- **Disaster risk management** often offers very favourable cost–benefit ratios and, with climate extremes projected to become more severe, may offer long term returns.

Box 5.4

Hypothetical example of identifying innovative investment opportunities for climate resilient development

The Framework is being applied at a national level and partnerships for innovation in climate resilience have been set up to generate new investment opportunities and mainstreaming activities. For example:

- Sector wide planning strategies may not have included any targets for climate resilience, leaving sectors potentially exposed to climate variability and change. Key strategic areas for inclusion in strategy formulation are identified.
- The multi-stakeholder platform has identified synergies between NGO activities in developing appropriate technology for 'on farm water management' and PRSP commitments. Potential policy interventions have been identified in order to upscale access to water management technologies and skills.
- The multi-stakeholder platform identified a lack of detailed climate change information or capacity amongst decision makers to make effective use of climate change information. Capacity building for planners to understand and integrate climate change in planning systems has been proposed as an effective first step in integrating climate resilience in planning.
- Ecosystems play an important role in boosting tourism revenues, but conflict between local people and the environment is threatening to reduce the long-term sustainability of tourism in the area. Taking an ecosystem approach to land use management has been identified as a potential approach to resolving these conflicts through more equitable sharing of the ecosystem benefits to reduce overall impacts.

5.3 Sift ideas for a balanced portfolio of no/low regrets investments

The screening of ongoing development activities and identification of new options for resilience will likely result in a broad range of ideas and proposals for no/low regret investments. Sifting these ideas and options down to a balanced portfolio of priority investments requires evaluation against criteria representing opportunities and barriers to implementation[29].

- **Effectiveness** – will the investment meet your objectives?
- **Robust** – is the investment robust under a range of future climate projections? (see Section 5.4 for further guidance)
- **Efficiency** – do the benefits exceed the costs? Considering also social and environmental costs and benefits (see Section 5.5 for further guidance)
- **Equity** – does the investment adversely affect other areas or vulnerable groups?
- **Flexibility** – is the investment flexible and will it allow for adjustments and incremental implementation?
- **Sustainability** – does the investment contribute to sustainability objectives, and are the investments themselves sustainable?
- **Legitimacy** – is the investment politically and socially acceptable?
- **Urgency and practicality** – how soon could the investment be implemented relative to constraining timescales?
- **Synergies / coherence with other strategic objectives** – does the investment help to achieve other objectives?

A balanced portfolio of priority investments, which are demonstrably no/low regret, justified economically and aligned with wider agreed development objectives will present a strong case for attracting financing from IFIs, donors and specialist climate funds.

Box 5.5

Hypothetical example of sifting ideas for robustness and resilience at a local level

Many ideas for climate resilience emerge from application of the Framework to ongoing activities and through partnership building. These are tested for feasibility against a number of criteria using a simple checklist approach in order to flag up potential issues. Robustness and benefit–cost ratios are assessed in more detail in order to make the case.

It is difficult to assess the benefit–cost ratio of many of the investment options that deliver social or environmental returns. Therefore a participatory prioritisation system can be used to assess the value associated with the various benefits to assist in ranking investment options. This allows discussion of the trade-off in cost and benefit between investment options in attempt to reach a consensus.

Robustness against climate change is assessed by using climate change experts in collaboration with local knowledge to make an informed qualitative judgement on the robustness of each investment option.

5.4 Ensure investment options are robust against uncertainty in climate change

Although climate change projections are inherently uncertain, there is a consensus that average temperatures will increase over the coming decades, but how rainfall will change is much less certain. Extremes of rainfall and storm occurrence are thought likely to become more severe and frequent in the future. Therefore it is not possible to simply assume climate will stay the same as past climate or that a single climate future will materialise. Such assumptions have the potential to contribute to maladaptation. A number of future scenarios are required to capture the range of uncertainty.

Scenarios can vary in complexity from a small number of simple assumptions on rainfall and temperature projections, drawn from existing synthesis reports such as the IPCC Assessment Reports, to large numbers of projections of future time series of environmental variables, such as temperature, rainfall and wind speed derived from regional climate modelling studies.

The required level of complexity depends on the user requirements. Simple scenarios may be appropriate for risk screening exercises and dissemination, whereas data rich scenarios are often needed to drive detailed hydrological or agricultural models, which are used for planning and design. Investments such as institutional strengthening and collaboration are unlikely to be influenced by climate and will require less rigorous testing than investment in water management infrastructure.

RDM principles have been developed for appraising the performance of a system, existing or proposed, under different climate change scenarios. The main characteristic of an investment option selected using RDM is that it delivers adequate performance under the range of future climate scenarios. It is not necessarily an optimal decision for one scenario. Investment options may require revision in order to improve robustness, which may entail additional costs. Some investment options, such as improved water governance systems, are likely to deliver benefits across all future scenarios, and therefore to be robust.

