



THE FUTURE CLIMATE FOR AFRICA (FCFA) PROGRAMME PRESENTS TWO MAJOR OPPORTUNITIES: TO GENERATE FUNDAMENTALLY NEW CLIMATE SCIENCE FOCUSED ON AFRICA, AND TO ENSURE THAT THIS SCIENCE HAS AN IMPACT ON HUMAN DEVELOPMENT ACROSS THE CONTINENT.

WHY CLIMATE INFORMATION MATTERS FOR AFRICA

Sub-Saharan Africa is developing rapidly. The region's population is expected to almost double by 2050 and Gross Domestic Product (GDP) could increase more than ten-fold. Governments and businesses are investing around US\$70 billion a year in infrastructure alone across Africa.

Simultaneously, it is the only region where vulnerability to weather extremes is rising; since 1980, more than 420,000 people have died from climate-related events and direct economic damages have totalled at least US\$9 billion. Added to this, future climate change is expected to create a more challenging environment for development in the region. For example, it could lead to around a 10% reduction in total crop productivity across sub-Saharan Africa and up to a 50% reduction in water availability across most of Southern and West Africa (World Bank, 2013). These threats are high on the political agenda. There is therefore an urgent need to reduce climate-related risks today, and account for future climate risks in long-lived projects, planning and policy-making.

“The scale of climate change and the devastating impacts mean that there is an increasingly urgent need for action. However, reconciling the tension between tackling climate change, achieving economic development and addressing global development issues is a complex assignment for us.”

Dr. Vincent Biruta, Minister for Natural Resources, Government of Rwanda (2015)

The availability of high-quality climate information is a crucial foundation for effective climate risk management and adaptation. It could provide a vital input to many social and financial decisions, including disaster preparedness,

agricultural and food security, water and energy supplies, social protection systems, and national planning. Decisions on where and how societies build, together with changing patterns of economic growth and livelihoods present vast potential to increase the climate resilience of new African infrastructure, buildings and development with potentially life-saving results. Conversely, a failure to properly account for long-term climate change in decisions now could lock in greater risks and costs down the line.

“Without tackling climate change, we will not succeed in eradicating extreme poverty.”

High Level Panel on the Post-2015 Development Agenda (2013)

Yet challenges abound: many parts of Africa currently have very weak climate information and services. The science is generally not available and where it is, is not used. Investment in better climate information provides an important, cost-effective opportunity to enhance well-being through more effective disaster risk management, climate change adaptation and development.

FCFA is a £20 million (US\$30 million) programme funded by the UK Department for International Development (DFID) and Natural Environment Research Council (NERC). It promotes the use of improved medium- to long-term climate information in development projects that are being designed today.

ABOUT FUTURE CLIMATE FOR AFRICA

The ultimate goal of FCFA is to reduce disruption and damage from climate change and to safeguard economic development and poverty eradication efforts over the long-term. In this way, FCFA aims to make new African infrastructure and urban and rural plans and investments more climate-resilient.

