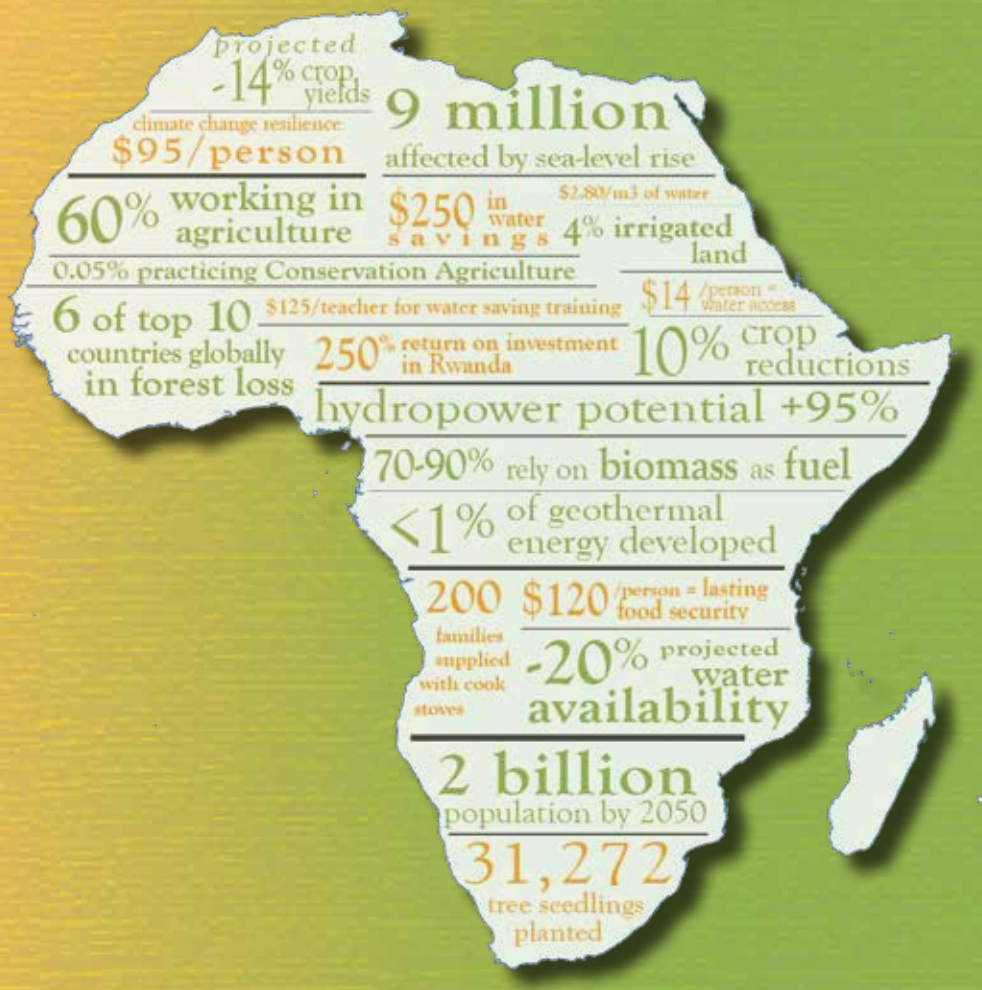

KEEPING TRACK OF ADAPTATION ACTIONS IN AFRICA

UNEP

Targeted Fiscal Stimulus Actions
Making a Difference

AMCEN

KEEPING TRACK OF ADAPTATION ACTIONS IN AFRICA

Targeted Fiscal Stimulus Actions Making a Difference

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Table of Contents

Foreword

African development and economic growth are being strangled by climate change, which poses major challenges to already fragile situations at the household, national and regional levels. In recognizing resource limitations and capacity constraints in adequately responding to the multiple challenges facing vulnerable communities, it is important that targeting particular climate risks includes climate change adaptation actions that offer new opportunities. Co-benefits that go beyond the targeted and non-targeted sectors and communities to improve income, social welfare, eradicate poverty, create jobs, protect or restore ecosystems and provide cross-cutting solutions that serve other sectors as well are especially desirable.

Currently, adaptation actions are prioritized for implementation on an as-needed basis typically applied to high-risk communities, ecosystems and sectors, instead of being prioritized based on the potential of the action to generate environmental, social and economic benefits capable of spurring new actions to promote private and public investments and foster new investment partnerships. Therefore, other catalysing techniques are required to attract national budget resources and private sector investments. In order to provide economic incentives for public or private sector investment in adaptation actions, it becomes important to keep track of adaptation actions in such a way that they can be factually represented by figures, graphs and attractively detailed life stories showing how adaptation has contributed to human welfare, poverty alleviation, job creation (i.e., in the Green Economy) and strengthened ecosystems.

From these drivers stems this publication, "Keeping Track of Adaptation Actions in Africa" (KTAAA). Using projects conducted in various countries in sub-Saharan Africa, KTAAA shows, in a myriad of ways, the direct benefits of adaptation actions and their capability to provide transitional pathways to green growth and sustainable development. KTAAA also shows how concrete demonstration actions can provide solutions that can move countries and communities in Africa towards climate-resilient development. These actions that deliver solutions with multiple benefits and diverse beneficiaries – ranging from reducing environmental impacts to engineering a transition to greener economic growth – can be embraced by other countries. The various adaptation lessons highlighted in this booklet are highly relevant in contributing to decision-making processes. By highlighting concrete examples of success, KTAAA seeks to act as a catalyst and spur the world community to greater actions through the policy sphere.

Mr. Mounkaila Goumandakoye

Director and Regional Representative
Regional Office for Africa

United Nations Environment Programme (UNEP)

Hon. Dr. Binilith Mahenge

Minister of State- Environment, United Republic of Tanzania

and

President, Africa Ministerial Conference on the Environment (AMCEN)

Context

New information on climate change only emphasizes the need for urgent action, particularly in regard to adaptation actions that safeguard human well-being and earth systems. The impacts of climate change are raising major public and policy concerns, as they result in financial costs and clear risks to people and national development. Other challenges such as prevalent and widespread poverty, food, health and energy insecurities amplify the burden of responding to climate change. Furthermore, incipient threats posed by climate change, particularly in terms of potentially overturning decades of development efforts in the most vulnerable areas (e.g., sub-Saharan Africa) suggest that future development efforts should incorporate greater resilience to climate change impacts.

Unfortunately, adaptation to climate change has no fixed time horizon as do emission reduction targets in the global negotiation process, or the eight Millennium Development Goals. This undermines the urgency to act now in adapting to challenges, especially in developing countries where capabilities to respond to the magnitude of the problem are limited. However, the direct role that adaptation to climate change has on the realization of certain MDGs (e.g. 1 and 7) underlines the urgency of action as the world approaches the 2015 timeline for their realization.

How to achieve the desired speed of intervention, scope of adaptation actions and resilience of these actions to future climate impacts, will depend on the choice and means of intervention, and the engagement of the actors and networks chosen. Adapting to the challenges posed by climate change and at the same time managing the alignment of national economic development activities along new paths of low carbon, green economy and renewable resources require that countries think about potential barriers to taking actions, and also about actions beyond

their national boundaries when developing strategies to guide their responses. Tapping into the emerging opportunities linked with the transition to a greener economy and renewable resources will require using new partnership arrangements,

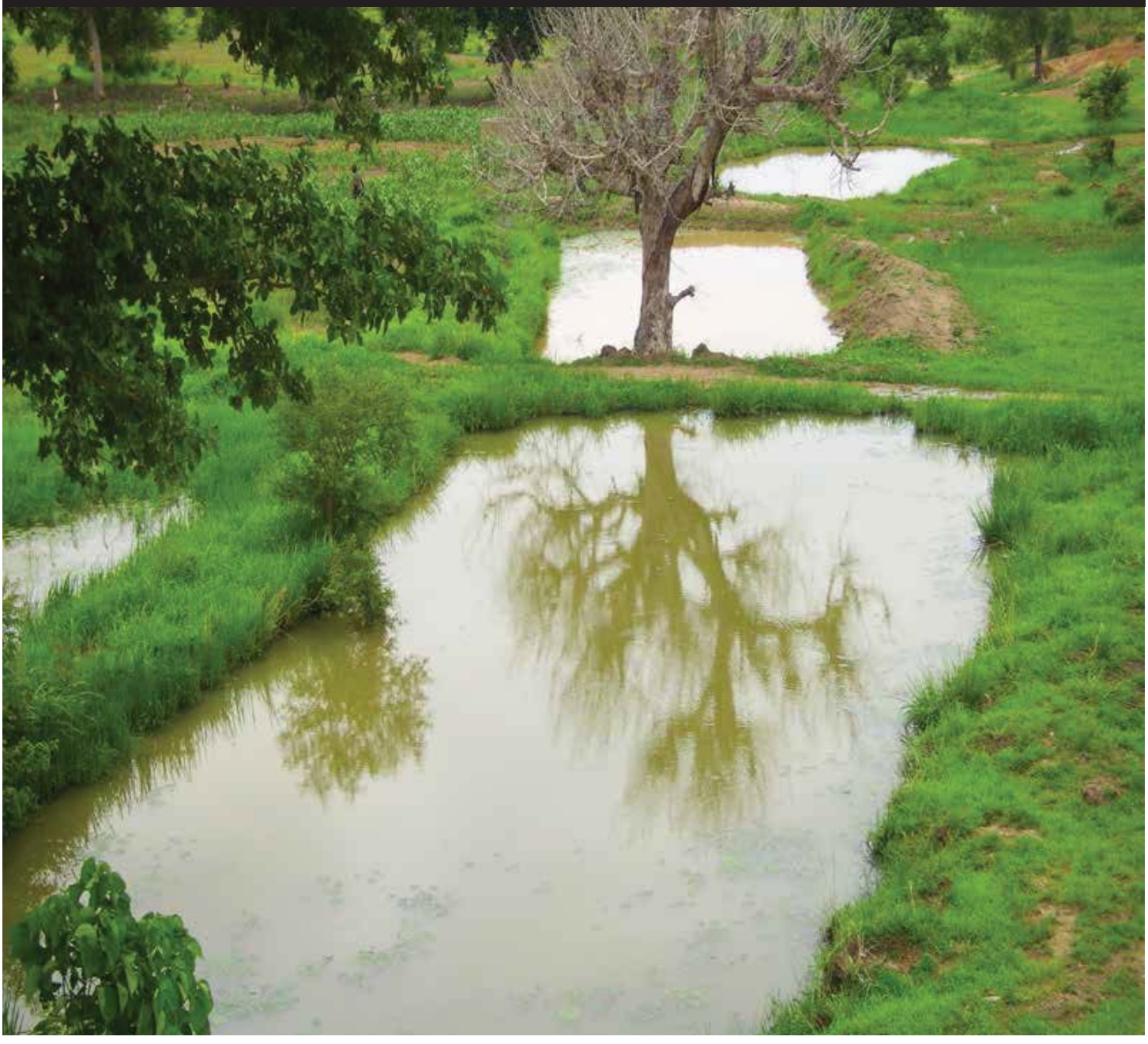
as well as new adaptive mechanisms, to buffer short-term risks and other tradeoffs that could accompany the transformation process. Developing beneficial adaptation strategies that harness existing social and economic structures will require transcending physical boundaries throughout the planning process.

Unfortunately, adaptation to climate change has no fixed time horizon as do emission reduction targets or the eight Millennium Development Goals

How to use this booklet

This booklet is one part context and one part solution. In the first part one finds "snapshots" of the many elements of the climate change context (including water scarcity, agricultural production, deforestation and energy sources and uses). Often the current context paints a grim picture for the future. In the second part one can learn about solutions to adapt to climate change and better our interactions with the environment, some of which are already in place in many communities throughout Africa. These solutions provide a positive way forward and demonstrate how ecological approaches can be upscaled, so that Africa can lead in adaptation to climate change.

As the climate change literature continues to pile up evidence of increasing temperatures and changing rainfall patterns, this publication attempts to demonstrate the current context from the start of the century, while including the most up-to-date projections for future changes.



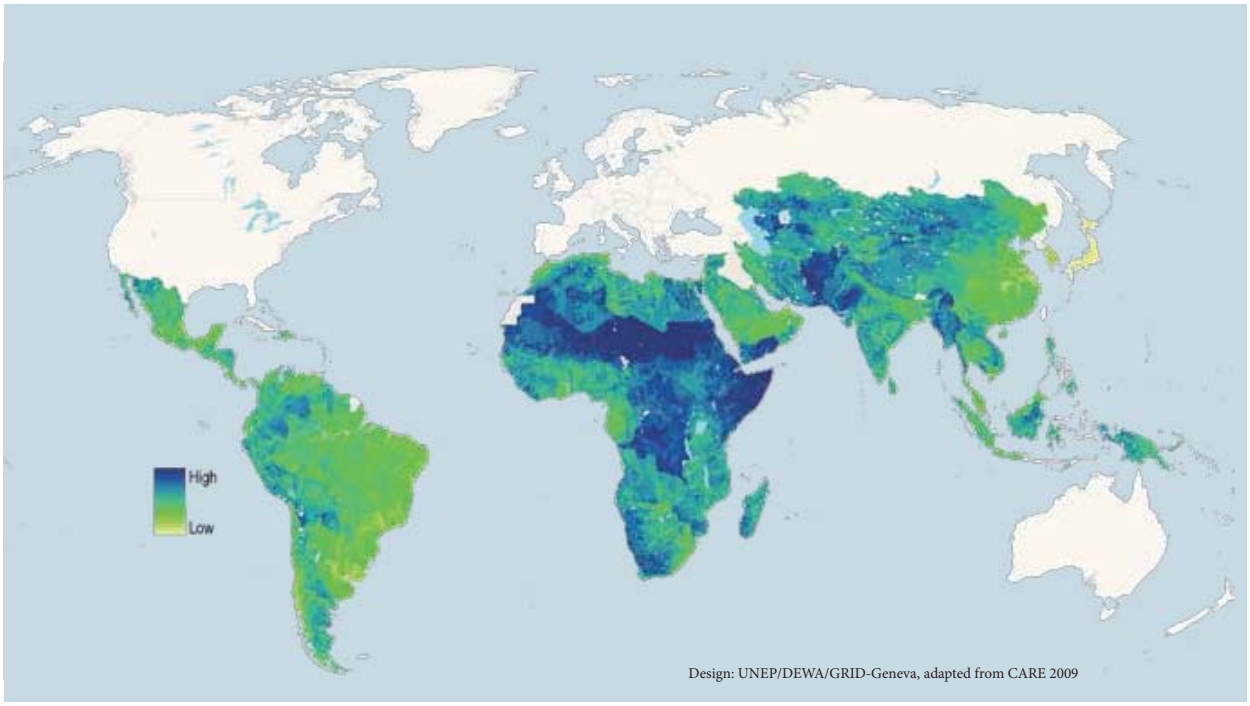
Climate Risks in Africa

A growing population faces increasing risks from climate change.

Tracking temperature and land changes, disaster occurrences and costs, water availability, food production, income, population growth and ultimately health will be crucial.

Encouraging innovative solutions will be vital.