Box 5.6

Robust Decision Making

RDM brings the analysis of risks centre-stage in investment option prioritisation. Most African countries use BCA as an important tool in programme prioritisation. BCA uses sensitivity analysis to explore the impact of uncertainty and risk, and the techniques can be used to examine the sensitivity of returns to climate change scenarios. However, sensitivity analysis is often treated as an afterthought, checking the reliability of the headline analysis. RDM raises the profile of sensitivity analysis by requiring a more explicit treatment of scenarios of assumptions. A range of plausible climate change scenarios is defined and the return of the investment option is estimated for each scenario. This allows investment options to be classified as no regret, climate change justified and climate change risky, and this evidence is used for deciding whether an investment option needs to be revised or rejected.

Illustrative example of multiple scenarios for RDM

Example A represents a proposed irrigation system and B represents a programme to reduce water demand through efficiency saving. Impacts are identified under each scenario, which can be managed to ensure a minimum level of performance in the most severe scenarios.

Example A – New irrigation infrastructure	**Rainfall decrease of 20%**	**No change in rainfall**	**Rainfall increase of 20%**
Temperature increase of 1.5°C	Substantial losses	Small impacts	Substantial benefits
Temperature increase of 4.7°C	System failure	Small impacts	Minor benefits

Example B – Efficiency savings	**Rainfall decrease of 20%**	**No change in rainfall**	**Rainfall increase of 20%**
Temperature increase of 1.5°C	Substantial benefits	Benefits to other water users	Potential co-benefits to ecosystems
Temperature increase of 4.7°C	Substantial benefits	Benefits to other water users	Potential co-benefits to ecosystems

5.5 Make the economic case for investment options

Economic justification is a powerful tool in arguing the case for investing in identified no/low regrets options. A range of tools exist, which will be familiar to financial planners and economists. Cost Effectiveness (CE) and BCA are commonly used for financial appraisal. Many investments offer returns which are difficult to assign monetary values, but this should not mean that these benefits, often social or environmental, remain hidden to decision makers[30]. In some cases these benefits can be monetised although this may entail significant additional work. In cases where monetisation is not possible Multi-Criteria Analysis (MCA) offers the potential to compare diverse cost and benefit factors.

Studies which monetise the value of ecosystems services can help to address the consistent under-valuation of these services in decision making, which is usually dominated by standard economic appraisal techniques.

Box 5.7

Valuation of ecosystem services against water resource allocation, Nigeria[31]

In the traditionally prosperous Hadejia-Jama'are flood plain region in northern Nigeria, where more than one half of the wetlands have already been lost to drought and upstream dams, ecosystem valuation has been used to weigh the costs and benefits of proposals that would divert still more water away for irrigated agriculture.

The net benefits of such a diversion were priced at US$29 per hectare. Yet, the intact flood plain already provides US$167 per hectare in benefits to a wider range of local people engaged in farming, fishing, grazing livestock, or gathering fuelwood and other wild products – benefits which would be greatly diminished by the project. Thus, even without accounting for such services as wildlife habitat, the wetland is far more valuable to more people in its current state than diverted for irrigation.

Box 5.8

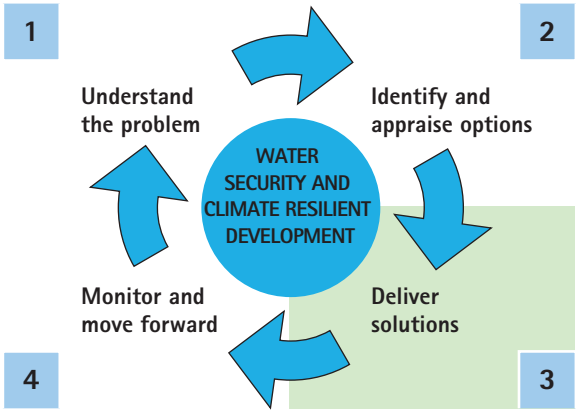
Techniques for economic appraisal[32]

Cost effectiveness (CE) is used to measure alternative ways of attaining a given objective and is therefore useful where it is difficult to quantify benefits. This is relevant where a country or basin faces one or a small number of risks from climate change, and is able to identify and cost the different ways of dealing with each of these risks.

Benefit–cost analysis (BCA) is one of the most widely-used single criterion methods for option appraisal in which a threshold value of the result (e.g. size of Net Present Value, benefit–cost ratio, Economic Rate of Return) is used to select from candidate options. BCA does not address the relative distribution of benefits and costs between different stakeholders, and the choice of discount rate to deal with future costs and benefits is a deeply problematic area.

Multi-Criteria Analysis (MCA) is useful where decision makers wish to use a number of different criteria, rather than monetising to a single measure such as those used in BCA and CE. MCA might, for instance, include environmental and social impact, effect on jobs, ease of implementation, political feasibility, etc., as well as economic and financial criteria. Where more than one criterion is used, the scores on different criteria have to be combined, which normally requires a weighting for each. This in itself can be a contentious issue. Alternatively, one criterion can be selected as the dominant one, subject to each of the others being satisfied to some degree.

6.
PHASE 3 – DELIVER SOLUTIONS



The aim of Phase 3 is to take the balanced portfolio of no/low regret investment options (from Phase 2) and integrate these into existing development planning systems for implementation. In addition, financing strategies for these investments are developed. Mainstreaming climate resilience in development planning processes is recommended as a longer-term measure.