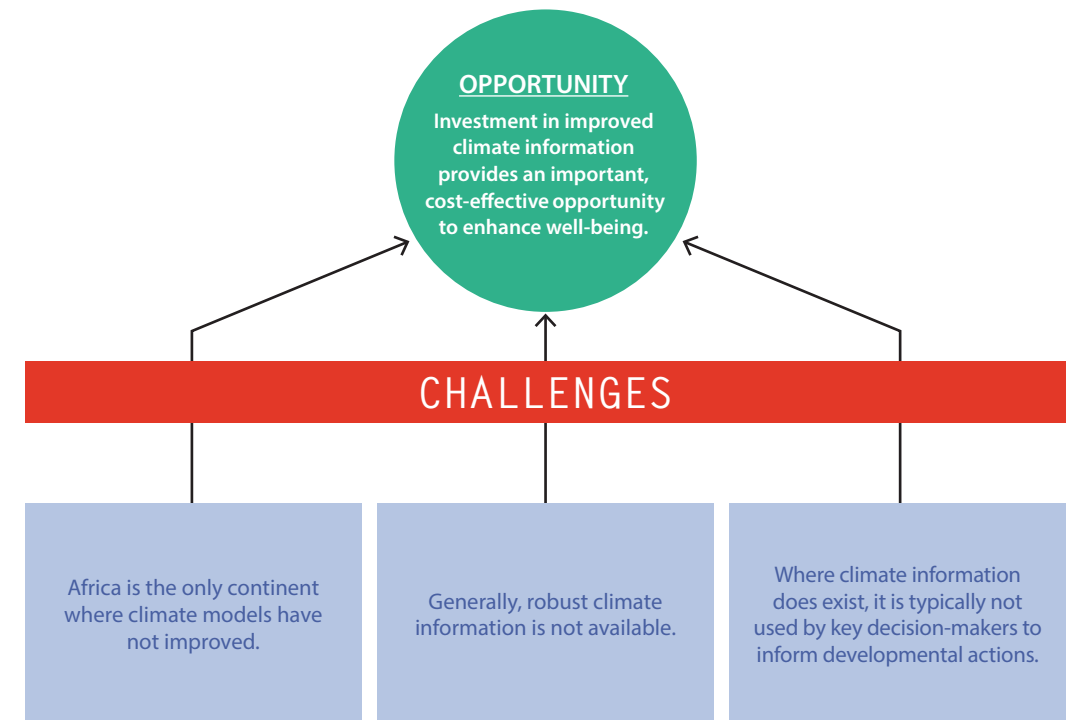
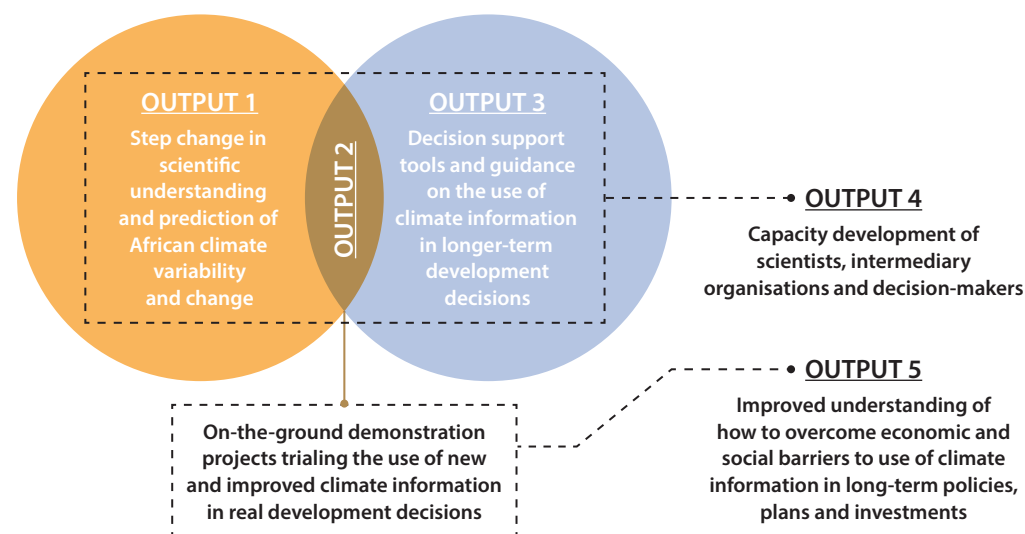
FCFA's goals are:

- Significantly improved scientific understanding of climate variability and change across Africa and the impact of climate change on specific development decisions;
- Demonstration of flexible methods for integrating improved climate information and tools in specific decision-making contexts;
- Improved medium- to long-term (5–40 year) decision-making, policies, planning and investment by African stakeholders and donors.

FCFA will be delivered by five independent research consortia, with support from a central coordination unit. Each consortium includes partnerships among leading and emerging African, British and other international centres

of excellence. Research on physical climate science will be undertaken at both pan-African and regional scales, and a selected number of pilot projects will provide on-the-ground demonstrations of how improved climate information may support particular development decisions (see pages 4–5).

Decision-makers are not accounting for climate risks in plans, policies and investments today, which in the long-term could lead to reduced resilience.



Source: World Meteorological Organization (2011); Intergovernmental Panel on Climate Change (2014); FCFA pilot phase (2014).

