

CONCEPT PAPER ON

WACCA – WATER AND CLIMATE CHANGE SERVICES FOR AFRICA

A programme to strengthen the development of climate
and water information services in Africa.



BACKGROUND

Arguably no other continent will be as severely affected by the impacts of climate change as Africa. The continent's innate vulnerability to a warming climate by virtue of its geographical positioning is further compounded by acutely low adaptive capacities, limited infrastructure, constraints in technological options, rapidly expanding populations and high poverty levels of citizens, even in those countries and regions experiencing rapid economic growth. On a continent where hundreds of millions rely on rain-fed agriculture for livelihood and sustenance, the poorest and most vulnerable people, especially women and children, face daunting risks from extreme weather events such as droughts, floods and storms. Moreover, attendant disease outbreaks associated with extreme weather events like floods such as cholera and typhoid fever from polluted water sources add another layer of suffering and risks to already vulnerable populations.

Reliable climate and water information is of high necessity in developing robust resilience to climate change risks but such information is lacking on a wide, albeit differing scale in many parts of the continent. Many humanitarian aid organisations have been investing in water management interventions in Africa for decades, and in some cases, these have led to perverse side effects with a wide flora of supply-driven solutions being left behind for decision-makers to deal with, leading to more confusion and reliance on further aid at the end of the lifespan of such interventions.

There is an urgent need for the development of end-user driven tools to support Climate and Water Information hubs as well as allied services in providing reliable, time critical and actionable information across the African continent. The development and distribution of information needs to be significantly accelerated to support the increasing number of local, national and regional authorities across Africa whose demanding task it is to formulate and implement adaptation strategies for a changing climate, increase resilience and reduce risk levels of the vulnerable populace to short and longer term climate hazards.

A user-need driven approach in exploiting the untapped potential of new IT, open data and open-source computational tools is necessary for a holistic understanding of the water cycle and regional water issues. Combined with sound communication pathways, evidence-based governance and increased public awareness, existing water challenges can be tackled more efficiently at various levels. By improving not only the quality of regional climate information but also the ease of access and interpretation of data, we increase the usability of that information. Decision makers require this precise and actionable information to make the kind of appropriate decisions required to prepare and protect the people from the effects of a changing climate.

Global climate models can provide some general indications of the changes that may occur in a region but not at the level of detail required for informed decision-making on local and national scales. Regional climate modelling or downscaling has developed over recent years; however, the information produced is not accessible nor directly applicable (useful) to on-the-ground local and national policy makers who must determine how to address or adapt to projected climatic changes. A situation thus exists where lack of knowledge exchange results in regional climate modellers being poorly informed of the end-user needs and thus producing information which may be easily misinterpreted by both the Vulnerability and Impact Assessment (VIA) community and the final end-users. There is a clear need to bridge these science-society gaps.

Water is essential for life and a key reason why society develops in a certain way. The availability and distribution of water affects the ecosystem, as well as the demand for drinking water, food, sanitation, energy, industrial production, transport and recreation. Where water is a limiting resource, its efficient management becomes crucial for livelihoods and economic growth. Moreover, due to its variability in space and time, water is also the most important environmental hazard with about 90 percent of natural disasters being water related; droughts, floods and attendant waterborne pollutants and diseases cause thousands of casualties, famine, disruption to society and damage worth billions every year. Population pressure, increased consumerism, climate change and variability along with associated disaster risks are an added strain to development in Africa. This not only necessitates a more stringent and sustainable use of already limited water resources, but also requires increased resilience of individuals and the society as a whole against water-related hazards.

Integrated water resources management (IWRM) is a coordinated way to manage water, land and related resources in order to maximize economic and social welfare as equably as possible without compromising the sustainability of vital ecosystems. High-quality water information at appropriate temporal and spatial resolution is key in all forms of water-related management, whether in planning long-term strategies or for day to day appropriation of the resource. In many countries, large efforts and investments have been made recently to provide needed information to policy-makers and water managers at various levels, for instance, in Europe toward implementing the Water Framework Directive (WFD). Accordingly, the EU Open Data policy and the INSPIRE directive call for increased data access to stimulate economic growth, transparency of governance, good ecological status and sustainable development. Such initiatives, where they exist in Africa are in need of support toward increasing their effectiveness and reach.