This can be achieved through:

- Ensuring detailed planning and implementation of the investment portfolio is assigned to an appropriate responsible authority. This will include integrating the investments into financial plans, such as a Budget Strategy Paper (BSP) for national level application of the Framework.
- Developing financing strategies for priority investments based on internal and external funding, including leveraging climate funds where appropriate.
- Identifying strategic activities that will help to mainstream water security and climate resilience into existing strategic planning processes and systems.

6.1 Integrate no/low regrets investment strategies in development planning

The no/low regrets investments that have been prepared thus far will require detailed planning for funding and implementation. The ownership of detailed planning and management of implementation should be transferred to the appropriate responsible implementing bodies. This will ensure that no/low regrets investments form part of their existing portfolio of investments. In addition, the skills gained in the process of applying the Framework are retained and climate resilience may rise on the agenda within government, leading to wider mainstreaming of climate resilience into planning.

Integration of the no/low regrets investments into existing planning systems involves the following actions:

- Ensuring high level political support for integrating investments into relevant planning bodies' detailed planning processes. This provides a driver for planning authorities to carry through investments to the implementation phase.
- Anchoring the process in a higher level government ministry or body with the authority to convene sectors – the Ministry of Finance, Cabinet Committee, Prime Minister or Vice President's Office are some examples.
- Understanding the national development planning process, process for developing a Medium-Term Expenditure Framework (MTEF) and annual sector budget and budget allocation, and finding entry points to influence these.
- Identifying the relevant planning authorities for individual no/low regret investment areas – this will be straightforward as these authorities should be leading the process as part of the stakeholder platforms which were used to develop and screen the investments.
- Ensuring that the investments can be built into annual budgetary processes (such as BSPs), or in the case of medium-term investments built into MTEFs.
- Integrating investments into bilateral and multilateral country assistance and/or investment plans (e.g. World Bank Country Assistance Strategies or AfDB Country Investment Plans).
- Ensuring plans and policies for budget support contributions (from external funds) identify water security and climate resilience as outcomes, and incorporate no/low regret investments for implementation.
- Integrating investments into departmental and/or other organisational strategic plans through alignment with their goals, targeting strategies during periods of renewal and forging dialogue with those directly involved with strategy formulation, ideally through the medium of national level government.
- Identifying 'windows of opportunity' for detailed planning and implementation of investments within existing

Box 6.1

Hypothetical examples of integration processes for Framework application at different levels

Transboundary level investments identified during Framework application include investigation of modifications to operating rules and constraints in transboundary multipurpose storage to optimise performance and equity. This investment has been aligned with the river's basin organisation in its mandate to provide technical assistance for water resources management. In addition this research needs to be translated into agreed operational codes of practice. This requires a programme of action supported by riparian national governments and also representatives of water users (such as power companies, agriculture and communities).

- The RBO needs to engage with regional entities dealing with investments in energy, agriculture, and other cross-border development projects including natural resources and the environment. The no/low regrets investments need to be integrated in Basin Investments Development Plans/Strategies as well as in National Development Plans. The RECs have a fundamental role to play in getting beyond the water 'box' as most RBOs are composed of water directors from water ministries.

National level investments have been identified to increase resilience in the agricultural sector, in order to reduce the heavy costs associated with climatic variability. These investments include strengthening a seasonal weather forecasting and dissemination service and implementing agricultural diversification schemes to provide alternative income sources in dry years. An economic case for such a service is prepared and lobbying undertaken to have these investments included in the annual and medium term budgetary plans.

- The process of integration would entail working with Economic Planning and Finance, Cabinet, Prime Minister's Officer or Vice President's Office to get the key sectors together. Planners in sector ministries would need to play a leading role under the coordination of the Economic Planning Unit in charge of coordinating the National Development Plans.

Municipal level investments have identified the critical need to reduce vulnerability of assets to natural hazards and to maintain this in the face of increasing severity of storms and coastal flooding. A programme of risk mapping and land zoning is considered a high priority investment as the urban municipality rapidly expands. Incorporating natural hazard specialists within the urban planning team will help to develop hazard zones and build capacity in reviewing hazard exposure of urban development proposals. At the same time, an economic case for the risk reduction measures can be prepared.

- The process of integration needs to involve the local government development planning unit as well as traditional governance institutions where they exist. The no/low regrets investments need to be integrated into the Local Development Plan, and would need to involve the mayor or local government CEO's office.

plans and strategies (for example alongside the planned upgrading of existing infrastructure) or integrating longer term investments in strategies under review (for example strengthening of RLBO mandates).

- Maintaining support to planners through partnership and capacity building to catalyse integration and capitalise on new skills and partnerships.

It is important to ensure that following the intense period of activity in applying the Framework, stagnation in detailed planning and implementation does not occur. Integration processes should include measurable targets for progress and contingency measures to bring detailed planning and implementation back on track.

6.2 Develop financing and investment strategies

No/low regrets investments have the potential to attract finance from a wide range of sources, including conventional sources as well as emerging climate adaptation and mitigation financing streams.