Human Vulnerability to Climate Change



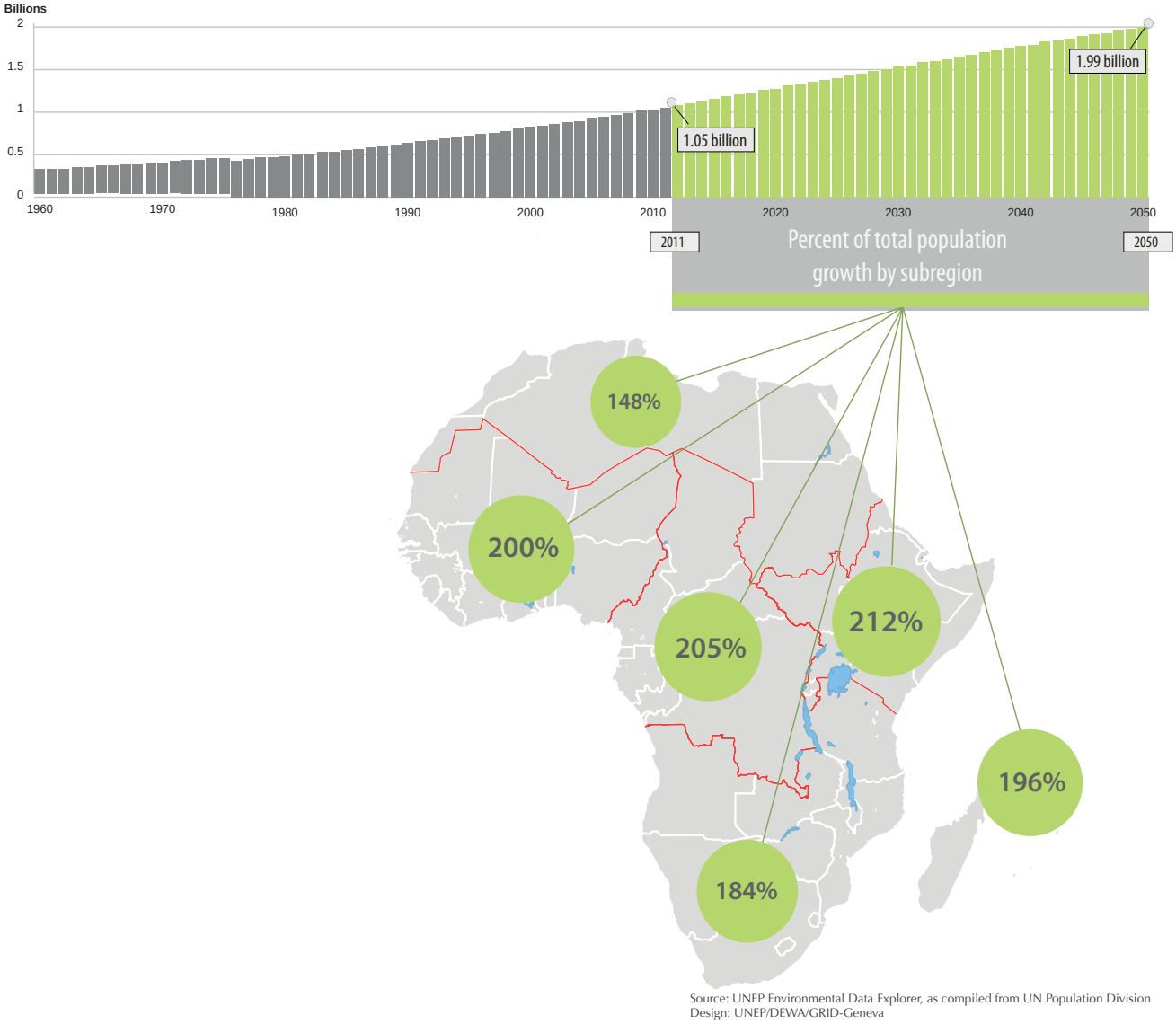
Population and Economic Development

Population

In the next fifty years the African population is expected to double. This means that by 2050 there will be nearly two billion people living on the African continent. Changes to their environments will directly affect the livelihoods of this growing population.

In terms of global population growth, developing regions are expected to grow the fastest. Sub-Saharan Africa's population is expected to grow the fastest (World Bank, 2013).

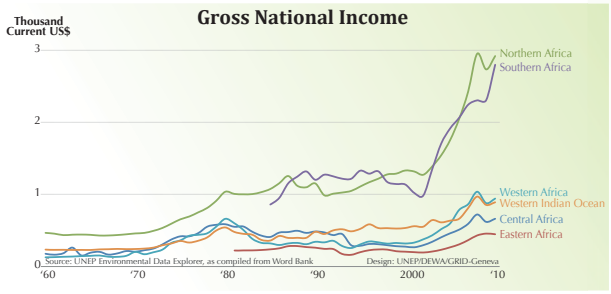
Population Growth and Percent of Growth for Each Subregion



Source: UNEP Environmental Data Explorer, as compiled from UN Population Division
Design: UNEP/DEWA/GRID-Geneva

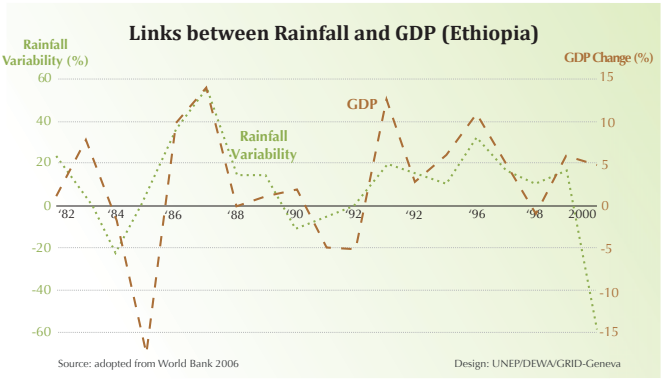
Income

The collective Gross National Income of Africa is rising. Despite this, 60% of the Sub-Saharan population still depends on the agricultural sector for their livelihoods (World Bank, 2013).History shows us

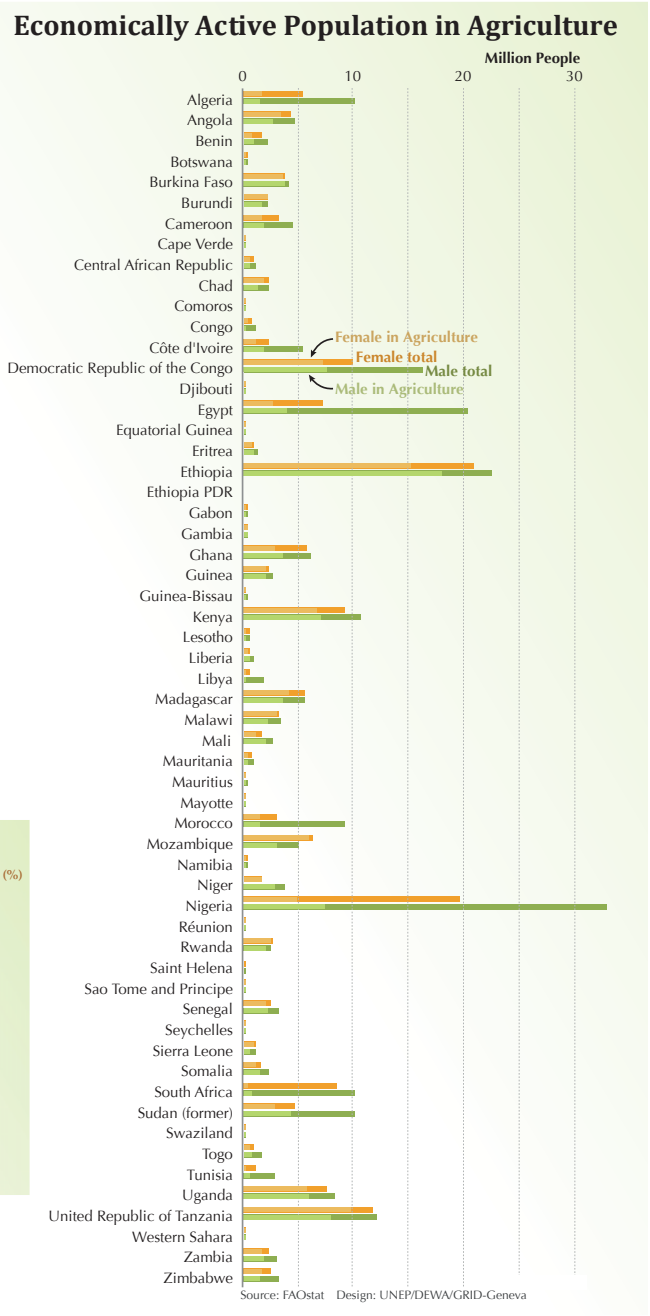


how much changes in the environment and climate change can affect livelihoods. The graph below shows the impact that variations in rainfall have had on GDP in Ethiopia, a heavily agriculturally-dependent country (World Bank, 2006).

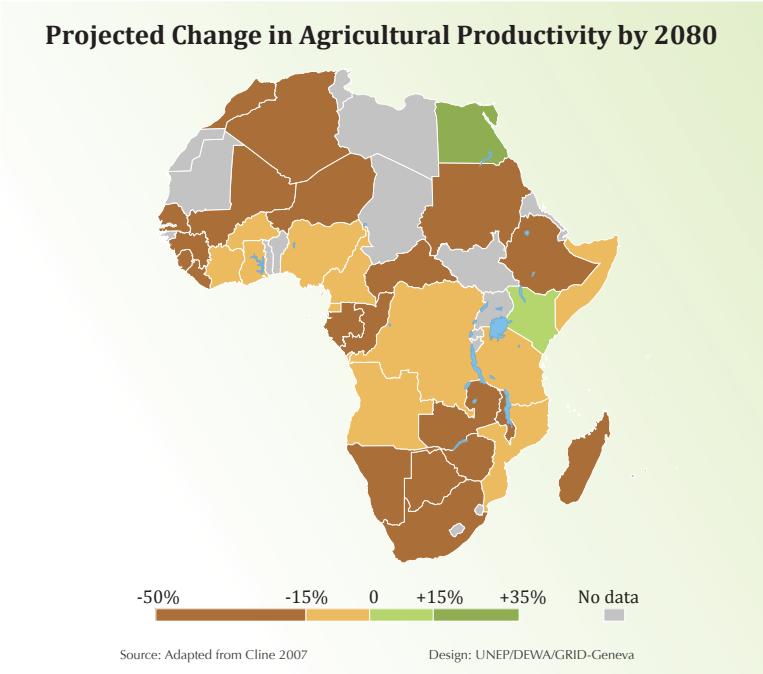
Pioneering approaches combined with strong support from policy-makers will allow for relatively low-cost solutions in



building the resilience of communities to climate change.



Agriculture



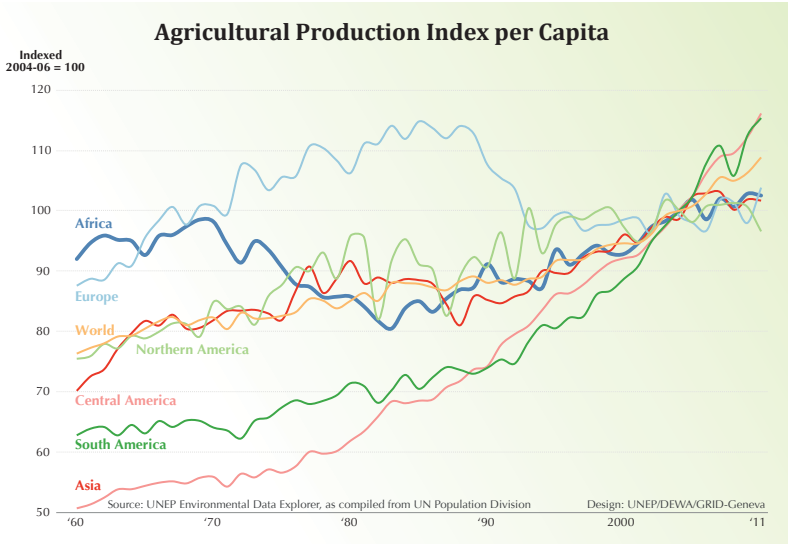
Less than 4% of agricultural lands in Sub-Saharan Africa are irrigated (World Bank, 2013).

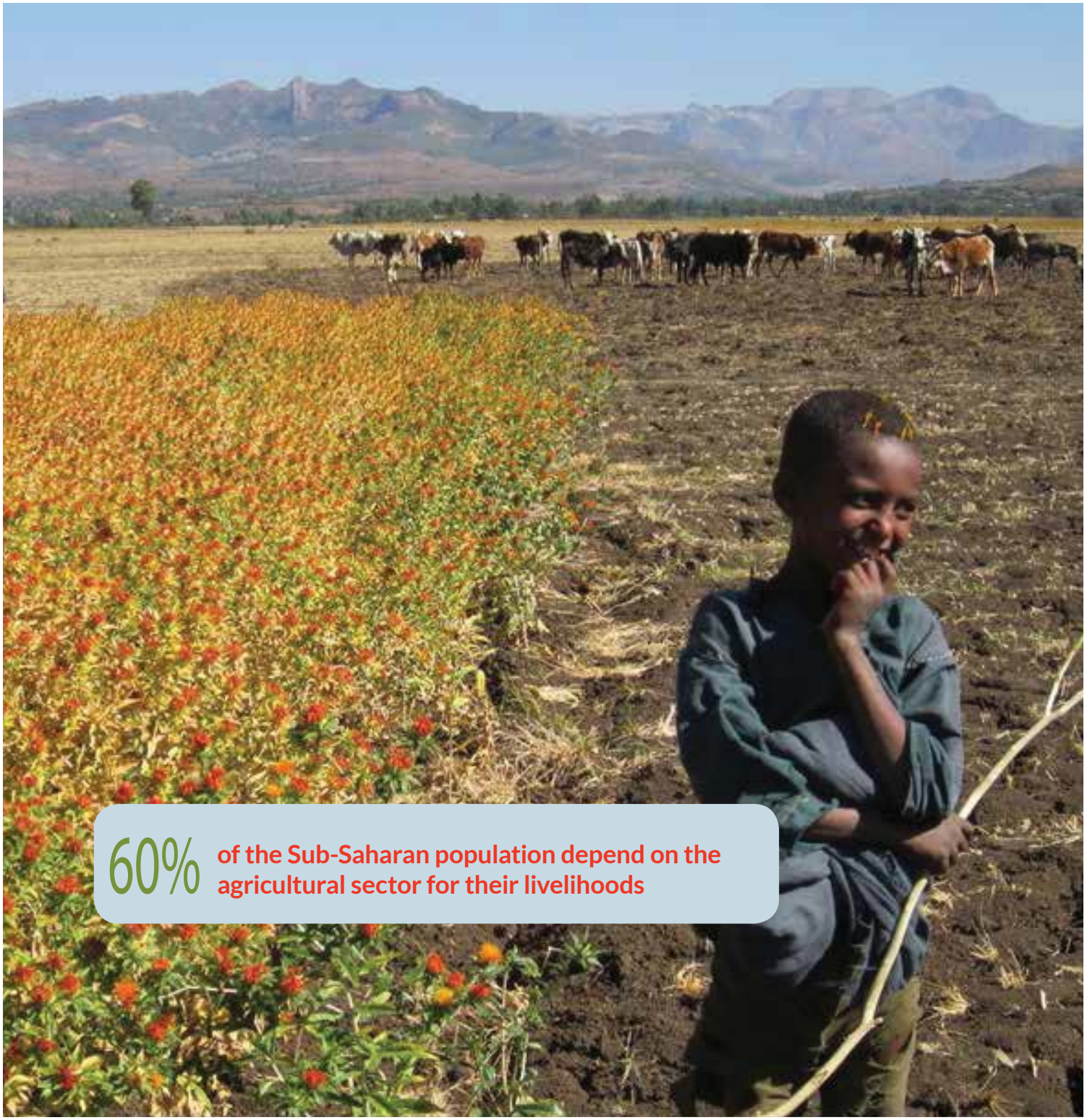
This means food production is almost entirely reliant on rainfall and therefore is highly vulnerable to changes in precipitation and the occurrence of drought (World Bank, 2013).

FOOD PRODUCTION

Food production yields in the future will alter as a result of these changes to the environment. Some crops will grow better in certain locations (cassava) while many others will experience sharp declines (maize). By 2050, per capita crop production (at warming of about 1.8°C) is projected to decline, compared to a case without climate change. Across Africa crop yields are predicted to decrease by 15-20 per cent (World Bank, 2013).