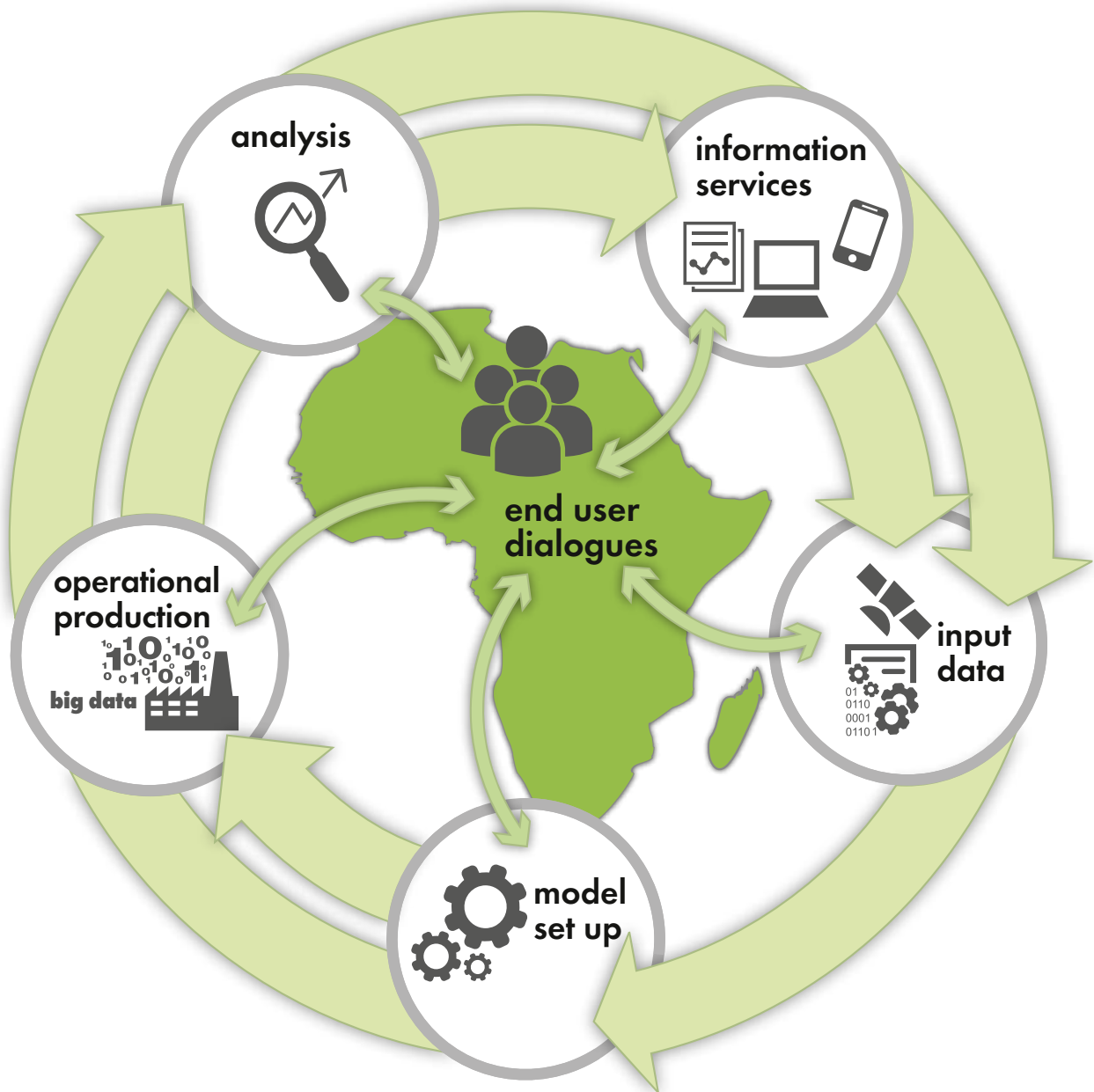


Figure 1. The WACCA programme follows a holistic approach and integrates all parts of the chain from the climate model down to adaptation measures, with the end-user dialogue being at the heart of the whole programme.