For African infrastructure, an emerging pattern of specialisation between three broad types of finance has been noted: (i) *private equity participation* gravitates towards commercially profitable sectors, above all information and communications technology (ICT); (ii) *financiers from emerging markets*, especially China, favour productive infrastructure, mainly in power generation and railways; while (iii) *traditional Official Development Assistance* (ODA) funds public goods including roads and water supply, alongside other sectors[33].

Since circumstances are very varied, financing strategies should be judged pragmatically, by whether they deliver sufficient affordable funding of the right type. The following 'rules of thumb' may be helpful:

- '**public goods**' such as strategic water storage and flood risk management need public initiative and financing;
- '**private goods**' such as household and industrial water supply, should to be able to attract commercially motivated investment and funding, although whether the delivery mechanism is private, public or a combination of the two will be dependent on the local institutional context;
- **subsidies and taxes** are needed to compensate for market failures and externalities, e.g. payments for environmental service schemes to reward farmers for careful husbandry of watersheds, and pollution charges to dissuade untreated effluent discharges;
- **bridging a financing gap needs a systematic approach**, it starts with minimising costs and setting realistic service standards, then maximizing internal cash flow from the "3Ts" – tariffs, taxes and external transfers from ODA and philanthropic sources (including corporate social investment). It uses these to leverage repayable funds in the shape of loans, bonds and private equity;
- residual climate risks, which are not feasible or rational to mitigate against, can be dealt with through **insurance** policies for individuals, businesses and even governments.

In most African countries the prospects for water finance – compared with those a decade ago – lie less with commercial bank loans, private equity and bonds, and more with host government budgets, lending from IFIs and finance from other emerging economies, especially China, and the impact of these new funds is starting to be felt.

Specialised climate finance

Africa's vulnerability to climate change suggests an urgent need to finance adaptation activities. Historically, very little financing for adaptation has been directed toward the region. CFU data suggests that this trend may finally be changing in absolute terms: between 2004 and 2011, US$328 million has been approved for 75 adaptation projects. US$132 million has been disbursed to date, which represents about 30% of finance disbursed for adaptation globally (US$439 million) through dedicated climate financing instruments[34].

African Ministers' and negotiators continue to press for greater parity of treatment for funding climate adaptation (c.f. climate mitigation) in the ongoing negotiations for the Green Climate Fund (GCF). The meeting of the COP of the UNFCCC in Durban in 2011 adopted the governing instrument of a GCF. The broad principles for its governance and operation have been agreed, and a provisional secretariat appointed, and the precise modalities of its work and the scale of its operations are being fleshed out. The GCF will "seek a balance" between mitigation and adaptation, and receive financial inputs from developed country members of COP and a variety of other sources, public and private. Its operations will be country-based, including both project and programmatic approaches, and will have provision for capacity building, technological development and transfer, and innovative methods. Access to its funds will be though accredited national, regional and international implementing entities, and it will also have a private sector facility[35]. Proponents hope that the GCF will become a main channel for climate adaptation finance, underpinned by substantial flows and long term sustainable funding.

In the meantime, other climate adaptation funds for water related projects in Africa are available, and Box 6.2 presents the most substantial. Most projects funded by these facilities are relatively small, and typically comprise the preparation of plans (e.g. NAPAs), capacity building, creation of implementation structures (e.g. National Implementing Entities (NIEs)), and the implementation of innovative or pilot projects. The average size of projects in Africa based on Box 6.2 is below US$5 million. They mostly target early stages of the adaptation project cycle, and are intended to leverage larger volumes of money from elsewhere for upscaling implementing and replicating projects at a larger scale.

Relevance of finance for mitigation

The overwhelming proportion of existing climate funds and the funding flows to date are directed at mitigation – clean energy production and use, and the creation, preservation and enhancement of carbon sinks. Some of the funds include

Box 6.2

Examples of adaptation funds for African water related projects[36]. Total deposited fund amounts have been derived from www.climatefundsupdate.org[37]

Global Climate Change Alliance
(US$225 million deposited as of April 2012)

An EU initiative for Least Developed Countries (LDCs), Small Island Development States and African countries affected by drought, desertification and flooding, e.g. Mozambique project for "Mainstreaming climate change into policies and strategies".

International Climate Initiative
(US$841 million deposited as of April 2012)

A German Government scheme, operational since 2008, funded from revenues of EU emissions trading. Although its main focus is mitigation, the scheme also assists development and implementation of adaptation strategies and ecosystem adaptation; with GIZ and KFW the implementing agencies. Examples of their projects are development of climate scenarios for the Congo Basin; and, more generally, preservation of natural carbon sinks, and conservation of forests and ecosystems.

Adaptation Fund
(US$258 million deposited as of April 2012)

Created under the Kyoto Protocol, and operational since 2009, this fund is financed from a 2% levy on clean development mechanism (CDM) receipts plus direct support from developed country budgets. For direct access, potential recipients need to create NIEs or alternatively access the Fund through accredited Multilateral Implementing Entities (MIEs), which include international agencies such as UNDP, UNEP, World Food Programme etc. A total of 17 projects (2 in Africa) have been approved for funding, to a value of approximately US$104 million. Water management projects are the highest in terms of concept endorsement and proposal approval.