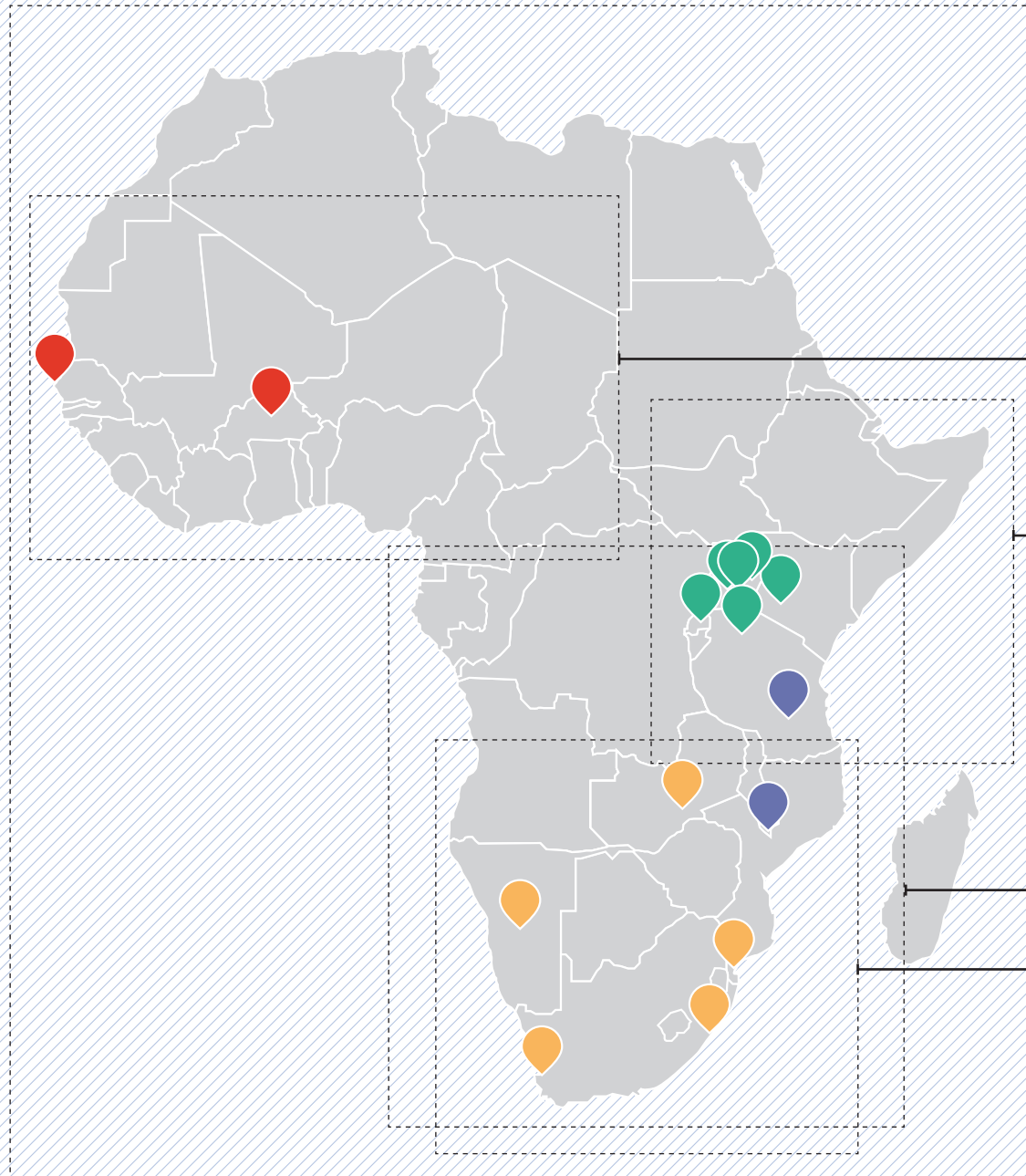


FCFA WILL MAKE SIX IMPORTANT CONTRIBUTIONS TO AFRICAN DEVELOPMENT



FCFA FOCUS REGIONS FOR DEVELOPING NEW CLIMATE INFORMATION

The pins show the locations of demonstration projects, where researchers and their partners will trial the use of the new climate information.