THE WACCA CONCEPT

The WACCA programme is designed to support, strengthen and accelerate partner efforts at national and regional levels across Africa in the development and accessibility of climate and water information and early warning services. WACCA aims at fostering institutional sustainability for the provision of these services in the partner countries and regions. Under three thematic focal points, WACCA will strive to bridge the gap between science and society, providing end-user tailored information based on best available knowledge about the future climate and region specific best-practice solutions for adaptation. A bi-directional chain of communication will be enshrined as a core part of the process so that end-user needs are carried through into the global numerical modelling and regional downscaling processes to ensure delivery of useful and appropriate information. Such actionable information would enhance the accountability of civil society as well as national and regional authorities in Africa in applying evidence regarding climate change in their own governance. The projects and activities within WACCA are in line with high priority rationales and objectives within the UN Agenda 2030. To achieve these objectives, SMHI, in collaboration with Swedish, international and African regional partners, will build and strengthen local know-how in climate change, vulnerability and impacts, climate modeling and impact on water resources as well as efficient data management. Of necessity is the strengthening of information and communication pathways between different services and data providers such as the meteorological and hydrological services as well as the disaster risk management authorities. The line of information and communication between different stake holders such as the agriculture, water and power sectors will likewise be addressed.

Education and training permeate the whole programme, but it is also a separate thematic focus of WACCA geared toward training end-users, decision-makers and the public, thus increasing and updating individual as well as collective requisite skills for sustainable development. As the sustainable and equitable use of water is essential for all sectors of society, Water Services that apply the Integrated Water Resource Management approach is another focus of WACCA. Last but not least, the need for improved Climate Services is high across all levels of government, motivated by the need for communities and decision makers to better anticipate, evaluate and mitigate risk while increasing resilience in the context of a changing climate.

EDUCATION

Spreading awareness of the causes and consequences of a warmer climate throughout the society is essential toward meeting the necessary measures for Climate Change adaptation in Africa. Education and capacity development are important keys to such awareness and

success in fostering sustainable development. Therefore, support to capacity and institutional development constitutes an important part of our cooperative initiatives. International Training Programmes (ITP) is a potent mechanism for capacity development. The overall objective is to engage actors representing organisations in countries with which Sweden cooperates, enhancing their competence and capability to initiate and actuate their own processes of change to reduce poverty and risk in their respective areas of influence.

Several evaluations have shown that ITP is successful as a method in general and also that the specific programmes have yielded expected and desired output and outcome. Our experience from running ITP261 “Climate Change – Mitigation and Adaptation” since 2007 is that the majority of participants make good use of the knowledge acquired, with their individual project work being useful for their organizations and many have also transferred knowledge to colleagues in and outside their respective organisations.

Based on our experience as well as an assessment of needs in developing countries obtained through numerous contacts during our projects abroad (capacity development and research), SMHI is now undertaking a new series of ITPs related to Climate Change, mitigation and adaptation, with themes on water resources and agriculture, supplemented by short courses for specific target groups.

The focus of the training programmes includes:

- Education and training on climate change, vulnerability and impacts.
- Setting up appropriate tools - from climate to hydrological impacts models on relevant scales, based on assessments of gaps in existing operational routines.
- Education in data management.
- Facilitating dialogues between service/data providers and stakeholders/sectors with the aim to provide customer-tailed products/services.
- Facilitating end-user dialogues to ensure information is accessible, relevant and understandable.
- Facilitating cooperation, and the create an open source community to ensure general access to tools, models and data, and establish a knowledge sharing culture.