Least Developed Countries Fund
(US$379 million deposited as of April 2012)

This fund has been operational under the GEF since 2001 to develop NAPAs, and to implement projects arising from them, in LDCs. Nearly all the finance it provided has been used for the preparation of NAPAs.

Special Climate Change Fund
(US$170 million deposited as of April 2012)

Created in 2001, and administered by GEF on behalf of UNFCCC COP, this fund is mainly intended for adaptation projects in water and coastal zone management, and on coping with drought, through capacity building and technology transfer. Pledges continue to accumulate. There are currently 15 approved projects at a value of approximately US$68 million.

adaptation as their aim as well, but this accounts for a minor part of their activities and financial allocations.

Certain water related activities could, however, benefit from mitigation funding including:

- development of micro-hydro, to replace other energy sources such as diesel generation;
- transmission and treatment of raw water, which is a highly energy-intensive, inefficient user of energy;
- wastewater treatment and disposal is a major source of methane, a potent greenhouse gas;
- high rates of leakage and waste in typical urban water systems translate into further energy waste.

Water consumption has a high carbon footprint, and measures to reduce its energy consumption, as well as being economically and financially efficient, should be eligible for funding as mitigation too. The re-use of treated wastewater for agriculture, municipal use or power station cooling may also be considered an aspect of mitigation insofar as its net effect may be to reduce the use of energy for the distribution and treatment of water and wastewater. Some of these activities, which fit into the mitigation agenda, are potentially no/low regret investments too.

Another set of projects, for example, that should qualify for mitigation funding, as they are carbon sinks, include the preservation of forested watersheds, wetlands and other ecosystems, necessary to secure abstraction of freshwater and assimilation of wastewater.

Box 6.3

Hypothetical examples of financing strategies for no/low regrets investment strategies

The application of the Framework at a municipal level has identified the need to invest in flood risk management measures for coastal urban areas. Flood risk management has been demonstrated to deliver a favourable benefit to cost ratio but some flood defence measures may be exposed to rising sea levels over their lifespan. This will mean that although the most cost effective level of protection is to the 1 in 100 year return period storm, this may be reduced to 1 in 50 year protection by the 2030s. Therefore, additional investment is required to climate proof flood risk management for the future. Identified measures include:

- over designing defence infrastructure to maintain levels of protection into the future;
- designing defences to allow flexible management such as raising heights in the future;
- proactive land zoning and disaster insurance in areas which are uneconomic to defend to prevent an increase the in the risk posed to communities within these zones;
- improved management of coastal areas to reduce erosion which exacerbates coastal flooding problems.

A comprehensive flood risk management programme requiring substantial investment is needed covering both the immediate problems facing the municipality due to present climate variability (addressing the adaptation deficit) and also any additional risks which climate change may bring (climate change adaptation). Both existing and future climate risks are addressed, and a financing strategy is developed that draws on both standard development funding (domestic funds or IFI finds or non-OECD sources) with specialist climate adaptation funding. Specialist climate funding may be most appropriate for adding value to activities within the programme such as the strengthening of flood risk management institutions and the development of knowledge products to assist in risk management.

6.3 Mainstream climate resilience in development planning

Mainstreaming involves changing the policy and planning landscape so that climate resilient development for water security occurs as a matter of course, rather than requiring special efforts. Such changes need to overcome the institutional inertia and multiple political drivers that influence high level strategies. Applying the Framework to develop no/low regrets investment strategies is a key tool for engaging with high level officials and demonstrating the benefits which climate resilience can bring in terms of economies, livelihoods and accessing finance.

The Framework is likely to be utilised at a critical time in the development of NAPs across Africa. Investments identified through application of the Framework will be strongly evidenced and prioritised, and should be integrated into NAPs for implementation as many investments will align closely with the aims of the NAPS.

Box 6.4

Opportunities for integrating no/low regrets investment strategies with the NAP process

The development of NAPs will build on the experience of LDCs in preparing and implementing NAPAs. NAPs are intended for identifying medium- and long-term adaptation needs and developing and implementing strategies and programmes to address those needs.

A recent report on the Expert Meeting on the process and the modalities and guidelines for the formulation and implementation of NAPs[38] identified the following general objectives for NAPs:

- integrate adaptation into national development planning processes;
- reduce vulnerability to climate change;
- build adaptive capacity and resilience;
- climate-proof development;
- ensure sustainable and long-term environmental, social and economic development.

The NAP approaches recommends: (a) generation and sharing of knowledge, experiences and understanding; (b) integration of climate change into relevant existing policies, programmes and activities; and (c) development and implementation of new policies, programmes and activities, as necessary.

The NAP objectives and approaches align closely with the principles and objectives of the Framework in developing no/low regrets investment strategies. Opportunities may present themselves for integrating investments identified using the Framework within emerging NAPs, but noting that at present NAPs are in their early stages of inception and therefore the exact modality of any integration will need to be explored as the NAP process develops.

Box 6.5

Zambia – integrating water and climate resilience in national development planning

In early 2010, Zambia embarked on its Sixth National Development Plan (SNDP) process, leading to the adoption and release of the SNDP in January 2011. The process was coordinated by the Ministry of Finance and National Planning working alongside other line ministries. The process was structured to reflect national government strategies sectorally, and as an integrated picture of the national economic and social trajectory.