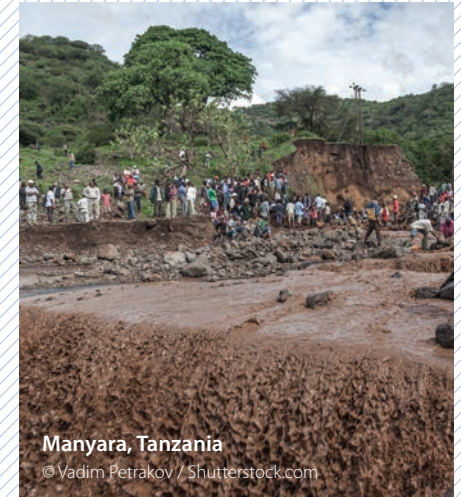
PAN AFRICA

Deliver a step change in global climate model prediction capability for Africa.



Kampala, Uganda

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Manyara, Tanzania

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EAST AFRICA

- Kigali (Rwanda), Kampala (Uganda), Kisumu (Kenya): making critical water and public health infrastructure more climate-resilient.
- Wamala (Uganda), Kawi (Uganda) and Victoria (Tanzania, Uganda, Kenya): climate-proofing investments in rural livelihoods, including fisheries.
- Ugandan Water Management Zones: river basin planning, including irrigation and hydroelectric power.

WEST AFRICA

- Niakhar, Senegal: developing climate-resilient frameworks for agriculture planning.
- Ouagadougou, Burkina Faso: informing the Grand Ouaga city expansion plan on urban flood risk management in a changing climate.

CENTRAL AND SOUTHERN AFRICA

- Rufiji river basin, Tanzania: catchment planning, including climate-resilient irrigation and hydroelectric power.
- Lower Shire, Malawi: climate-proofing local plans for water infrastructure, irrigation and agriculture.

SOUTHERN AFRICA

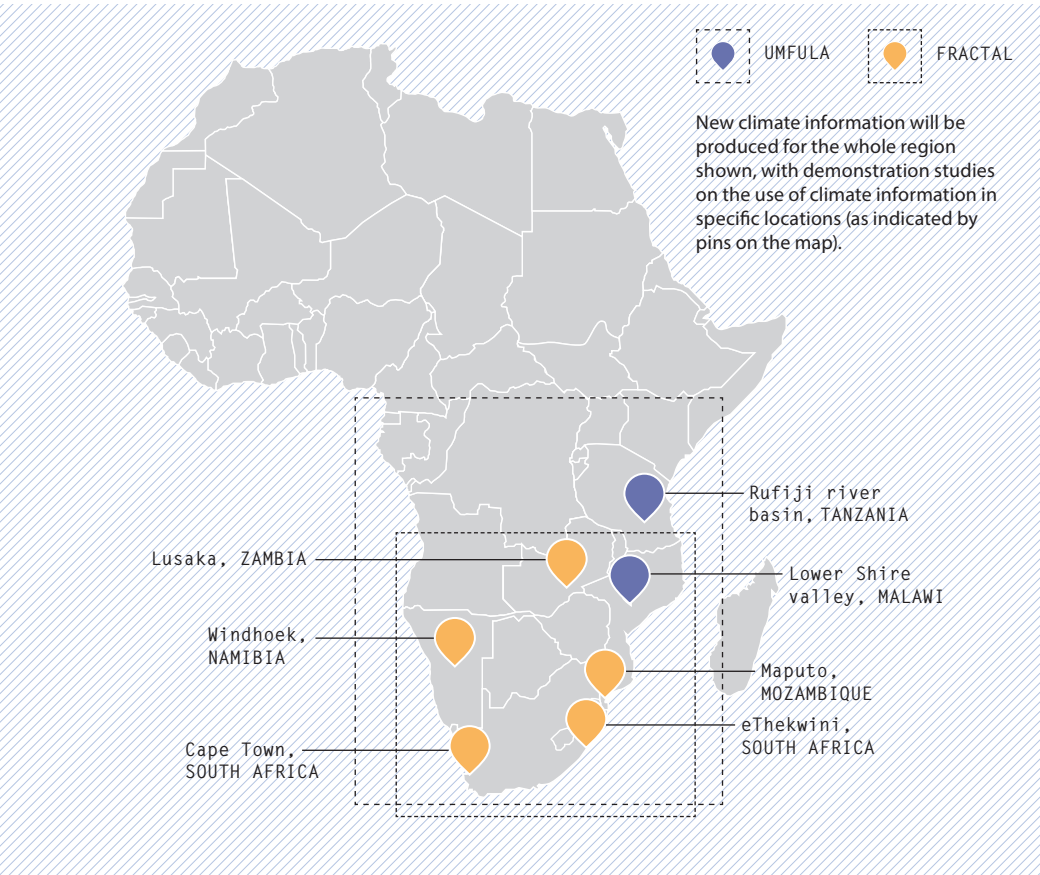
- Maputo (Mozambique), Lusaka (Zambia), Windhoek (Namibia), Cape Town and eThekweni (South Africa): understanding how urban energy and water systems will function in a changing climate.