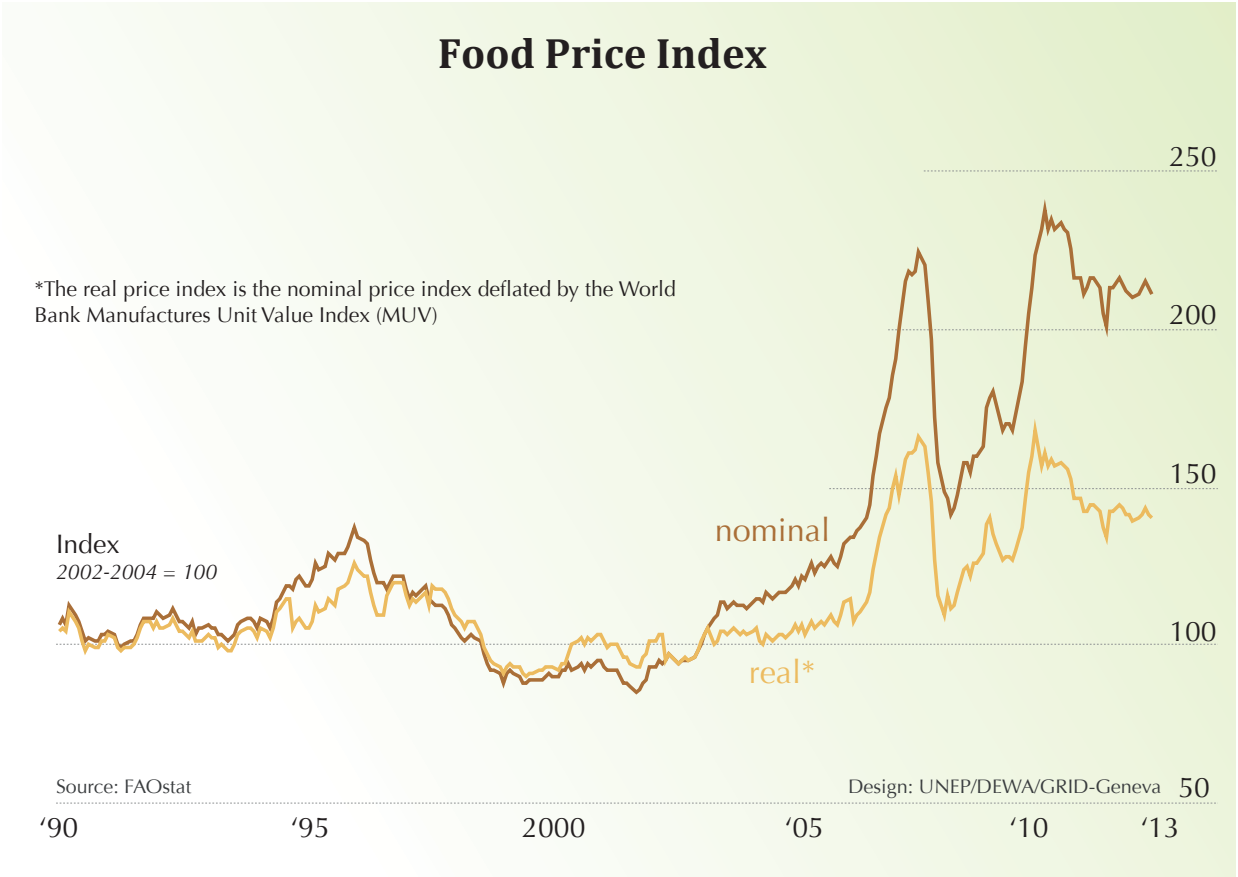
By 2080, projections are even worse for agricultural productivity if substantial changes to policy and practices are not made now.




60% of the Sub-Saharan population depend on the agricultural sector for their livelihoods

Food Prices

Food prices only became higher and more volatile as the world entered the 21st century.



The FAO warns that "*Agriculture in the 21st century faces multiple challenges: it has to produce more food and fiber to feed a growing population with a smaller rural labor force… [policies must] adopt more efficient and sustainable production methods and adapt to climate change*" (FAO, 2009).

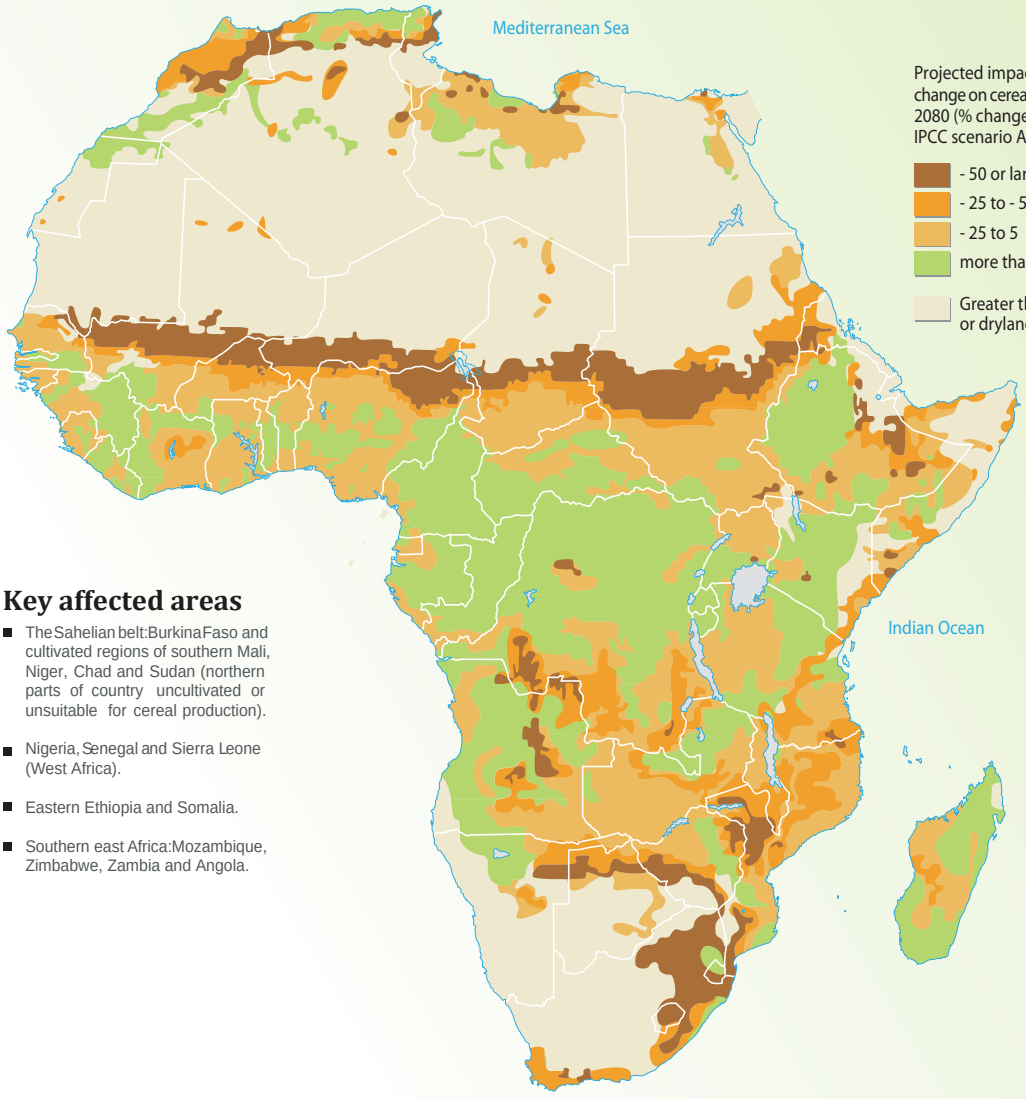

97%
of agricultural production is currently rain-fed

The Case of African Cereal

FAO data show that food and in particular cereal prices will soar in the coming years. At the same time, Africa as a whole will experience a reduction in cereal yields. The countries that are already the most vulnerable will continue to be hit the hardest by these changes. Countries along the Sahel desert and Eastern Africa (Ethiopia and Somalia) already face harsh climatic conditions including extreme drought. Countries in Southeastern Africa (e.g. Mozambique) are projected to face the reduction in cereal yields alongside increased risks of cyclones and sea level rise, compounding the threats posed by climate change.

Cereal Productivity in Sub-Saharan Africa

under a scenario of the IPCC that shows CO_2 atmospheric concentrations a level at 520-640 ppm by 2050



Key affected areas

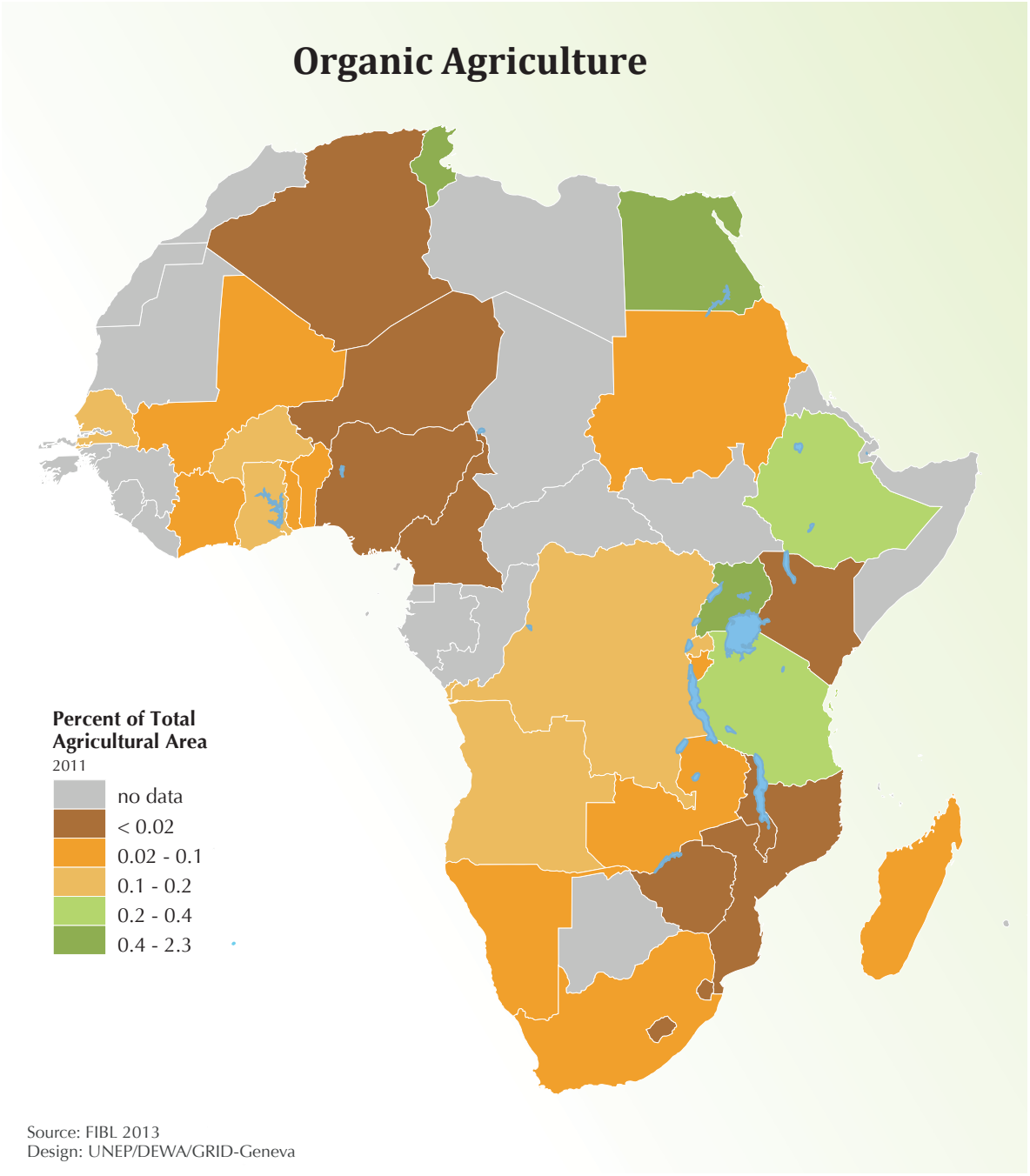
- The Sahelian belt: Burkina Faso and cultivated regions of southern Mali, Niger, Chad and Sudan (northern parts of country uncultivated or unsuitable for cereal production).
- Nigeria, Senegal and Sierra Leone (West Africa).
- Eastern Ethiopia and Somalia.
- Southern east Africa: Mozambique, Zimbabwe, Zambia and Angola.

Source: Fischer 2005
Design: UNEP/DEWA/GRID-Geneva, adapted from Rekacewicz 2009

Land Use

Assuming per capita crop production and agricultural productivity drop as predicted while food prices rise, it will become even more necessary to implement far-reaching and innovative solutions in agricultural practices. Such policies will have to both increase productivity and be climate-smart. This will include implementing practices that promote soil and water conservation, biodiversity, resource and watershed management, and sustainable practices.

Currently, only a very small number of agricultural practices explicitly incorporate conservation techniques or are designed to build climate change resilience into food systems. Even in the five countries where the use of organic farming methods has grown, its percentage of total farming practiced remains between 1-2%.



Source: FIBL 2013
Design: UNEP/DEWA/GRID-Geneva


70-90%
of Africans rely on biomass as fuel

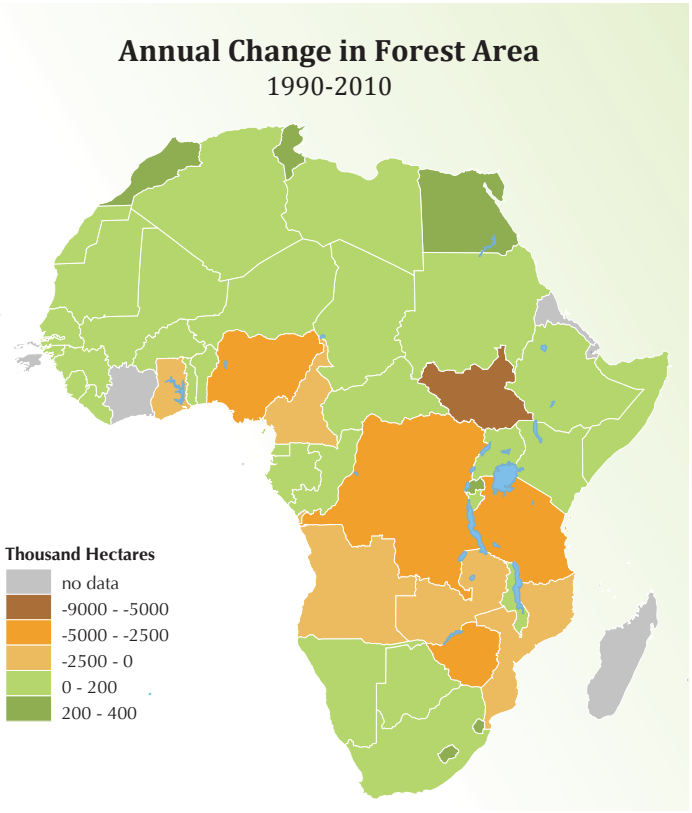
Deforestation

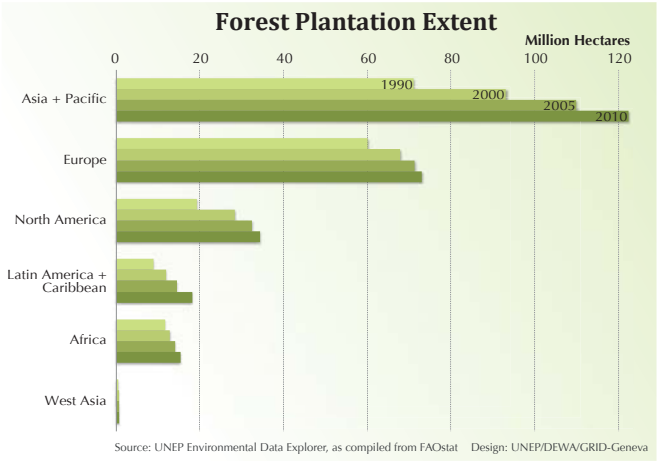
Of the ten countries with the largest net loss of forest per year during 2000–2005, six are in Africa (Brazil, Indonesia, ***Sudan***, Myanmar, ***Zambia***, ***Tanzania***, ***Nigeria***, ***Democratic Republic of the Congo***, ***Zimbabwe*** and Venezuela). The map (right) shows the decline of forest area in Africa from 1990 onwards (FAO, 2010).

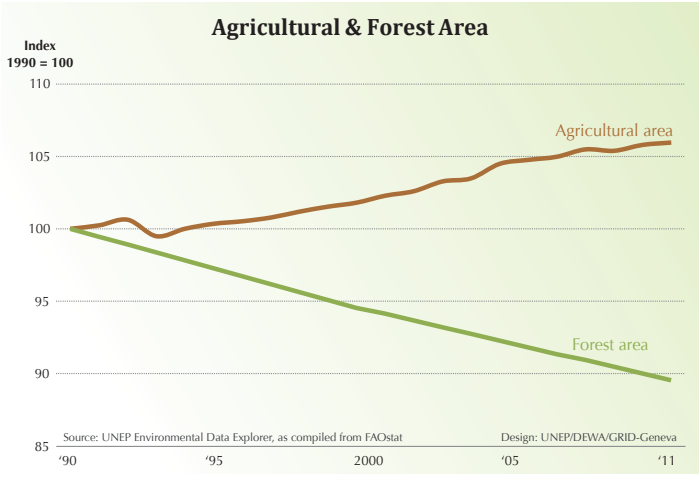
Not a single country in Africa experienced a net gain of forest area between 2005 and 2010.