Each sector strategy was convened by a sector specialist group, with input from other sectors providing cross-linkages, and input to the specific sector strategy. Thus sector strategies and action plans are cognisant of, and integrated with, cross-sectoral issues. A consolidated strategy and action plan was convened by the ministry, drawing together each of the sector strategies. This provided a second layer of integration and consolidation.

Climate change and water featured strongly in the SNDP process, and were well represented in the published SNDP. Strategies that built resilience to climate change were evident in many sectors, including environment, energy, transportation, health, water and sanitation, agriculture, livestock and fisheries, mining, tourism, information and communications technology, natural resources, and local government and decentralisation. A Climate Change Facilitation Unit in the Ministry of Environment was mandated to mainstream the cross-sectoral climate issues into the sector strategies and was part of each of the sector processes, rather than linked to a particular sector.

The effort built on earlier processes in which IWRM was integrated in Zambia's 5th National Development plan.

Key mainstreaming activities to strengthen climate resilience in high level strategies at different planning levels

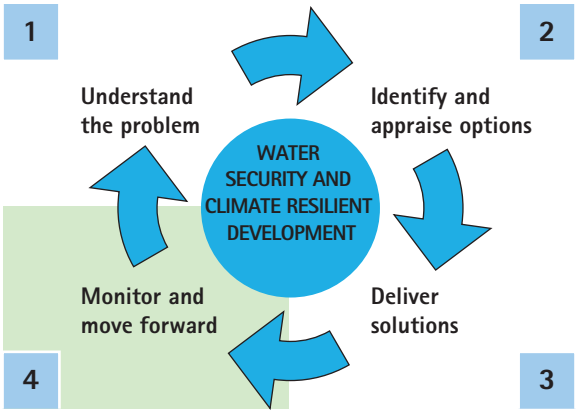
At a national level, the main tools for mainstreaming and incorporating climate change in development planning processes are the National Development Strategy, MTEFs, and annual budgetary processes. Leadership and coordination by central government is essential. Instruction to line ministries should ensure climate change considerations, and the costs of enhancing climate resilience, are included in sector strategies and submissions. Multi-stakeholder engagement and public consultation can provide validation and public support for priorities, and to leverage further political buy-in. Introducing climate change considerations into criteria used to screen and select investments (e.g. by Ministries of Economic Planning and Finance or similar) can also support prioritisation of investments for climate resilient development. The most vulnerable communities, and those sectors most at risk from climate change, should receive prioritisation. Analysis may already exist, for example as part of the standard vulnerability and adaptation analysis and in the preparation of NAPAs, to identify these priorities.

At a sector level, ensuring a strong case for prioritising water security and climate resilient development is included as part of the preparation and submission of sector strategies and plans will help during prioritisation. Evidence of the application of climate impact and screening procedures should also be emphasised as part of sector submissions. There is also an important role for plans and strategies that bring together the various sectors involved in water security and climate resilience, and demonstrate the cross-sector linkages. These strategies may not be associated directly with spending plans, rather they should refer to the sector strategies and their associated spending plans and present the vision for coordination between these plans, for example coordination through a central ministry, apex body or similar.

At a sub-national level, local government (including decentralised physical planning and local development planning departments), civil society organisations and community representatives are often best placed to understand vulnerability and to ensure that adaptation meets local needs[39]. Processes to mainstream climate resilient development should therefore capture community perspectives and indigenous knowledge as part of the process to identify problems and solutions. Local consultation can throw light on the more subtle ways in which climate change affects people. Encouraging a two-way dialogue with national and sector counterparts can help to bring together top-down and bottom-up approaches. Many local governments manage programmes in which grants are delivered to low-level administrative units (e.g. villages and communes), which decide how the funds are used. Procedures and principles governing the use of these funds could be updated to ensure that climate considerations are drawn to the attention of local leaders and/or officials.

At a regional/transboundary-level, most RECs now have some form of institutional capacity for coordinating work on climate change. Multi-stakeholder forums at the regional level need to draw together RECs, RLBOs and national, sectoral and local stakeholders from riparian countries. Mainstreaming is likely to have a range of different entry points such as regional development, sector-specific initiatives (e.g. energy, food security or flood control), regional security, and local hot-spots identified through vulnerability analysis. The emerging philosophy of RLBOs toward benefit sharing should encapsulate water security and climate resilience, and be aligned toward specific regional priorities. Influencing regional plans and ensuring the case for water security and climate resilience is clearly articulated at a regional level is a natural extension of making the case at a national level, and vice versa.

7.
PHASE 4 – MONITOR AND MOVE FORWARD



The aim of Phase 4 is to review the application of the Framework process, to capitalise on new skills and improve future iterations. Building on existing systems for monitoring progress with implementation of investments is also recommended.

This can be achieved through:

- learning lessons from the application of the Framework, to identify what has and has not worked well and propose improvements for upscaling, repeating the process and mainstreaming;
- setting monitoring indicators and a review process to track the implementation of no/low regrets investments, and future cycles of applying the Framework.