Kinyihira, Rwanda

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CENTRAL AND SOUTHERN AFRICA



WORKING IN:

- Rufiji river basin, Tanzania: catchment planning, including climate-resilient irrigation and hydroelectric power.
- Lower Shire, Malawi: climate-proofing local plans for water infrastructure, irrigation and agriculture.

TIMELINE: June 2015 to June 2019.

WORKING IN:

- Maputo (Mozambique), Lusaka (Zambia), Windhoek (Namibia), Cape Town and eThekweni (South Africa): understanding how urban energy and water systems will function in a changing climate.

TIMELINE: June 2015 to June 2019.

Key

Climate modelling

Policy-makers guide research questions

Scientific publications

Public communications

Secondments for African scientists

Scientific training workshops

UMFULA

(Uncertainty reduction in Models for Understanding Development Applications)

The UMFULA project (‘river’ in Zulu) will provide new insights and more reliable information about climate processes and extremes in Central and Southern Africa. UMFULA will partner with agencies and universities in Tanzania and Malawi to link the information to development decisions with long-term consequences.

This initiative aims to create a step change in scientific understanding of Central and Southern Africa’s climate – and how the climate will change in the 5–40 years ahead. To ensure the information is relevant for decision-making, the team will work closely with development partners in the water, agriculture and energy sectors in the Rufiji river basin in Tanzania and at the sub-national level in southern Malawi. Researchers will collaborate with stakeholders to understand the links between climate and weather events and on-the-ground development impacts to inform response strategies.

A knowledge-mapping exercise will illustrate where and how climate information is currently being used in Central and Southern Africa. The team will assess local power dynamics – to examine whose decisions count, how actors relate to each other and how these dynamics set the policy agenda and influence decision-making.

The team will produce scenarios for the climate in the decades ahead, including the effects of ‘high impact’ events like intense rainfall and droughts, on natural resources and socio-economic activities. This will highlight the trade-offs that decision-makers face in the context of uncertain future climate and rapid economic change.

The team will use participatory, gender-sensitive approaches, to ensure that women’s views and concerns are heard and shape development agendas.

The project aims to provide support to planning for resource use, infrastructure investments and sectoral growth priorities, by identifying adaptation pathways which are robust and resilient in the face of climate change and other non-climate stressors.

What can we change?

“UMFULA aims to deliver practical guidance for the effective use of climate information in Central and Southern Africa to enable climate-resilient development. It will provide lessons that are transferrable to other African contexts and that can inform many regional strategies and policies.”

Declan Conway, Principal Investigator, UMFULA



CONSORTIUM MEMBERS: Grantham Research Institute on Climate Change and the Environment (London School of Economics and Political Science); Kulima Integrated Development Solutions; University of Oxford; University of Cape Town; Sokoine University of Agriculture; Lilongwe University of Agriculture and Natural Resources; University of Leeds Sustainability Research Institute; Council for Scientific and Industrial Research; University of Manchester; University of KwaZulu-Natal; University of Sussex; University of Dar Es Salaam; University of Zambia; University of Yaoundé; South African Weather Services; Tanzania Meteorological Agency; Mozambique National Institute of Meteorology.

FRACTAL

(Future Resilience for African Cities and Lands)

FRACTAL will improve scientific knowledge of future climate trends in Southern Africa, deepen urban policy-makers' understanding of how climate change will affect water and energy services, and support them to explore climate-resilient development choices.