Africa's rate of forest loss is the second highest in the world, only surpassed by South America's rate of change where overall forest extent is greater.

Some estimates conclude that globally deforestation contributes nearly 30% of greenhouse gas (GHG) emissions (CFR, 2009), which means that worldwide, emissions from deforestation rival emissions from the international transportation sector.



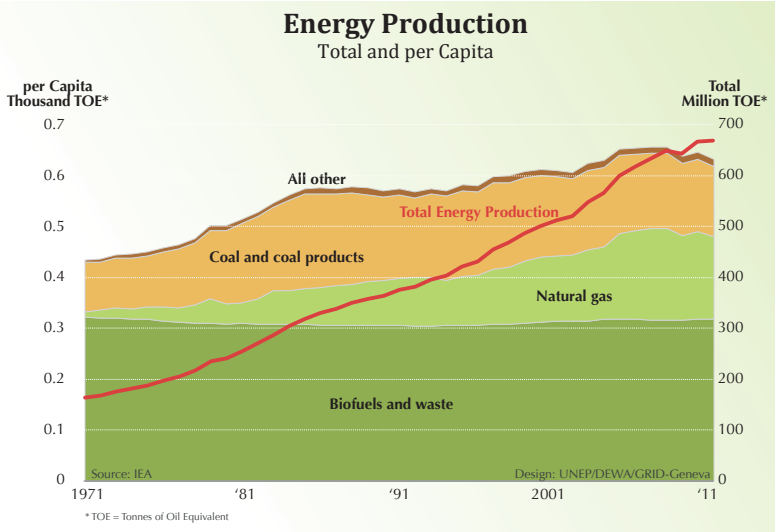


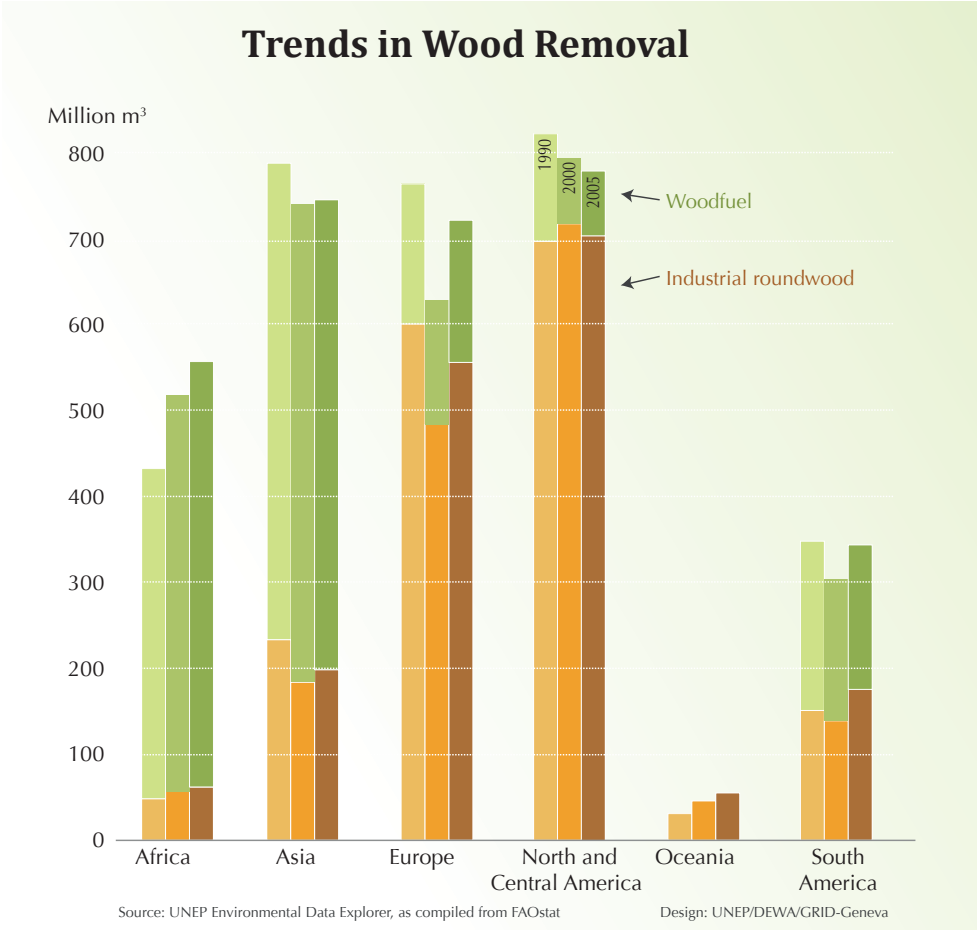


Energy

Africa has a great opportunity to capitalize on its available renewable energy potential. However, only about 5-8% of Africa's enormous hydropower potential has been harnessed (OECD/IEA, 2010). Geothermal energy potential stands at 9000MW, but in 2013 only approximately 52MW had been developed (IEA, 2010).

Currently, between 70-90% of Africa's needs for fuel are met by wood/biomass. However, this often contributes to greater forest loss (Adeola, 2009).



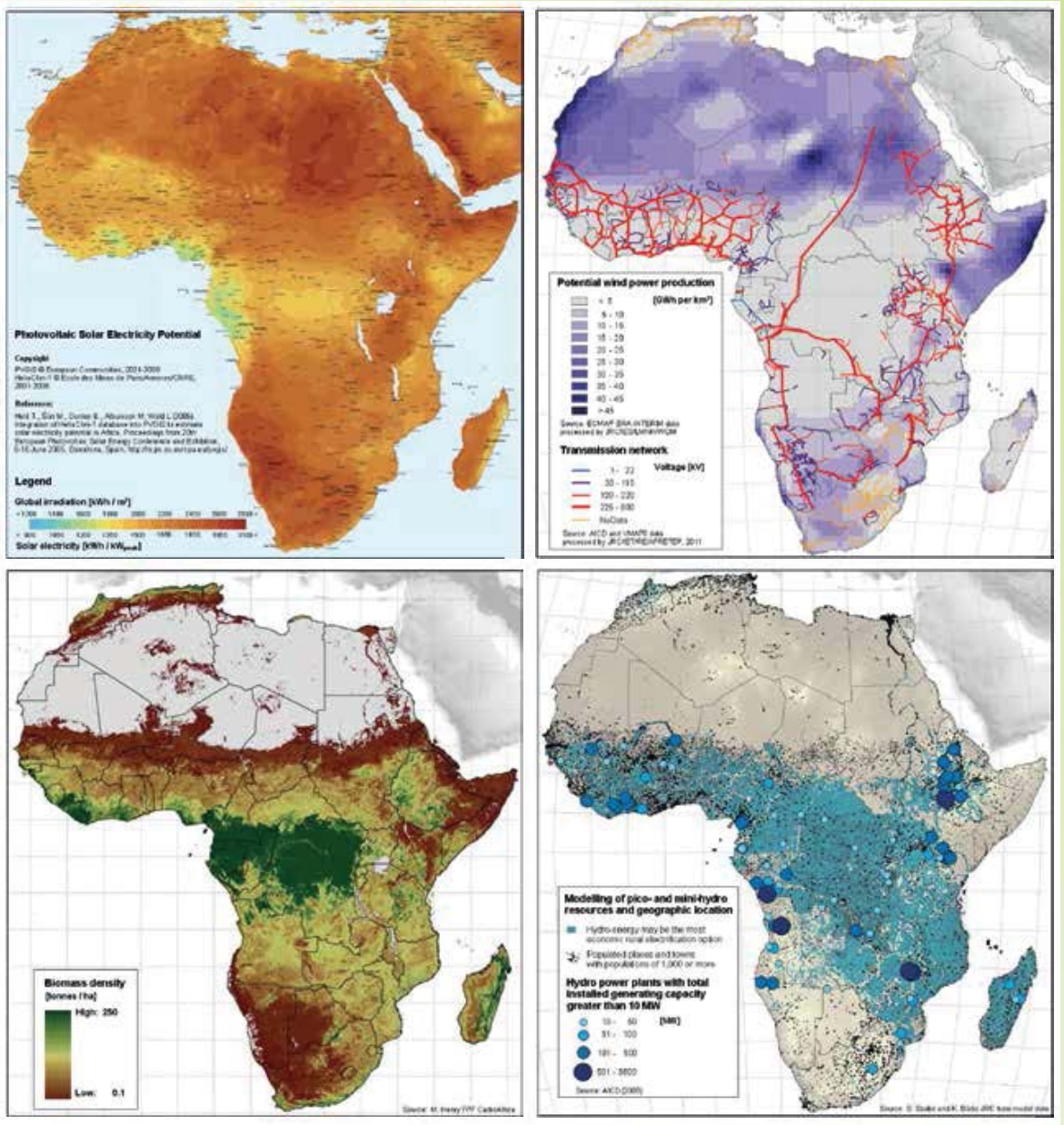


Renewable Potential

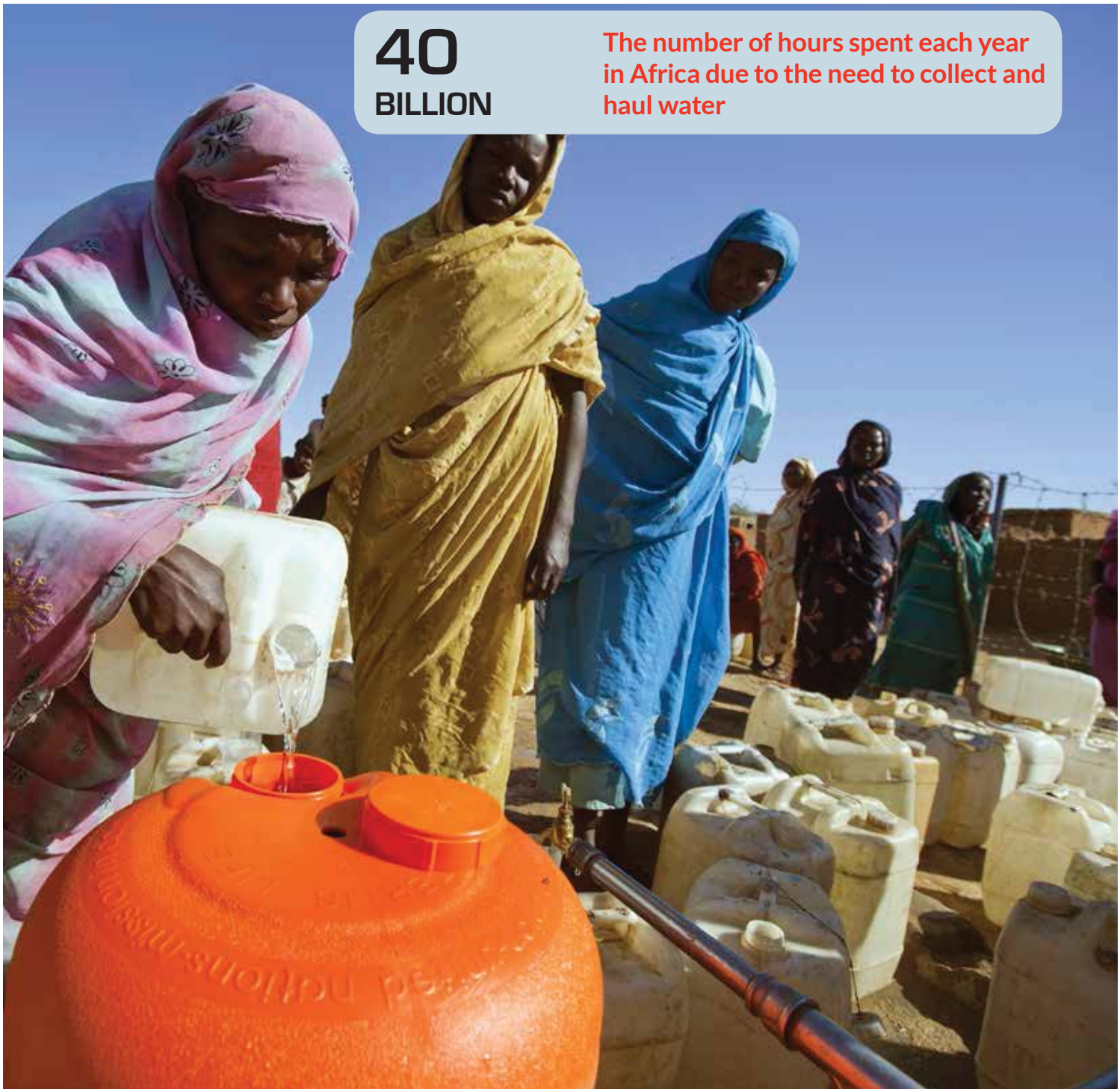
Harnessing renewable energy sources such as geothermal and hydropower would dramatically increase industrial development and improve services such as education and medical care, thus leading to substantial growth in Africa.

The maps below show the location and intensity of solar, wind, biomass and hydropower potential available on the African continent.

Renewable Energy Potential



Source: JRC 2011


40
BILLION
The number of hours spent each year in Africa due to the need to collect and haul water

Water

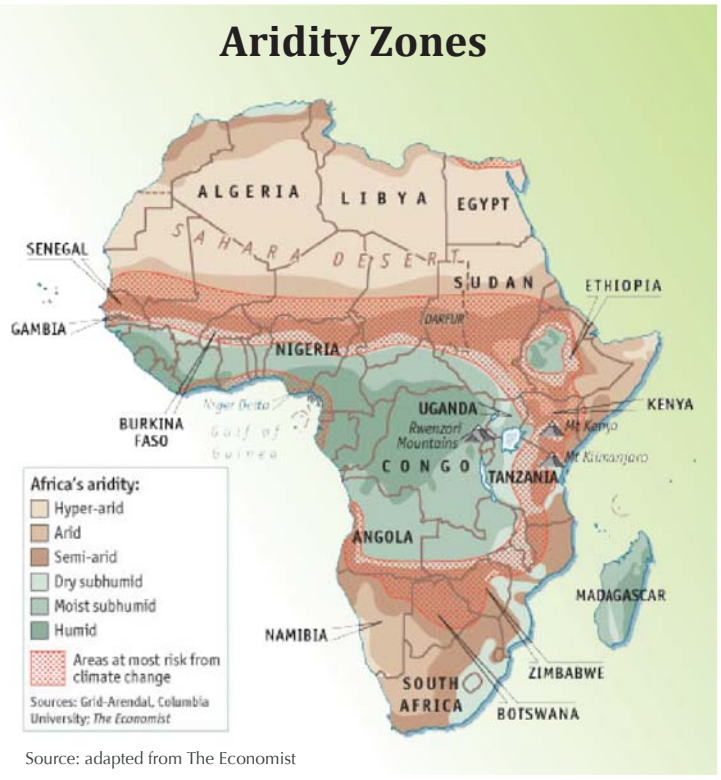
The majority of African states have made great progress towards improving access to drinking water. However, more extreme droughts, floods and sea-level rise are predicted to occur as the continent heats up.