7.1 Learn lessons from application of the Framework

Applying the Framework will do more than develop no/low regrets investments. The 'learning by doing' process itself helps to build climate resilience, by building institutional capacity and enhancing partnerships for action.

Learning lessons about the application of the Framework will have the following benefits:

- finding out what worked well and areas which need strengthening;
- tailoring the Framework to national/basin contexts and actors;
- highlighting successful partnerships which should be built upon;
- providing a forum for consensus on the way forward;
- disseminating good practice for future related initiatives.

Activities under this step may include:

- workshops to provide an appraisal of the general experience of all parties involved with the Framework, reviewing the engagement process in working with a multi-stakeholder platform and partnerships;
- identifying specific challenges and barriers encountered during the process, how these can be overcome, and what may limit outputs that can be achieved;
- summary or storyline of the development of investment strategies identifying the process of developing investment strategies, lessons learnt and successful outcomes;
- assessment of the information and knowledge gaps which hindered the identification and appraisal of no/low regrets investment options, including proposals to address these needs;
- identifying and scheduling opportunities for repeating the Framework application process, or applying it to other sectors or geographical areas.

7.2 Set a monitoring and review process

This section outlines monitoring and review of:

- the implementation of no/low regrets investment strategies in the short term (upstream of investments);
- the effectiveness of the investments in improving resilience in the medium term (downstream of investments).

The former is required to keep investment strategies on track for implementation, while the latter is a downstream process which seeks to quantify the benefits of the investments on target beneficiaries in the medium term.

Monitoring the implementation of investment strategies

Upstream monitoring will require a formal progress review process, which may involve the following:

Box 7.1

Example of some issues raised in a hypothetical lesson learned exercise for the sector wide application of the Framework

The Framework has been applied to the agricultural sector and used to generate a portfolio of investments designed to boost resilience including: (i) enhancing integration of water management with the agriculture sector; (ii) conducting detailed climate impact assessments for the sector; (iii) reforming agricultural policies to encourage diversity in the sector; and (iv) improving resilience of irrigation infrastructure.

The process highlighted the importance of bringing together planners with climate specialists, and working cross sectorally. In addition to the investment strategy new links across sectors and from government to civil society have been formed. Difficulty was encountered in reaching consensus across the irrigation management and natural environment conservation stakeholder groups. Financing strategies for the investments were largely successful and substantial climate finance was leveraged through the strong case for the no/low regrets investments.

The detailed planning and implementation has been taken on by the agricultural planning departments involved and the financing sponsors. Opportunities for revisiting the Framework approach for sub-sectors within agriculture have been discussed.

Areas for potential improvement of the approach include:

- Engaging with private investors and multi-national companies to a greater extent may have assisted in leveraging greater funding for some investment opportunities.
- Conducting focussed bottom-up vulnerability assessments may have brought more locally appropriate investment opportunities.
- Bringing in agricultural planners from other countries within the region may have assisted in identifying best practice.

- regular appraisal of progress against the implementation targets;
- expenditure reviews associated with different stages of implementation;
- revision of implementation plans to accommodate unforeseen changes in schedules due to external drivers.

Monitoring the impact of investment strategies and mainstreaming

The impact of no/low regrets investments for water security and climate resilience can be monitored using existing monitoring mechanisms built into national planning systems, by including a few key indicators related to climate resilience.

Progress in mainstreaming water security and climate resilience may itself be a subject for monitoring. IIED (2011)[40] propose the following indicators:

- number of programmes using climate information in design;
- performance of national planning system in conducting adaptation;
- proportion of programmes modified in design to become more climate resilient;
- number of mechanisms that target climate vulnerable people;
- use of a regulation requiring effective screening.

Patterns of expenditure can also be a useful monitoring tool. Reporting on trends in the proportion of expenditure that is, for example, related to water security and/or represents no/low regrets can be a good starting point. Some more sophisticated indicators may also be available, such as the proportion of programmes that have been adapted to reduce climate risks. Public Expenditure Reviews (PERs) (see Box 7.2) can provide a useful starting point for setting a baseline and establishing indicators for monitoring progress across water and climate change.

Finally, indicators for the measurable results of investments are the most direct measure of success. A number of indicators have been suggested by the Adaptation Fund and the Pilot Programme for Climate Resilience (PPCR) (see Box 7.3).

Box 7.2

Experience in climate change and water related PER

There is good experience in Africa with PERs, and broadening these to encapsulate climate change and water security perspectives would be beneficial in influencing budgets. This box describes climate change and water PERs although the principle can be applied to other water related budget lines such as agriculture.

Climate Change Public Expenditure and Institutional Reviews (CPEIRs) have been instigated in some countries to provide a specific focus on the integration of climate change-related expenditures in the national budget. A CPEIR has an important process function, acting as a starting point for longer term government-led stakeholder dialogue and learning involving the public and private sectors, academia, civil society and international development partners.