This initiative will organise 'City Learning Labs' in three Southern African cities – Lusaka, Zambia; Maputo, Mozambique; and Windhoek, Namibia – to explore the vulnerability of urban water and energy services to climate-related events such as flooding, extreme temperatures and sea level rise or storm surges. The Learning Labs will help the research team to pinpoint how the three cities will obtain their freshwater and energy in the changing climate of the future – and how climate-resilient investments could safeguard these services. Researchers will be embedded in city governments to act as sounding boards and advisors. FRACTAL will also collaborate with two additional self-funded South African cities, Ethekewini and Cape Town.

The team's expert communicators will produce data visualisations and communications products to bring the messages to a wide audience.

The process of joint exploration through City Learning Labs and secondments will set the agenda for the physical science research: ensuring that the FRACTAL team produces climate information that is as tailored and relevant as possible to urban decision-making. As well as the primary focus on Lusaka, Maputo and Windhoek, the team will also invite stakeholders from Blantyre, Malawi; Gabarone, Botswana; and Harare, Zimbabwe to shape the research agenda.

One of the chief scientific challenges for understanding Southern Africa's climate is that different models give contradictory scenarios for climate trends in the next 5–40 years. FRACTAL's team will advance understanding of regional climate systems and consolidate messages for decision-makers about regional and local climate trends.

What can we change?

"This is a multi-disciplinary research project in every sense and will generate more useful climate information from the local to regional level in Southern Africa than is currently available. It is also, at heart, a capacity development project. Our plans for peer-to-peer learning in city governments and knowledge exchange among researchers will deepen participants' understanding of climate change processes, impacts and climate-resilient development options. Together, we'll track how climate information is used over time and whether scientists and policy-makers can start speaking the same language."

Bruce Hewitson, Principal Investigator, FRACTAL



CONSORTIUM MEMBERS: University of Cape Town; Met Office (UK); START; Stockholm Environment Institute; ICLEI–Local Governments for Sustainability, Swedish Meteorological and Hydrological Institute/ Sveriges Meteorologiska och Hydrologiska Institut; Red Cross Red Crescent Climate Centre; Oxford University; Aurecon; Council for Scientific and Industrial Research; US National Atmospheric and Space Administration; Lawrence Berkeley National Laboratory; European Commission Joint Research Centre; City of Cape Town; City of eThekewini.

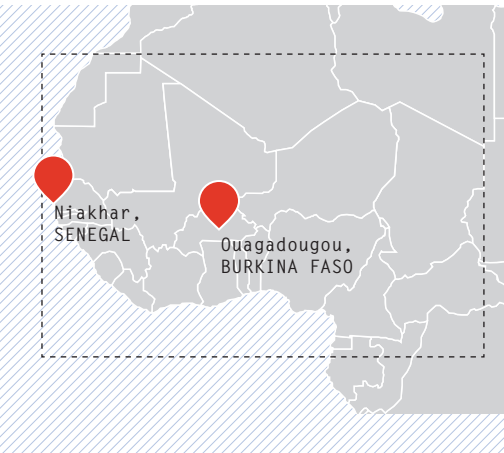


Lusaka, Zambia
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WEST AFRICA



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WORKING IN:

- Niakhar, Senegal: developing climate-resilient frameworks for agriculture planning.
- Ouagadougou, Burkina Faso: informing the Grand Ouaga city expansion plan on urban flood risk management in a changing climate.

TIMELINE:

June 2015 to June 2019.

New climate information will be produced for the whole region shown, with demonstration studies on the use of climate information in specific locations (as indicated by pins on the map).

AMMA-2050

(African Monsoon Multidisciplinary Analysis 2050)

AMMA-2050 will improve understanding of how the West African monsoon will be affected by climate change in the coming decades – and help West African societies prepare and adapt.

This initiative combines observations and climate models with new, cutting edge methods to assess how the West African climate is likely to change over the coming decades. It builds on the largest multi-disciplinary research effort ever undertaken on Africa's climate and environment, the African Monsoon Multi-disciplinary Analysis (AMMA, 2003–present).

The AMMA-2050 team will explore how improved knowledge about variations in the West African monsoon can guide development planning, leading to more resilient societies.