"Declines of 20% in water availability are projected for many regions under a 2°C warming and of 50 percent for some regions under 4°C warming. Limiting warming to 2°C would reduce the global population exposed to declining water availability to 20%."- World Bank, 2013

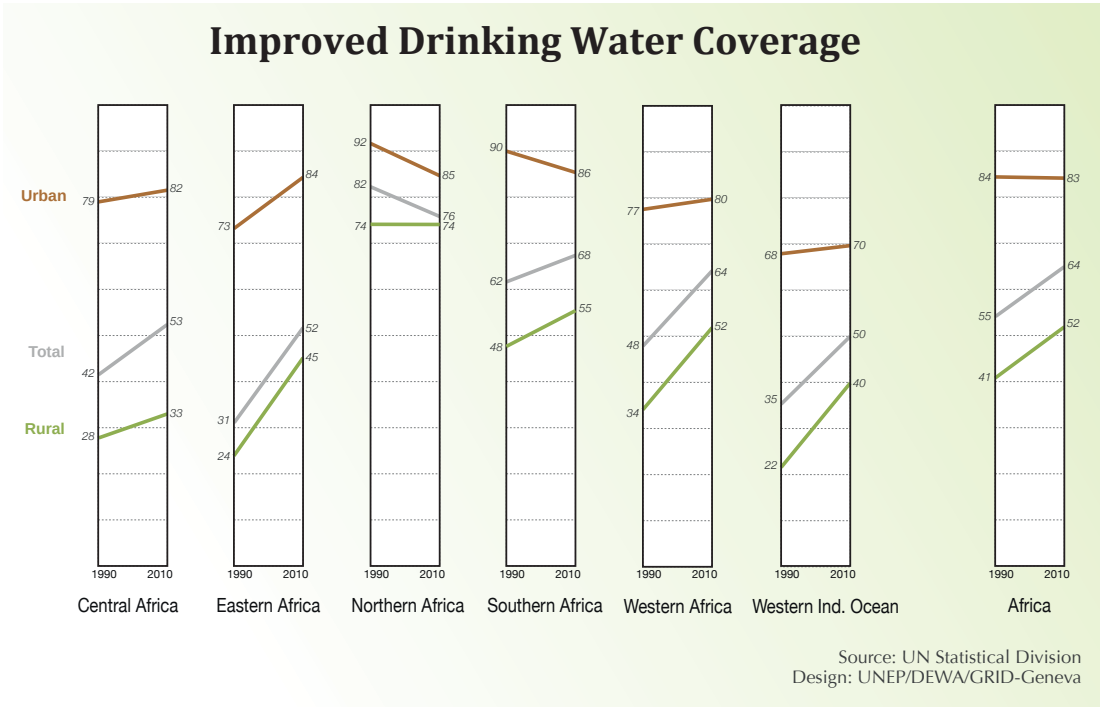
SYSTEM PATTERNS

As rainfall patterns change, water scarcity will increase in some regions as they become more arid, while torrential rains will cause more flooding in others.

East and Central Africa show an increase of total green and blue water[1] availability, while Southern Africa and most of West Africa are expected to experience reductions of up to 50 per cent.



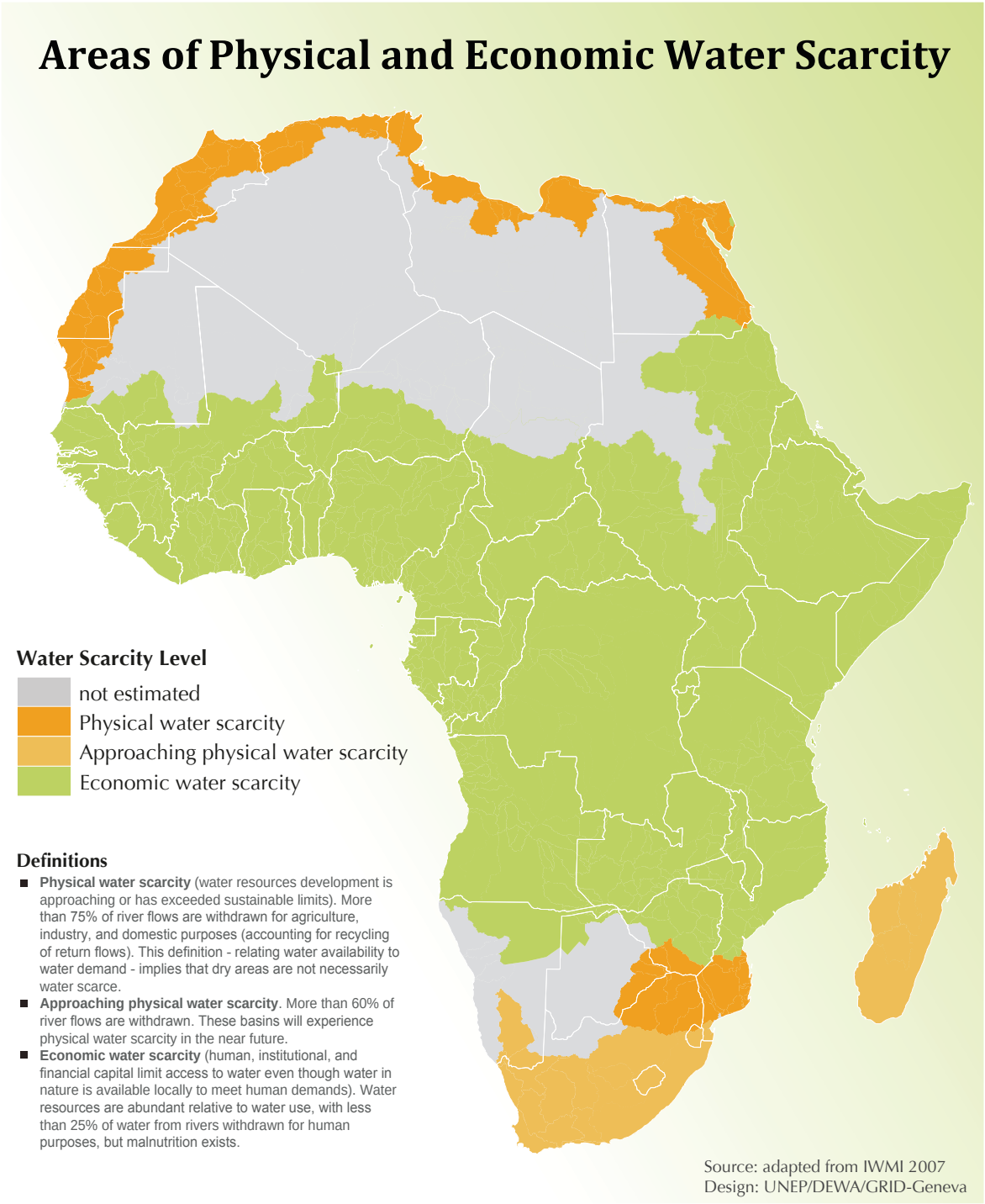
Source: adapted from The Economist



1 *Blue water refers to water in rivers, streams, lakes, reservoirs or aquifers that is available for irrigation, municipal, industrial and other uses. Green water refers to the precipitation that infiltrates the soil, which rainfed agriculture and natural ecosystems depend on.*

Many areas of Africa continue to face very high levels of economic and physical water scarcity (IWMI, 2007).

As a result, efforts to build resilience to changing rainfall patterns will become very important to poverty reduction efforts.



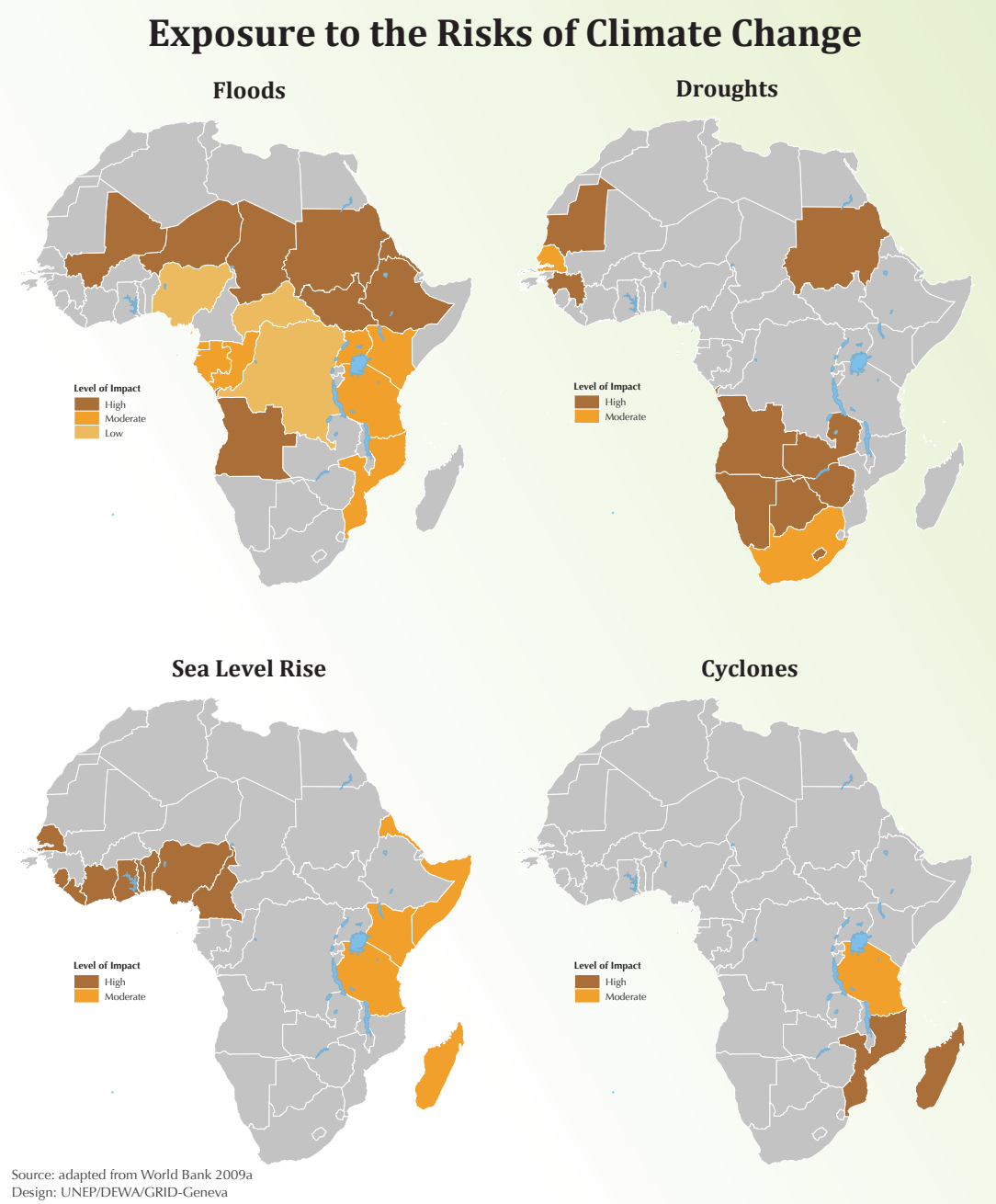
Sea level rise, drought, flooding

Case of Dar es Salaam Port

Sea level rise of 70cm by 2070 would cause serious damage to port infrastructure in Dar es Salaam, Tanzania, affecting assets of $10 billion, or more than 10% of the city's GDP (*Ibid*).

Sea levels are also due to rise, potentially affecting 9 million people (***Ibid***).

Africa will also face continued droughts (already heavily felt in the Sahel and the Horn of Africa) and experience severe flooding. Some countries such as Mozambique face extreme vulnerability to climate change and are likely to experience all three problems.



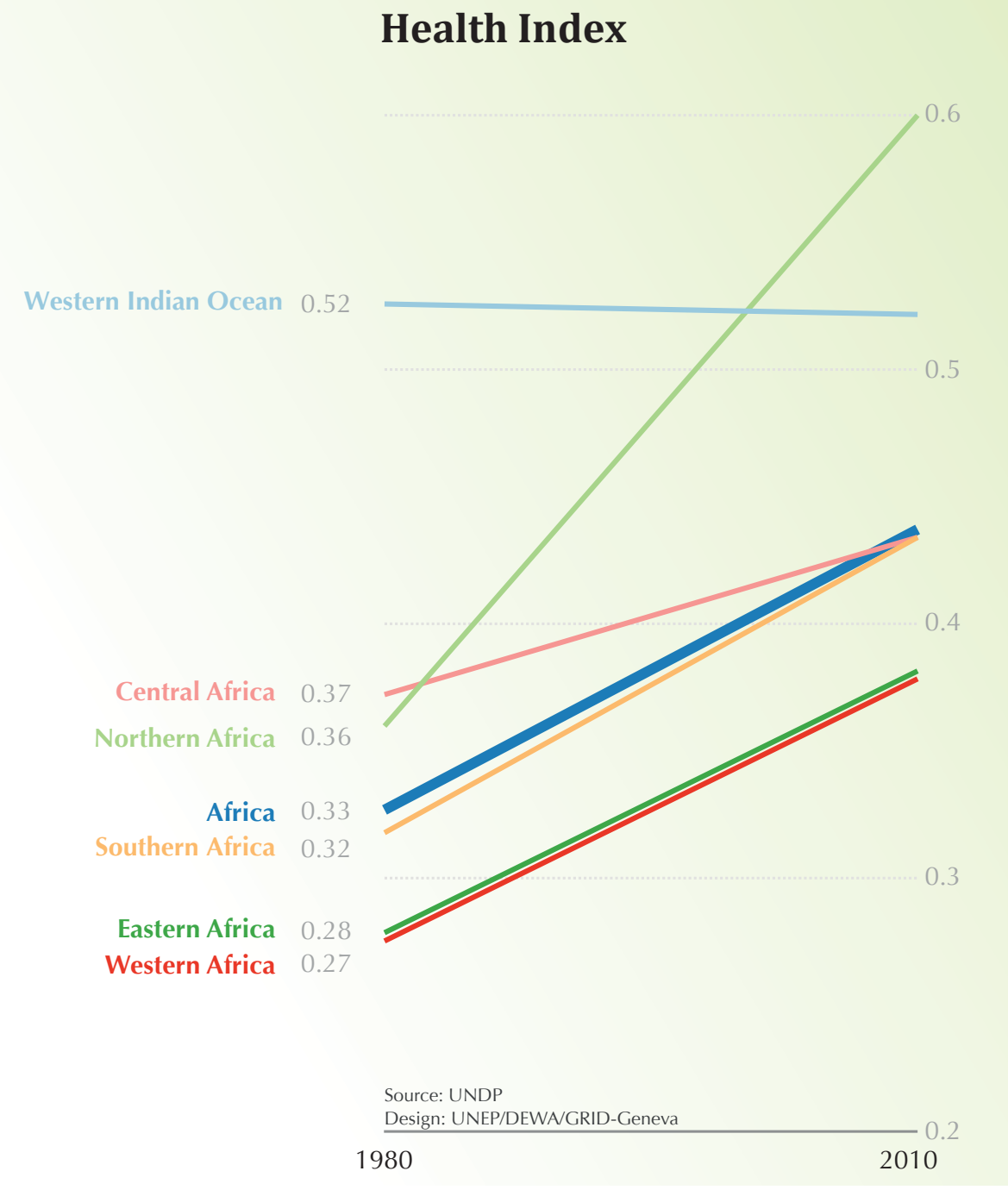
Source: adapted from World Bank 2009a
Design: UNEP/DEWA/GRID-Geneva

Health

Great progress has been made in improving human health in most African nations.

Yet the diseases that pose a threat in many parts of sub-Saharan Africa will continue to include vector- and water-borne diseases such as malaria, Rift Valley fever and cholera. The World Bank expects the risk from these diseases to rise as a result of climate change, as changes in temperature and precipitation patterns increase the extent of areas with conditions conducive to vectors and pathogens (World Bank, 2013).