WATER SERVICES

Africa is currently experiencing fast economic growth and extended international investments in diverse sectors. However, the economic growth is not equitably spread to all societal levels. Efficient integrated water resources management (IWRM) is a coordinated way to manage water, land and related resources in order to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. IWRM will lead to long-term resilience, improved health, safe livelihood and thriving ecosystems. Thus, the proposed programme “Water

And Climate Change Services for Africa” (WACCA) will implement a framework for development based on new water-related information having local and regional focus within a wider pan-African context. Projects will focus on supporting institutions by implementing participatory processes in the production of water information in providing open user-driven decision support tools to water managers at various levels who thus acquire ownership of such tools. The open source HYPE model originally developed at SMHI incorporates a crowd sourcing approach, having an online community of users and developers across the globe. Many of these partners have successfully adapted HYPE and taken operational ownership of it in addressing the specific needs of their respective regions. For example, the Niger-HYPE model is being successfully used in the Niger River Basin in West Africa.

CLIMATE SERVICES

Up-to-date and high resolution information about variability and future change in climate is needed for estimating the impact and consequences of climate change in different sectors of society. Decision-makers at all levels must be able to base decisions on best practices and best available climate information. Also, an array of uncertainties surrounds climate change. These include uncertainties emanating from the limits of current knowledge on the climate, especially at the local scale, and which affect model reliability. Other uncertainties come from natural climate variability, unquantifiable future greenhouse gas emissions of sovereign states, and difficulty in assessing the impacts of current emission levels which could have significant consequences over a long time scale. All these complexities need to be taken into consideration when making decisions. With most water, meteorological and climate centres in Africa limited to tackling short to medium term issues, there exists a clear need for developing a more robust climate scale information service structure on the continent. Such information structure, as envisaged in the WACCA context, will take into cognisance the intrinsic link between water and climate and provide a holistic approach to tackling water related adaptation issues on a climate scale.

Thus, this theme will not only achieve progress in improving the quality of regional climate model information but will address, and make steps to overcome, the current hurdles to knowledge exchange to all relevant partners leading to more informed policy decisions and enabling African communities to reduce risks, increase resilience and achieve sustainable and healthy growth in a changing climate.

PARTNERS AND END-USERS

The WACCA programme aims to be of service to African partners on individual, organisational, local, regional as well as continental levels.

African citizenry in general, especially the very poorest and most excluded who are dependent on marginal farmland areas for their livelihood and thus particularly vulnerable to a changing climate, will benefit from improved Climate Information Services and effective early-warning systems when these mechanisms aid the mitigation of the effects of natural disasters, insecure food production and pandemics.

African communities will be better prepared and have greater resilience for risk and capacity for adaptation due to both improved climate data and enhanced information pathways, allowing for improved community based decisions and more informed demands on accountability and sustainability from higher authorities.

African policy and decision makers will benefit from a better coordinated and integrated water resource management, with high quality climate information services. The WACCA training programmes will work with them in the proper interpretation and use of resulting data. Through dialogue and interactive activities, end user needs will feed back all the way through the information chain to the RCM community producing the data, leading to an increasingly user-needs tailored information cycle.

The African VIA community will be provided with data that they can either easily utilize and where necessary, the training required handling such information. They will also be able to influence the data being produced from RCM simulations, through the end-user dialogue activities.

Regional climate scientists and experts in Africa will benefit from improved data access and training opportunities in model development and handling regional climate information, in addition to direct financial support for African based training activities such as MENA-CORDEX and CORDEX Africa.

Regional climate modelling experts will have at their disposal, the experience, guidance, and mentorship of Rossby Centre experts toward building capacity and establishing an African centre of excellence in climate modelling and model development. Such a centre would then become a knowledge multiplier for other African centres wishing to start their own regional climate modelling effort.