The team will investigate how physical processes interact to cause 'high impact weather events' such as storms, and heat waves that affect lives and livelihoods. Not only will they look at how the total amount of rainfall is likely to change – but also at how rainfall is likely to be distributed throughout the wet season. For example, heavy rainfall concentrated in just a few hours places great stress on human settlements, infrastructure and agriculture. By applying expert judgement, they will identify adaptation options in water resources and agriculture.

The AMMA-2050 team will work with decision-makers and affected groups to jointly develop tools and approaches which can support them in using improved climate information.

CONSORTIUM MEMBERS: National Agency for Civil Aviation and Meteorology (Senegal); Félix Houphouët-Boigny University; University of Cape Coast; Senegalese Institute for Agricultural Research; Cheikh Anta Diop University, Dakar; International Institute for Water and Environmental Engineering (2iE, Burkina Faso); VNG Consulting Limited; University of Leeds; Met Office (UK); University of Sussex; Centre for Ecology and Hydrology (UK); Institute for Development Research – Hydrology and Environment (France); Pierre Simon Laplace Institute – Oceanic and Climate Laboratory; French Agricultural Research Centre for International Development; National Centre for Meteorological Research – the Meteorological Atmosphere Study Group (France).

What can we change?

"In West Africa, severe weather, such as flood-producing storms or an early end to the cropping season, has profound impacts on populations. We have an opportunity in AMMA-2050 to apply new techniques to interpret high impact weather, and apply this to specific problems for developing climate-resilient agriculture and cities in the region. Decision-makers can use this knowledge to design progressive, flexible policies that improve their chances of meeting development goals."

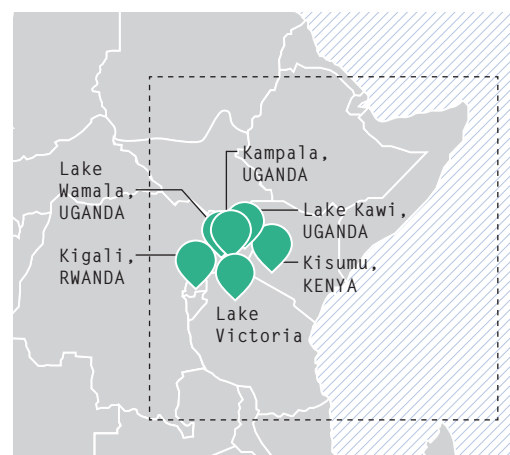
Chris Taylor, Principal Investigator, AMMA-2050

"Common to sub-Saharan countries, Senegal is facing food insecurity that is likely to worsen with climate change. By identifying which farming technologies are best adapted to this region and that will be productive under an unpredicted climate, AMMA-2050 will provide scientific-based briefs for policy-makers and stakeholders to use in planning their future populations' needs."

Ndjido Kane, Co-Investigator, AMMA-2050



A photograph showing three men working on a wooden boat in Lake Victoria. One man is seated inside the boat, another is leaning over the side, and a third is kneeling in front. They are using a blue container to apply a substance to the boat's interior. The background shows other colorful boats and stacks of wood on a muddy shore.



- Kigali (Rwanda), Kampala (Uganda), Kisumu (Kenya): making critical water and public health infrastructure more climate-resilient.
- Lakes Wamala (Uganda), Kawi (Uganda) and Victoria (Tanzania, Uganda, Kenya): climate-proofing investments in rural livelihoods, including fisheries.
- Ugandan Water Management Zones: river basin planning, including irrigation and hydroelectric power.

New climate information will be produced for the whole region shown, with demonstration studies on the use of climate information in specific locations (as indicated by pins on the map).

(Integrating Hydro-Climate Science into Policy
Decisions for Climate-Resilient Infrastructure
and Livelihoods in East Africa)

Availability of water is fundamental for development in East Africa. However, this vital resource is already under stress from land degradation, pollution and overfishing. Climate change adds to these problems, greatly increasing the vulnerability of the poorest people in the region.

in East Africa. This will include the production of new, accessible, understandable and easy-to-use tools for water resource management in a changing climate. The methods and tools developed will then be applied to decision-making processes.

Climate projections show a warming trend in East Africa in the decades ahead, but changes in rainfall and weather extremes are currently uncertain. HyCRISTAL will tackle current uncertainties which exist around climate change projections for the region, concentrating in particular on what they mean for the availability and management of water.