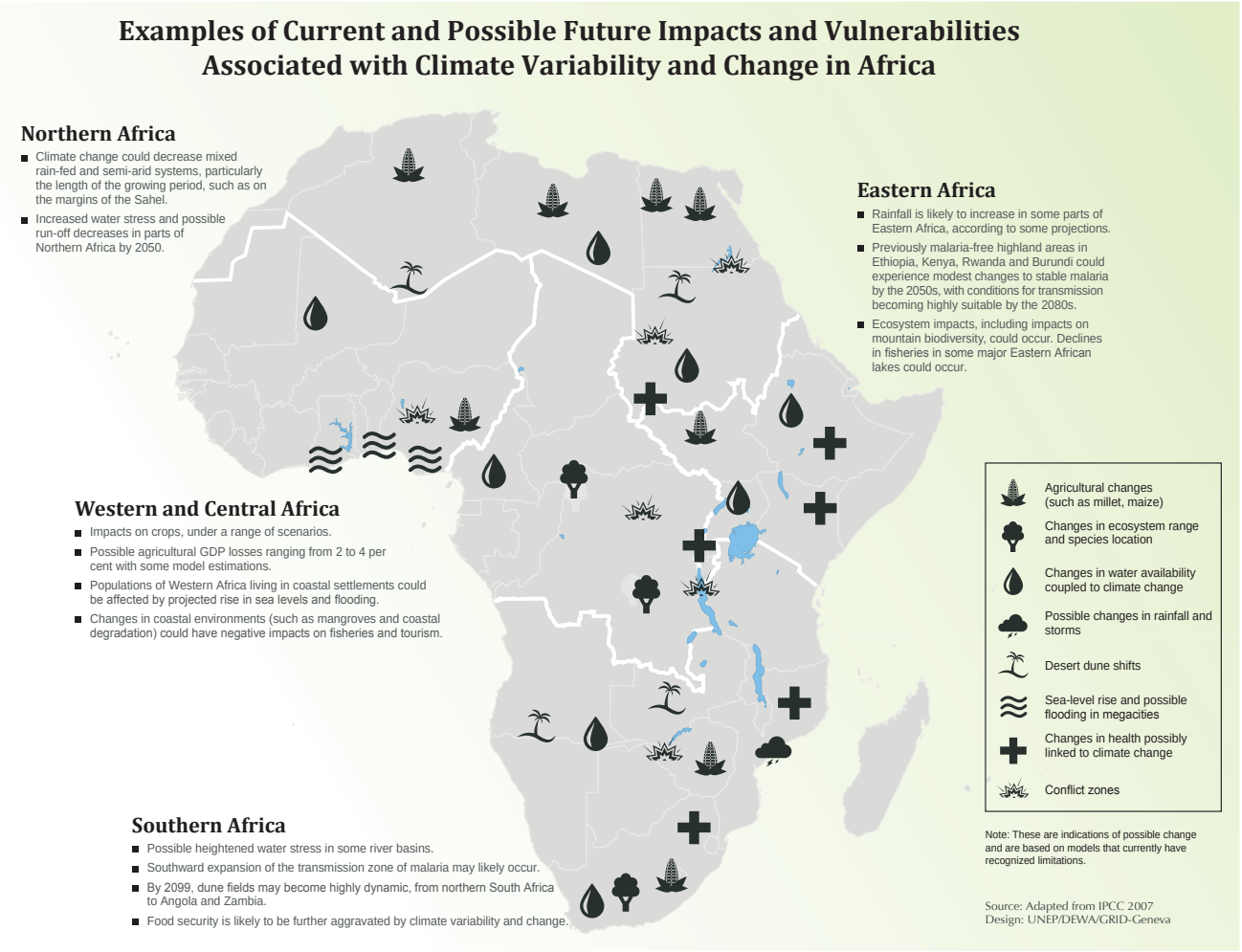
Other impacts expected to accompany climate change include increased mortality and morbidity due to such extreme events as flooding and more intense heat waves (***Ibid***).



Aggregated Climate Change Threats in Africa

Climate change threatens poverty reduction efforts from past achievements to current activities. It threatens all of us. And it won't wait. The time to act is now.

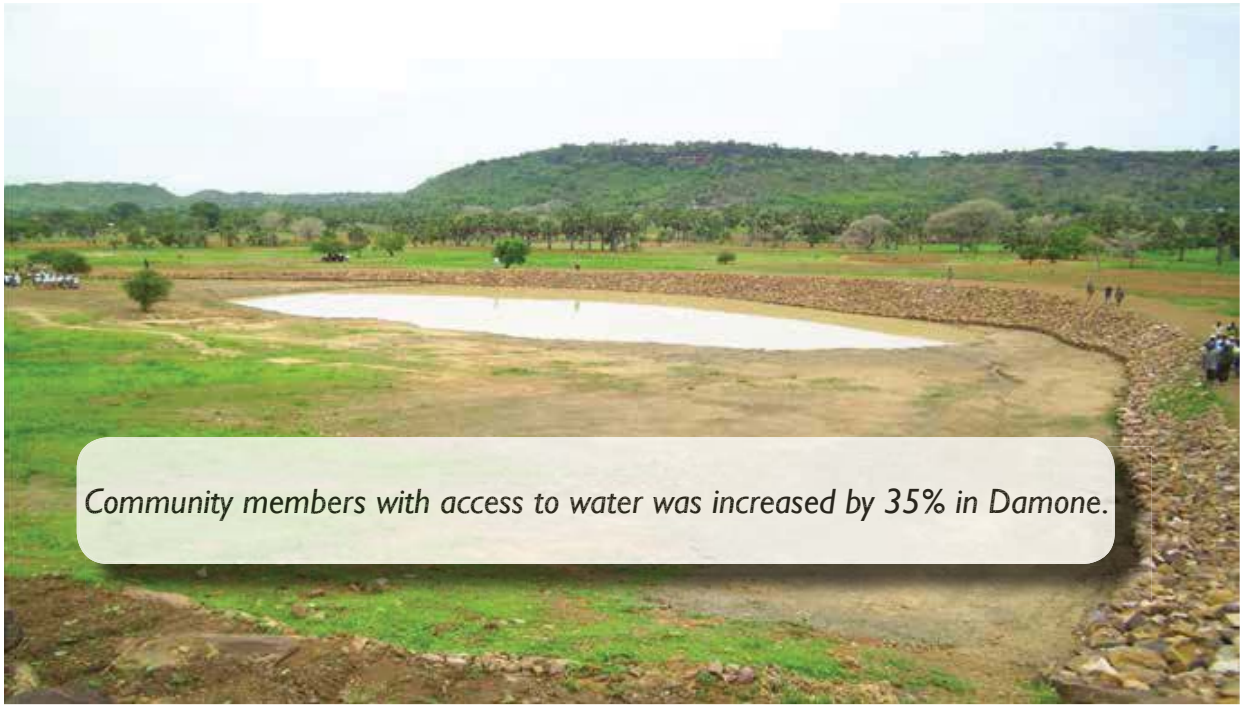
Progress has been made but much remains to be done in order to build healthy ecosystems. The second major section of this report profiles model communities which have successfully implemented Ecosystem-based Adaptation to improve their resilience to climate change.



Community Profiles: EbA in Action

Aquatic Ecosystems

TOGO



Rehabilitated dam at low season capacity.

THE CLIMATE CHANGE CONTEXT:

Togo is one of several countries whose northern region borders the Sahara Desert and is threatened by water shortages. The population in the north has for years used earth reservoirs to capture and store water for domestic use and for their livestock in times of drought. Many of the dams in these poor rural areas have fallen into disrepair.

With desert encroachment accelerated by climate change, the water reservoirs are no longer able to hold an adequate supply of water to meet the needs of the population and their livestock. This threatens the health and development of the entire community.

THE ADAPTATION SOLUTION:

In July 2009, the Climate Change and Development – Adapting by Reducing Vulnerability (CC DARE)[1] programme through its climate change adaptation work responded to a request from Togo's Department of Village Water. CC DARE supplied financial and technical support to help the authorities and communities of Savanne District in northern Togo improve their understanding of climate change adaptation. This was to involve the rehabilitation of selected water reservoirs, and then use the information and expertise gained to develop a proposal for the rehabilitation of all water reservoirs in Togo. Using about $100,000, two dams were rehabilitated. This involved excavation, enlargement, reinforcement and repair of dykes, pipe strengthening and development of channels to feed fishponds. As compared to initial levels before the action took place, overall storage capacity was increased by more than 40%. The project increased the storage capacity at Damone Reservoir from 9,000 to 24,000 cubic meters of water and from 50,000 to 70,000 cubic meters of water at Timbou Reservoir. The number of community members with access to water increased by 448% (from 1,460 to 8,000 persons) in Timbou, while access increased by 36% in Damone (from 1840 to 2500).

The project also yielded reliable economic data and concrete adaptation information that can be used by the government of Togo to complete economic projections, future interventions and projects elsewhere in the country.

Working with the Togo Government, local authorities, community leaders and the private sector, the project showed how small, flexible and targeted support could lead to significant change. This includes improving access to water for local communities, enhancing understanding of climate change and the planning and activities necessary to adapt to it.

1 *CC DARE was a UNEP/UNDP led climate change adaptation project for Africa*

Rehabilitied dyke.

Rehabilitied dyke.

THE BIG PICTURE, SUSTAINABILITY AND CROSS-CUTTING THEMES:

Ecosystem Rehabilitation and Protection

As a result of this rehabilitation project, local communities are increasingly aware of the role of plants and forests in conserving water and soil, and also of the need to manage landscapes around water points to reduce evaporation and encourage biodiversity renewal.

Capacity Building and Future Climate Change Resilience Efforts

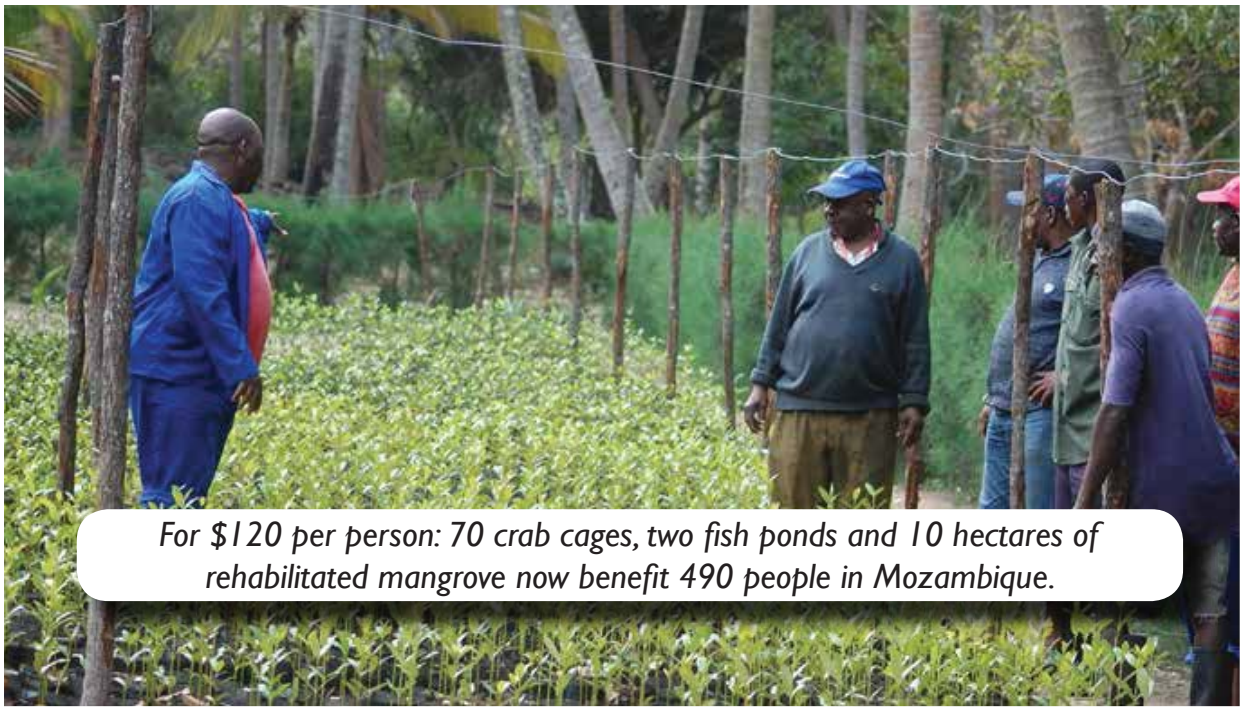
Togo's Ministry of Water Resources now has a tool to help manage water policy under a changing climate, supported by more informed communities and local authorities that understand the importance of small dam rehabilitation. The Ministry and other relevant bodies can also see the positive impact of such interventions on people and their livelihoods.

The data on costs extracted from the project will not only enable such schemes to be put into practice on small or large scales elsewhere in Togo and across Africa, but will also allow them to be implemented at a significantly reduced cost and with locally-sourced materials.

Implications for Upscaling across Africa

At a cost of about $2.80 per cubic meter of water, the Togo project was able to provide long-term community access to water for human use, agriculture and livestock. Broken down another way, water was provided to the communities at a cost of about $13.88 per person. With many rainwater-dependent regions facing changing rain patterns, such projects as this one for Togo show that small-scale projects can build resilience for local communities at a very low cost.

MOZAMBIQUE



For $120 per person: 70 crab cages, two fish ponds and 10 hectares of rehabilitated mangrove now benefit 490 people in Mozambique.

Mangrove Nursery

THE CLIMATE CHANGE CONTEXT:

The Xai-Xai District of Mozambique, located along the lower Limpopo where the river empties into the Indian Ocean, is subject to intense floods, regular seawater intrusion and prolonged droughts. These events threaten the three most vital economic activities of the communities in the area: rain-fed agriculture, open sea fishing and livestock raising.

Climate change has had a significantly negative impact on the area. Farming activities are affected by floods, droughts and increasingly erratic rainfall. Regeneration has been poor. Extensive patches of mangroves have been destroyed by the floods. The mangrove habitat which once provided a wide range of ecosystem services and was an important nursery ground for fish has been devastated. Farmers have also experienced a decrease in fish catch at sea due to loss of the mangroves. The destruction of the zone has had negative impacts on the health and well-being of the surrounding communities that depend on the mangroves for their livelihoods.

THE ADAPTATION SOLUTION:

With an overall budget of $60,000, and technical backstopping and financial support from UNEP, CC DARE and the Centro de Desenvolvimento Sustentável das Zonas Costeiras (Center for Sustainable Development of Coastal Zones) introduced an Ecosystem-based Adaptation (EbA) approach to rehabilitate the area's natural environment. The project sought to rebuild the resilience of the local ecosystem (and thereby improve the climate change resilience of the local population) through a combination of ecosystem repair and ecosystem services' diversification.

UNEP's activities sought to:

- Increase the area's resilience to climate change.
- Improve food security and the incomes of local communities.
- Ensure the recovery and sustainable future use of the mangrove ecosystem.

The project took a multi-disciplinary approach which included the:

- Introduction of fish farming.
- Introduction of crab farming.
- Reforestation of the mangroves.

These community-based and community-led interventions enhanced the adaptive capacity of the community. The project was highly successful as it resulted in the building of:

- Seventy crab cages (for raising and

Seedlings ready for planting.

Digging of fish pond.

harvesting of crab meat for sale or consumption) and two fish ponds.

- Mangrove restoration (10 hectares).

THE OUTCOMES

Mangroves now provide a nursery area for many important edible marine species such as fish, crabs and shrimp, and the reforestation of mangroves ensures the continued productivity of the local ecosystem. The introduction of crab farming has had the effect of reducing the pressure for deforestation of mangroves at the local level, while creating demand for mangrove nurseries and restoration activities that provide an alternative economic activity. Finally, fishery productivity and yields have increased, contributing to enhanced food security.

As a result of the project, 98 households (490 people) directly benefited. The beneficiaries include ten households which diversified into crab farming and twenty households in fish farming with sixty-eight households that contributed to mangrove reforestation, four of which are permanently involved in maintaining the mangrove nurseries. Additionally, the project will indirectly benefit many more people in the food production value chain including producers, retailers and consumers.

The implementation of the project has brought about a new mindset within the local community and other partners. Many people are interested in developing similar projects and are seeking funding. In fact, the College of Marine Science from Eduardo Mondlane University received funding from the Fishery Development Fund and, based on the success of this project, is developing fish and crab farming in nearby areas.

THE BIG PICTURE, SUSTAINABILITY AND CROSS-CUTTING THEMES:

The implementation of fish and crab farming has increased the climate change resilience of the local community.

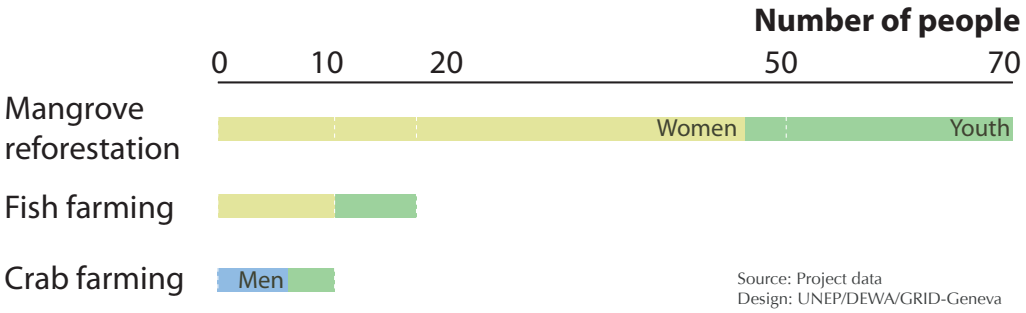
Food Security Contributions

- Fishermen, who previously relied solely on fishing in the sea for their livelihood, have embraced crab farming as an opportunity to overcome their dwindling fish catches.
- Families that once solely relied on fishing as a livelihood are now involved in fish and crab farming, as well as selling the outputs from these activities.
- The planted mangrove area has helped to diversify the livelihoods of the community and now ensures improved food security and climate change resilience.