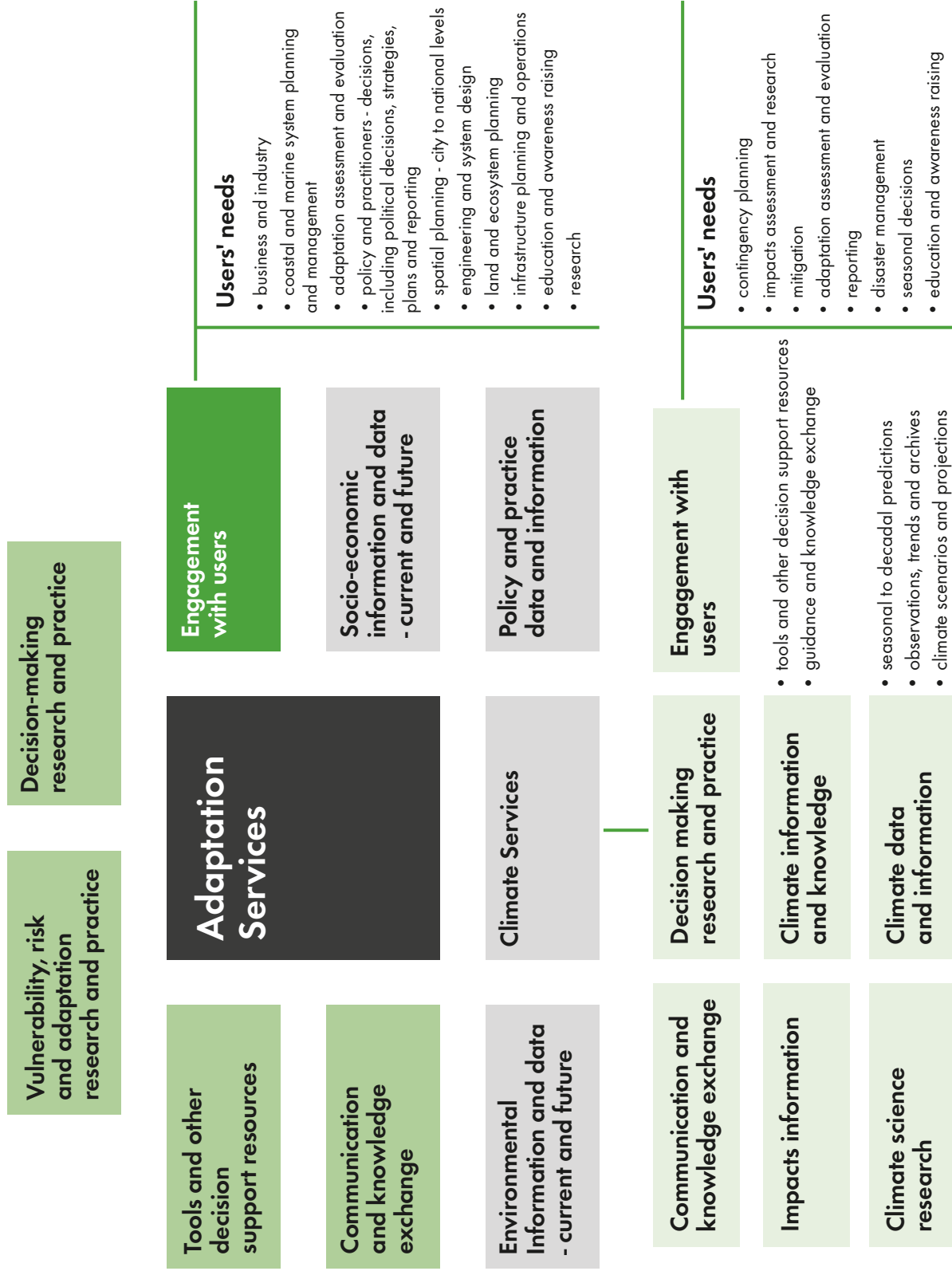


Figure 2. WACCA: user-needs driven climate and water information services that bridges the communication gap between science and society.