HyCRISTAL will improve our understanding of key climate-water processes in the region, and then work in partnership with a wide range of stakeholders to apply this knowledge in two different settings: rural communities that rely on agriculture and fishing; and urban populations where water supply and sanitation are under pressure.

By developing climate science and helping water users assess their vulnerabilities, the HyCRISTAL project will increase the resilience of communities

"Making use of the latest climate science and applying this to water resource management will help communities adapt and be resilient to future changes."

East Africa has one of the world's fastest growing populations, and is very vulnerable to climate change. HyCRISTAL will work with water users in the region to ensure that key long-term decisions for both rural and urban communities take account of climate change."

John Marsham, Principal Investigator,
HyCRISTAL



CONSORTIUM MEMBERS: University of Leeds (water@leeds); African Centre for Technology Studies; British Geological Survey; Centre for Ecology and Hydrology (UK); Evidence for Development; Jomo Kenyatta University; Loughborough University; Met Office (UK); National Centre for Atmospheric Science (UK); National Fisheries Resources Research Institute (Uganda); North Carolina State University; Practical Action; Stony Brook University; Tanzanian Meteorological Agency; Ugandan National Meteorological Authority; Ugandan Ministry of Water Resources; University of Connecticut; Makerere University; Maseno University; Walker Institute, University of Reading (Africa Climate Exchange).

PAN - AFRICA



African dust storm
© CNRS/Francoise Guichard



WORKING IN:

Africa as a whole. This initiative aims to deliver a step change in global climate model capability that will reduce uncertainty and enable better informed evaluation of the robustness of future projections for the continent.

TIMELINE: February 2015 to January 2019.

IMPALA

(Improving Model Processes for African Climate)

The IMPALA project aims to deliver a step change in global climate model prediction capability for Africa.

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

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

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

The IMPALA project will develop, for the first time, a pan-African very high resolution model (grid-spacing of around 4km) to better capture key processes and local-scale weather phenomena including extremes, providing new understanding of the roles played by these processes in African climate variability and change. The improved knowledge and new

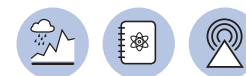
simulations will be used by scientists in the four regional research projects (previously described in this booklet). This, in turn, will deliver more reliable information for decision-makers and scientists in a range of sectors including agriculture, urban and rural water resources, health and infrastructure management and renewable energy.

It is difficult for decision-makers to plan effective adaptation actions and build resilience in the face of poor and often conflicting climate information.

What can we change?

“By delivering a step change in global climate model capability for Africa and new information about the role of previously unresolved processes driving regional climate variability and change over the continent, the IMPALA project will put in place a key building block to empower decision-makers with information that can be used to reduce risks to health, water resources and agriculture and help protect the livelihoods of the most vulnerable.”

Cath Senior, Principal Investigator, IMPALA



CONSORTIUM MEMBERS: Met Office (UK); African Centre of Meteorological Applications for Development; Centre for Ecology and Hydrology (UK); University of Cape Town; University of Exeter; University of Leeds; University of Nairobi; University of Oxford; University of Reading; University of Yaounde.

GET INVOLVED WITH FCFA

The Coordination, Capacity Development and Knowledge Exchange (CCKE) unit will coordinate activities across the different FCFA thematic and geographic research clusters, develop the capacity of key stakeholders, and produce and distribute news, features and reports on FCFA's work.

The unit will:

- Produce guidance related to climate information, decision support tools, and training materials – both generic and for specific African decision-making contexts.
- Disseminate results and lessons learned from FCFA to a general audience.
- Provide capacity development opportunities for African researchers, communicators and knowledge brokers, and others who will use climate information.
- Enhance FCFA's coordination and collaboration with other programmes and institutions producing and enhancing the use of climate information for Africa.

“Training and capacity building activities will work directly with a targeted group of scientists, decision-makers and intermediaries. Tens of thousands will benefit from the knowledge and tools disseminated through open platforms.”

Nicola Ranger, Scientific Advisor, DFID (2015)

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Visit www.futureclimateafrica.org, where we host a growing library of policy briefs, technical reports, working papers, and case studies for several African countries and sectors.

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