Ecosystem Rehabilitation and Protection

- The mangrove is a nursery for many marine species, most of which are important for food such as fish, crabs and shrimps.
- Fish and crab farming has help reduce deforestation of mangroves at the local level.
- Reforestation of mangroves has boosted the functioning of this ecosystem, which in turn has improved fish production.

Employment Generation by Gender



Source: Project data
Design: UNEP/DEWA/GRID-Geneva

Diversification in use of resources can yield emerging opportunities for all sectors of society

Capacity Building and Future Climate Change Resilience Efforts

- The outcomes of this project have helped in contributing information and data upon which future projects will be built.
- The College of Marine Science is using these valuable data to further develop fish and shrimp farming in the same area.
- The local government has set up a District Development Fund to support the community in establishing other fish and crab farming projects.

Implications for Upscaling across Africa

Africa has 26,000 km of coastline; in many locations the coastline hosts mangroves. Of the over 30 countries in Africa with a coastline, FAO estimates show that about 25 have varying amounts of mangroves (FAO, 2013). For $120 per person, the Mozambique project succeeded in securing continuous and increased food security, livelihood diversification, climate change resilience and community-led innovations. Dependent upon similarities (given different ecosystems, communities and policies), the Mozambique project has large potential for transfer of its initiatives to its neighbors across Africa.

Xai Xai community works to rehabilitate the lost mangroves

Seychelles

About 400 teachers and the students of seven schools were educated in ecosystem management principles and schools saved $250 each on water-related expenses.

Students at Water Harvesting Awareness Campaign

THE CLIMATE CHANGE CONTEXT:

The Seychelles, a Small Island Developing State (SIDS) in the Indian Ocean east of the African continent, is particularly vulnerable to climate change impacts. Climate change effects and challenges include sea level rise, increases in sea surface temperatures and changes in rainfall patterns, with short periods of heavy rainfall during the rainy season and severe droughts during the dry season. These effects have adverse impacts on the health and functioning of ecosystems and consequently on the well-being of humans, as they affect the social and economic systems that are central to human existence.

This problem of water scarcity is further compounded by the ever-increasing demand for water, heightened by further economic and social development and population growth. To address this, the country invested heavily in the construction of reservoirs and desalination plants. This, however, only resulted in greater use of fossil fuels and related increased GHG emissions. Specific impacts occurred on school grounds, where increased school populations and a local educational campaign to add vegetation to schoolyards led to an increased demand for water, resulting in high water bills which in turn led to cuts in other areas of school budgets.

THE ADAPTATION SOLUTION:

In an effort to address this issue, and at the same time demonstrate adaptation to climate change in local schools, targeted adaptation actions were put in place. This involved the development of a timely rainwater-harvesting project.

The objectives were to harvest rainwater so as to:

- Meet the needs of selected schools, thereby reducing the cost of water bills.
- Educate schoolchildren on the impact of climate change on water resources and on methods used to adapt to climate change.
- Raise awareness among the general public on climate change impacts in the Seychelles and on rainwater harvesting as a means of adapting to water storage problems caused by climate change.
- To share the water harvesting experiences of the schools with other organizations.

Partnerships were built with the Water and Sewage Division of the Public Utility Cooperative to provide sensitization materials on water treatment and management. Training and capacity building workshops involved teaching and non-teaching staff from seven schools, which resulted in the training of numerous community members and over 400 teachers.

OUTCOMES

The project succeeded in increasing awareness and capacity, and reducing vulnerability. Successes included tangible economic savings, health benefits and most importantly, increased water security.

First and foremost, rainwater harvesting increased the availability of water in general. This has also had some specific effects, such as increased sanitation efforts in schools leading to various health benefits, including a reduction in the risks of waterborne-disease outbreaks among pupils and teachers.

Rainwater harvesting at the selected schools also resulted in an average savings of $250 monthly on water bills registered by the schools. These savings are now being invested into school improvements, the recruitment of new teachers and the purchasing much needed educational resources.

Additionally, the water harvested at the school is now being used for school gardens, clean-ups and toilets, as well as during the dry seasons when there are water restrictions in force. This project has contributed to MDG Goal 2 "Achieve Universal Primary Education," Goal 3 "Promote Gender Equality," Goal 7 "Ensure Environmental Sustainability" and furthered Goal 8 "Global Partnership for Development." In the participating schools, children had an opportunity to partake in a variety of climate change activities, which helped them better understand the relationship between climate change and water.

Water cisternes installed in local villages and schools.

This project will have long-lasting effects, as it worked to build upon the climate change knowledge of students, teachers, community members and policy-makers. This illustration of economic benefits of the adaptation action to the national healthcare system has inspired greater, national-level action evidenced by the introduction of a bill to the Seychelles' national assembly for the inclusion of rainwater harvesting systems in building code.

THE BIG PICTURE, SUSTAINABILITY AND CROSS-CUTTING THEMES:

Capacity Building and Future Climate Change Resilience Efforts

The success of this project has created opportunities for other climate change adaptation initiatives. For instance, within the Seychelles, the Department of Environment and the Public Utility Cooperative (PUC) are already using this project as a means to sensitize and educate the general public on climate change. In addition, the group "Sustainability for Seychelles (S4S)" is using the project to promote rainwater harvesting at the community level, while the project has also attracted collaboration from the Ministry of Education and the Department of Environment, along with several NGOs including the PUC, the Seychelles Islands Foundation (SIF), the Sea-level Rise Foundation and the Environment Trust Fund to implement similar projects in other schools.

It can be concluded that rainwater harvesting is a sustainable intervention to adapt to climate change, given its incorporation in the environmental management strategy of the Seychelles. The prospect of rainwater harvesting being integrated in the country's national development policy also shows adoption of a sustainable development principle by the Seychelles.

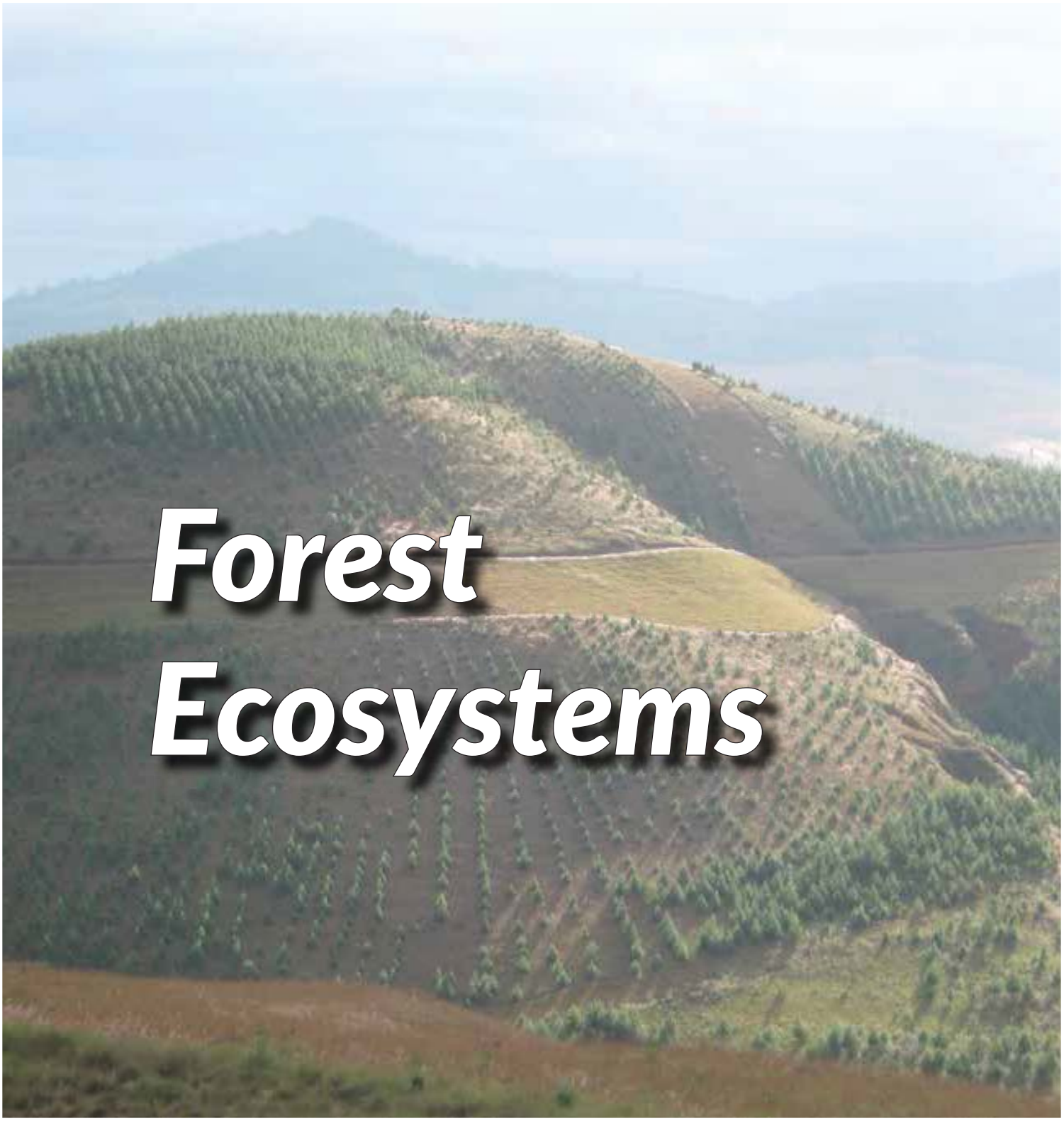
This is direct evidence that small but well-timed and targeted interventions can have significant impacts in moving policies forward and spurring development of larger efforts - an important factor in the transition from demonstration to policy actions.

Implications for Upscaling across Africa

Rainwater harvesting is a valuable tool in all areas. This technique will become especially important as rainfall patterns change. Areas becoming drier will need to store what water is available, while areas that are becoming wetter would be wise to tap into such a widely available and cost-effective resource to supplement the fresh water supply. At a cost of $125 per teacher, the project served to educate approximately 400 teachers and the students of those seven schools in ecosystem management principles. Several schools also reported saving as much as $250 on water-related expenses.

Garden supported by harvested rainwater.

Art work done by students to be used as models in community awareness campaign.



Forest Ecosystems

RWANDA

This $100,000 mapping project served as the impetus for the grander Rwandan Ministry of Agriculture investment of $25 million.

Terracing for watershed water flow management.

THE CLIMATE CHANGE CONTEXT:

Once home to large populations of chimpanzees and Golden Monkeys, the sloping terrain of Rwanda's Gishwati Forest has, in recent decades, suffered severe environmental degradation. The agricultural forest clearing activities spiked when the violence occurring in 1994 displaced many thousands of people and led to intense land clearing, as internal refugees were forced to settle on steeply sloping land in this densely populated country. The forest's degradation has also been exacerbated by devastating climate-related disasters. Landslides, floods and torrential rains have claimed lives, demolished human settlements and destroyed thousands of hectares of forest and farmland.

THE ADAPTATION SOLUTION:

The CC DARE programme provided Rwanda with funding to develop a Land Suitability and Land Use Plan. This guided the relocation of human settlements from high-risk zones, as well as the rehabilitation of vacated land, in order to reduce the vulnerability of local communities and ecosystems.

The project mapped and developed a comprehensive plan for suitable land use. Risk assessments showed that if further erosion of the Gishwati Forest was to be avoided, 43 percent of the terrain – around 2844 hectares – should be used for pasture, forest plantation and fruit trees. Of this land area, 1393 hectares should be fully preserved and invasive human activities forbidden. Manuals were developed to enable proper land use, guiding communities and authorities on carbon sequestration, high-value crops, soil resilience, sustainable farming systems, bridging periods of food insecurity and strategies to cope with climate variability.

The project:

- Enabled more than 2500 lead farmers to receive hands-on training on land husbandry.
- Established 432 ha of graded terraces, 73.72 km of waterways, 59.77 km of cut-off drains and a 105 ha drainage system.
- Employed about 4850 people paid via saving and credit cooperatives.
- Planted 110 km of live fence in Nyabihu and Rubavu using bamboo, acacia and Alnus ***acuminata*** trees.
- Planted 789 ha of forest.
- Enabled the cessation of farming activities which helped to encourage natural forest regeneration.

THE OUTCOMES

Working with the Rwandan Ministry of Environment, local government, districts and communities, and with $100,000 in project funding from the Danish Ministry of Foreign Affairs, UNEP provided timely and focused support for the planning that is vital for moving whole communities and rehabilitating land.

The relocation of communities to safer areas was implemented by local governments and supported by national budgetary allocations, demonstrating that appropriate partnerships and devolution of power can "fast track" the implementation of climate change adaptation, while keeping actions within national development programmes.

A conglomerate of NGOs, including the Nile Basin Discourse Forum and Media Houses of Rwanda, worked together to produce numerous materials on climate change, and train 45 representatives from Civil Society Organizations and 36 journalists from various media outlets. The Rwanda project successfully strengthened the local ecosystem and developed the capacity of the country to respond to the effects of climate change.

THE BIG PICTURE, SUSTAINABILITY AND CROSS-CUTTING THEMES:

Capacity Building and Future Climate Change Resilience Efforts

The CC DARE project showed that small, flexible and targeted funding could act as a catalyst for greater change. Seeing that the land use plan fit into the country's national development policies, the Rwandan Ministry of Agriculture requested $25 million from the Government of Rwanda for the resettlement of returnees displaced by the 1994 violence, and for the rehabilitation of land where the risk of landslides and flooding is greatest.

454 ha graded terraces

73 km waterways

105 ha drainage systems

60 km cut-off drains

The capacity building success of this project has been extensive. On a local scale, citizens, policy-makers and journalists that underwent CC DARE training are now more aware of adaptation techniques. There is great potential for the project to be replicated throughout Rwanda and elsewhere. Plans to share the knowledge and experience gained in the project have generated interest within other Central African countries to encourage the approach on a small or large scale beyond Rwanda's borders.

Women engaged in terrace management.

Ecosystem Rehabilitation and Protection

The updated Land Suitability and Land Use Map and Plan for Gishwati Forest has had a great impact, paving the way for innovative action on climate change adaptation in Africa's most densely populated country. Rehabilitation of the ecosystem will in turn enable Rwanda to play a larger role in global carbon trading through the establishment of new carbon sinks in Gishwati. The project also successfully influenced and educated local communities and governmental and other authorities on carbon sequestration, high-value crops, soil resilience, sustainable farming systems, how to bridge periods of food insecurity and strategies to cope with climate variability.

Implications for Upscaling across Africa

Given the various outputs of the Rwanda project, it is difficult to compute a "per person," "per hectare," or "per journalist trained" investment. However, as the $100,000 mapping project served as the impetus for the greater Rwandan Ministry of Agriculture investment of $25 million, the return on investment could be valued at 250%[1]

1 *1 ROI= ([25,000,000USD – 100,000US D])/100,000USD or ([Gain from investment – cost of investment] / cost of investment)*

TANZANIA

Innovative credit societies developed to provide financial credits to low-income people who used their woodlots as collateral.

THE CLIMATE CHANGE CONTEXT:

In the Makete District of Tanzania, forest, woodland and grassland resources are essential to the local economies, and are crucial for the protection of vital watersheds for the conservation of the environment for agriculture and livestock production. Widespread unsustainable land use, combined with other factors such as climate change, has produced serious ecological losses and limited farm productivity in Makete. These problems have also been aggravated by a lack of institutional, legislative and fiscal capacity for the effective management of natural resources and consequently for the stability of the Makete ecosystem. Using smallholder woodlot management practices as a strategy for climate change adaptation has created a new stream of income for local communities and revenues for the city, while enhancing resilience to climate vulnerability.