Two pilot CPEIRs have recently been carried out in Nepal and Bangladesh and three more are starting in Asia. The reviews cover: (i) national and sector policy; (ii) institutional arrangements for coordination of climate change work; (iii) patterns in public expenditure affected by climate change; (iv) methods for taking account of climate change in national budgeting; (v) financing options, including from the private sector; and (vi) arrangements for monitoring and evaluating climate change expenditure. They also assess expenditure at local level, including expenditure patterns and management processes, using official data available and supplementing this with sample surveys.

Water PERs have been increasingly used by the World Bank as instruments to engage its client countries on the allocation of fiscal resources and financing of water services[41]. The World Bank has produced over 40 water PERs responding to the need for improving long term sustainability in financing water services. In many countries water services are financed from national budgets, which places the Ministry of Finance at the heart of water sector investment decision making on new investments and managing recurrent costs. Water PERs are therefore a valuable exercise in understanding the existing financing mechanisms and initiating a dialogue on possible reforms to improve resilience and efficiency.

A recent World Bank water PER for Egypt identified the following:

- low cost recovery from water services;
- a decreasing proportion of funds allocated to recurrent costs, increasing the sector's liabilities in the long term;
- inequitable distribution of water services in rural southern areas;
- rearrangement of budget planning and allocation will be needed for reallocating budget appropriations between departments within agencies and water user groups;
- the water supply and sanitation (WSS) sector is moving towards corporatisation but must address a public debt overhang.

Box 7.3

Potential indicators for climate resilience

Both the Adaptation Fund and the PPCR use a mix of results indicators referring both to climate resilience and to progress with mainstreaming climate resilience into planning. Those for the Adaptation Fund, for example, include:

1.1	Projects that conduct and update risk and vulnerability assessments
1.2	Early warning systems developed
2.1	No. of targeted institutions with increased capacity to reduce risks
2.2	No. of people suffering losses from extreme weather events
3.1	No. of local risk reduction actions or strategies
4.1	Health and social services responsive to climate risks
4.2	Physical infrastructure improved to deal with risk
5.1	Ecosystem services maintained or improved under climate change
5.2	No. of natural resource assets with improved resilience
6.1	% of households and communities with more secure livelihood assets
6.2	% of targeted population with sustained climate-resilient livelihoods
7.1	No. of policies introduced/adjusted to address climate change risks

8.
CLOSING REMARKS

The immediate outputs emerging from the application of the Framework are prioritised portfolios of no/low regrets investments for enhancing water security and climate resilient development, yet the process of applying the Framework will itself help to build climate resilience, by building institutional capacity, strengthening understanding, and enhancing partnerships for action.

The emerging investments and their implementation will support a wide range of commitments and development needs including:

- identifying and developing no/low regret investments, and associated financing strategies, aligned with national development goals and priorities across a wide range of sectoral and sub-sectoral interests;
- ensuring measures and investments take into account current and future climate conditions, socio-economic development pathways, and water use trends;
- promoting practical, robust adaptation investments to ensure investments deliver benefits across a wide range of possible climatic and socio-economic futures;
- reinforcing development pathways that are firmly grounded in sustainable development, and that facilitate transitions toward the greening of economies;
- promoting increased investment in water security and climate resilience from a variety of domestic and international financing sources.

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Abbreviations

AfDB	African Development Bank
AICD	Africa Infrastructure Country Diagnosis
AMCEN	African Ministerial Council on Environment
AMCOW	African Ministers' Council on Water
AU	African Union
BCA	Benefit Cost Analysis
BSP	Budget Strategy Paper
CCASWS	Climate Change Adaptation Strategy for the Water Sector
CDKN	Climate and Development Knowledge Network
CDM	Clean Development Mechanism
CE	Cost Effectiveness
COP	Conference of the Parties
CPEIR	Climate Change and Public Expenditure and Institutional Review
DRR	Disaster Risk Reduction
EAC	East Africa Community
ECOWAS	Economic Community of West African States
GCF	Green Climate Fund
GCM	Global Climate Model
GDP/GNP	Gross Domestic Product / Gross National Product
GEF	Global Environment Fund
GWP	Global Water Partnership
ICT	Information and Communication Technology
IFI	International Financial Institution
IMF	International Monetary Fund
IPCC	Inter-Governmental Panel on Climate Change
IWRM	Integrated Water Resource Management
LDCs	Least Developed Countries
MCA	Multi-Criteria Analysis
MDG	Millennium Development Goal
MIE	Multi-lateral Implementing Agencies
MTEF	Medium Term Expenditure Framework
NAMA	Nationally Appropriate Mitigation Action
NAP	National Adaptation Plan
NAPA	National Adaptation Programme of Action
NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental Organisation
NIE	National Implementing Entity
ODA	Official Development Assistance
PER	Public Expenditure Review
PPCR	Pilot Programme on Climate Resilience
PRSP	Poverty Reduction Strategy Paper
RCCP	Regional Climate Change Programme
RDM	Robust Decision Making
REC	Regional Economic Community
RLBO	River or Lake Basin Organisation
SADC	Southern African Development Community
UN	United Nations
UNFCCC	UN Framework Convention on Climate Change
WACDEP	Water, Climate and Development Programme
WHO	World Health Organisation
WSSD	World Summit on Sustainable Development
WWDR	World Water Development Report
WWF	World Wide Fund for Nature

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