WHO WE ARE

SMHI is the Swedish management authority for government services related to meteorological, climatological, hydrological and oceanographical issues. As such SMHI has, among other duties, the responsibility to;

- Elaborate and provide decision-supporting information that contributes to good societal planning, to reduced vulnerability and to ensure that quality goals for the environment are achieved.
- Pursue applied research and development in meteorology and climatology
- Elaborate, compile and disseminate information and knowledge about climate change and adaptation to future climate

The importance of Climate change was emphasised in 1997 when SMHI climate modelling research unit, the Rossby Centre, was established. The Rossby Centre is the regional climate modelling centre for Sweden and is one of the leading climate modelling centres in the world. The unit has 20 scientists with expertise in advanced climate modelling and development, climate analyses, climate impact studies, supercomputing and climate communication. Initial focus was on regional climate modelling for use in dynamical downscaling, but has since expanded to include global climate modelling, including regional modelling in various developing countries domains as well.

In its role being a government authority, SMHI currently has responsibility for and performs public functions and task, including but not limited to the following:

- SMHI is since 2012 tasked with responsibility for the National Knowledge Centre for Climate Change Adaptation, that provides tools and information to help society cope with a changing climate, now and in the future.
- SMHI runs the Climate change adaptation portal, the result of the cooperation between fifteen Swedish governmental agencies - in collaboration with Sweden's municipalities and county councils www.klimatanpassning.se.
- SMHI is, since 2013, the national focal point for the UN Intergovernmental Panel on Climate Change, IPCC.
- SMHI is engaged in ongoing dialogue about a "Nordic Framework for Climate Services" (NFCS) about collaboration within the Nordic region.
- SMHI contributes, through participation in numerous Research and Development projects to production of Climate scenarios for various regions in the world, and making results available, to increase in delivery of climate information services for adaptation, resilience and disaster risk reduction.
- Researchers and experts from SMHI have recently actively contributed to the IPCC Fifth Assessment Report on Climate Change (IPCC AR5).
- On behalf of the Ministry of the Environment SMHI has coordinated the Swedish work on Short-lived Climate Pollutants, (SLCP) since 2011.

- SMHI has, through Sida funded capacity development projects, an extensive experience of supporting e.g. African organisations working with weather, water and climate, historic time-series as well as data about future climate (e.g. Zimbabwe, Botswana, Namibia, Niger, League of Arab states member countries etc.).

- During 2014 SMHI finalised the remaining activities within the Sida ITP261 "Climate change – mitigation and adaptation", that started in 2007 and has embraced some 450 participants from 50 countries. The interaction with all those participants has given SMHI an important insight in actual climate change problems in developing countries.

- SMHI, due to its proven capabilities in both regional climate modelling science and experience in training and capacity development in world regions including Africa, now hosts the International Project Office for CORDEX (IPOC).

Altogether, the knowledge, capacity and experience at SMHI gained through the above mentioned work has given SMHI a unique position as governmental authority in Sweden and in the world. This is further underpinned by the fact that SMHI's responsibility covers all the disciplines included in the atmosphere-ocean-earth system, namely meteorology, hydrology, oceanography and climatology. The strong link between the climate research at the Rossby Centre, the hydrological research and operations and a strong tradition of working with capacity development sets SMHI in a unique position in the field.

SMHI represents Sweden in the World Meteorological Organisation (WMO) and actively contributes to activities within the World Climate Research Programme (WCRP). Currently, SMHI is adapting according to EU open data strategy and the INSPIRE directive, is active in GEOSS and a partner in three on-going major GMES projects. The institute is involved in many national and international research projects and is currently coordinating several collaborative FP7 projects. SMHI has around 660 employees and the management system is certified under the quality standards ISO 9001 and ISO 14001.

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