THE ADAPTATION SOLUTION:

In an effort to mitigate the risks that climate change poses to development efforts, Tanzanian authorities and local communities sustained through the CC DARE project with financial support from the Danish International Development Agency (DANIDA), improved smallholder livelihoods through the management of woodlots in the Makete District. Following an assessment of smallholder woodlot management practices and the marketing of timber, user groups were assisted in developing their own woodlot operational plans and harvesting rules, in setting rates and prices for products, and in determining how surplus income would be distributed or spent. This produced significant improvements in the conservation of woodlots in terms of area and density, and also helped enhance soil and water management.

THE BIG PICTURE, SUSTAINABILITY AND CROSS-CUTTING THEMES:

This improved knowledge has allowed for producers to increase their incomes, and for the Makete District government to achieve a 64 percent increase in council revenue

Bare and rehabilitated hillsides in Tanzania

for 2009/2010 following the collection of royalties from timber sales. The creation of new sources of income triggered the setting up of community savings and credit societies. This was a highly innovative advancement that provided financial credits to individuals with low incomes, who were able to use their woodlots as collateral. This has promoted inclusive growth and promoted savings and credit operations among members and loans to finance income-generating activities. In addition, the concrete evidence of these benefits has increased the national government's interest in expanding climate change adaptation measures that improve rural livelihoods and the economy as a whole.

Cross-cutting Issues: Gender and HIV/AIDS Considerations

The results also included the empowerment of disadvantaged women and girls who work in woodland management and the marketing of wood products with knowledge relating to species selection, land management and preparation, field planting and spacing, and marketing channels for wood products.

Implications for Upscaling across Africa

As seen in the previous section, major progress has been made in Africa in terms of forest management. However, management plans still cover a lower percentage of forestland in Africa than they do in any other part of the world except Oceania.

UGANDA

An investment of $13.26 per person per year generated significant gains in ecosystem protection, livelihood improvement, and the planting of over 31,000 trees in Uganda.

Ugandan farmer displays produce from buffer plant crop.

THE CLIMATE CHANGE CONTEXT:

In 2007, Uganda developed a national climate change adaptation plan with several components focused on Ecosystem-based Approaches to climate change. The key ecosystem management approaches included community tree growing and managing land degradation. These components were adopted owing largely to the fact that Uganda had lost up to 24% of its forest cover since the 1990s.

Lack of access rights to forest resources can result in conflicts of interest between people and protected areas, in some cases leading first to encroachment and ultimately to deforestation. About five million people live around protected areas, national parks and forest or wildlife reserves or other managed areas. Itwara Central Forest Reserve in the Albertine Rift of Uganda was a site incorporated into the national network. It is a fragile area in terms of human-ecosystem interactions. In Itwara, poor management of natural resources directly impacts the agricultural industry – the one in which most women work.

THE ADAPTATION SOLUTION:

From 2009 to 2013, a $4.5 million project targeted poor households depending on natural resources, with the aim of stimulating improved local ecosystem governance and better management of natural resources. Over 31,000 tree seedlings have been planted to enrich the ecosystem and boost household livelihoods in the short and medium term. The project aimed to address climate change adaptation by planting of indigenous tree species, particularly *prunus Africana*, in addition to the existing eucalyptus.

The project aimed to ensure food security by diversifying crops produced, improving crop yields and by planting buffer crops to address crop raiding by wild animals. Specifically, chili (*capsium annum)* production was promoted, of which about 0.5 tonnes marketed during the off-peak dry season earns households up to $60 per week.

The project sought to address forest management issues by promoting community-based law enforcement initiatives that prevent illegal use of forest resources, promoting tree planting/ reforestation to facilitate community investment in forestry for household income and provision of forestry services, and facilitating strategic linkages and networks of the groups with service providers in agriculture. This was accomplished by developing resource management plans linking the policy and practice, and building strategic partnerships (between communities, Community-Based Organizations and Government).

The Uganda project trained and supplied over 200 farmers enabling better agricultural practices.

Promoting a balance between forest resource utilization, conservation and promotion of initiatives that contribute to food security was fundamental to this project. Uganda also generated long-term benefits in farmer empowerment, ecosystem management, food security and climate change resilience. The project is estimated to have benefited about 75,000 persons directly and over 1 million indirectly.

Borehole for rainwater harvesting in Uganda

Food Security Contributions

Greater food security was achieved as increases were realized in crop production (for instance, maize) as a result of reduced crop raiding. In addition, the surplus returns from the diversification into chili production can now be used to buy food items for households. Three tons of chili marketed in the peak season earns poor households about $240 per week, significantly contributing to increased ability to purchase food for the household.

Ecosystem Rehabilitation and Protection

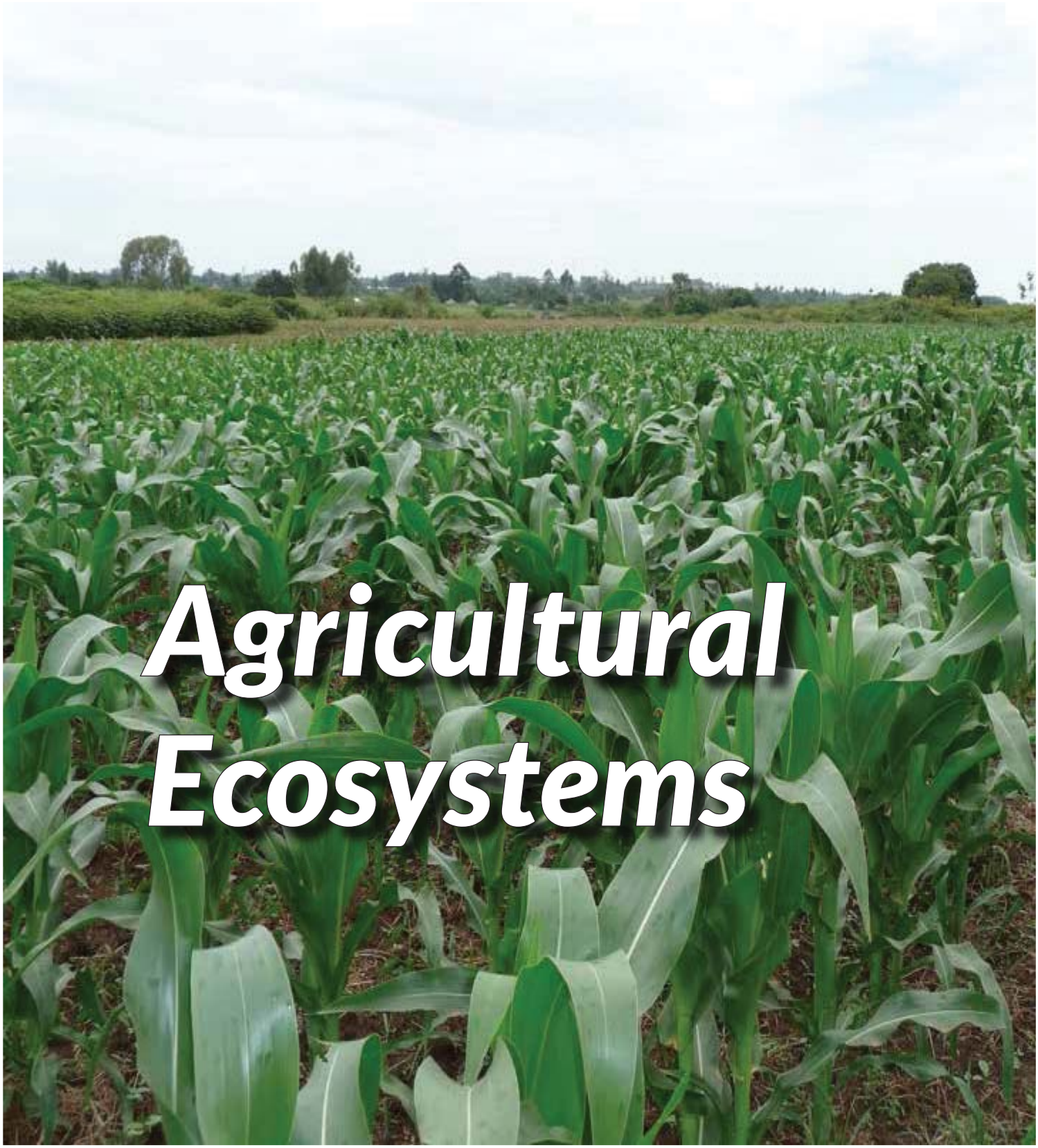
The Rights, Equity and Protected Areas project has reached about 64,500 persons. Farmers are focusing on implementing management plans through lobbying other actors, including government, to secure additional services (for instance from National Agriculture Advisory Services), since they now have a strong voice. Building the capacity of the community's structures so that they can become champions of forest governance, and addressing climate challenges through engagement with leaders, are also significant outcomes.

Capacity Building and Future Climate Change Resilience Efforts

The project contributed to long-term climate change adaptation and resilience efforts by establishing a forest governance forum and management structure. The forest governance forum is an avenue for political leaders and technical staff to share information and build cooperation. The embedded management structure will be used to develop and implement future activities.

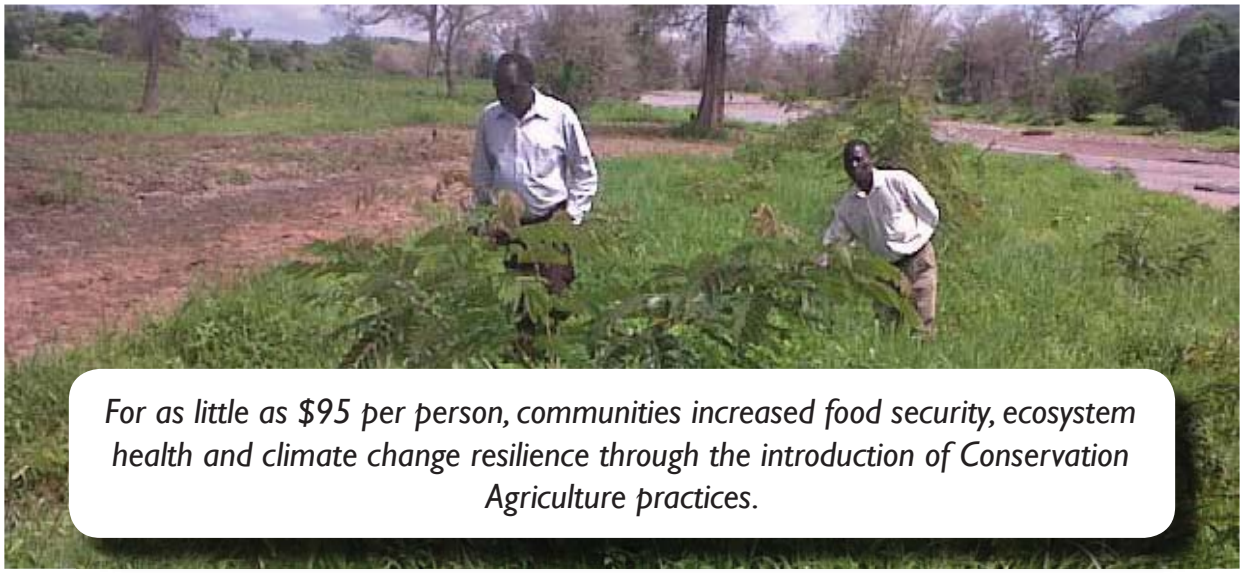
Implications for Upscaling across Africa

The Uganda project demonstrates that local engagement can yield vast improvements. Over the 4.5-year project, an investment of $13.26 per person per year generated significant gains in ecosystem protection and livelihood improvement, while the planting of about 31,000 tree seedlings was achieved. Upscaling to other forest-adjacent communities throughout Africa offers major promise.



Agricultural Ecosystems

MALAWI



For as little as $95 per person, communities increased food security, ecosystem health and climate change resilience through the introduction of Conservation Agriculture practices.

Crops being inspected in Malawi

THE CLIMATE CHANGE CONTEXT:

In Blantyre North, Malawi, where rainfall is characterized by short periods of erosive rain of up to 400-700mm/yr, agricultural productivity is well below its potential given the available biophysical resources and technology. This is particularly evident among the majority of smallholder famers. Malawi has employed agriculture based largely on small-scale annual maize-based cropping practices that has promoted mono-cropping and ridge tillage for a long period. This form of agriculture has continued to play a central role in defining livelihoods and economic development of the country, but has had varying levels of success.

A simple example of sub-par results is in terms of maize yields. Maize remains the staple crop, accounting for 50-90% of calorific intake. It is cultivated on over 70% of Malawi's arable land, but a wide gap remains between actual yields and experimental farm yields. For example, while the potential yields for hybrid maize range from 5 to 8 tons per hectare, the average actual yields range from 1.5 to 2.5 tons. Routine annual tillage of the soil with associated removal or burning of plant residues contributes to the deterioration of the physical quality of the soil. This also includes a strong potential to increase the impacts of climate change phenomena such as droughts, as the soil becomes less fertile and thus less able to allow for the infiltration of rain or irrigation water.

THE ADAPTATION SOLUTION:

The project responded to the need to promote policies, approaches and technologies that will improve the care of soil and rainwater resources, eliminate unsuitable land use practices and enhance stability in crop production. The project educated community members in regard to concepts of Conservation Agriculture to accomplish this goal. Conservation Agriculture entails the application of wise soil and water management practices that will improve and safeguard the quality of land and rainwater resources, so that they continue to meet the needs of agriculture, society and nature.

The three main principles of Conservation Agriculture are:

- Maintaining soil cover with plant residues.
- Reducing mechanical soil disturbance (tillage).
- The use of rotation and cover crops.

The project was implemented by the Traditional Authority (Chief) Lundu, the Ministry of Agriculture and Food Security and the Department of Forestry in the Ministry of Natural Resources, Energy and Environment. Local communities were engaged through groups such as Village Natural Resource Management Committees, and lead and vulnerable farmers were identified.

This effort focused on households classified as vulnerable. Planning was based on local conditions and farmers' experience with

Farmers practicing rainwater catchment in Malawi.

commercial standard applications of practices. Participants received seed and fertilizer relief or subsidy investments.

THE OUTCOMES

The project succeeded in raising awareness of Conservation Agriculture practices throughout Malawi and communicating Conservation Agriculture principles to local farmers.

Conservation Agriculture principles were communicated to 240 families farming on 0.1 ha and 283 families farming on 0.2 ha. In addition, 200 cook stoves were supplied, 52 knapsack sprayers were distributed to vegetable and cotton farmers, and various levels of media staff were trained in food security, agricultural and land conservation communications.

THE BIG PICTURE, SUSTAINABILITY AND CROSS-CUTTING THEMES:

Food Security Contributions

Conservation Agriculture offers win-win combination of being a soil and water conservation technology that can also increase productivity in the majority of cases, as was the case in Blantyre North. Higher yields demonstrated under Conservation Agriculture by various partners in Malawi are the result of an increase in soil quality, especially in topsoil quality. Additionally, increased production results are seen as a major driving factor for farmers to implement conservation agriculture, and thus these practices go beyond expensive efforts that fail to address food security issues.

Ecosystem Rehabilitation and Protection

By all indicators, farmers are expected to continue practicing Conservation Agriculture long after withdrawal of project support. In particular, the project focused on building the technical capacity for the transition period from an intensively cultivated system, whose timescale was dictated by the onset of the rains, to the forward planning that Conservation Agriculture demands. With less time spent on land preparation and greater predictability, farmers were able to take on additional hectares and divert labor and resources to diversify crops and other enterprises. The diversification of crops often inadvertently boosts the health of the ecosystem by depositing otherwise unavailable nutrients, while the produce itself provides greater nutritional diversity for the local communities, thus contributing to more robust food security. Both of these advances would not be possible without the greater efficiency and ecosystem benefits provided by Conservation Agriculture techniques.

Capacity Building and Future Climate Change Resilience Efforts

As climate change continues to alter rainfall patterns, planting seasons, soil moisture consumption and soil nutrient retention, crop yields will be affected. By introducing Conservation Agricultural principles, the Malawi project has increased resilience to the negative impacts of climate change while boosting food production. Increased resilience and greater availability of food has enhanced the quality of life and socioeconomic status of the Blantyre North communities. In fact, in follow-up studies, many farmers cited a better quality of life as a major advantage of Conservation Agriculture (Utila, 2013).

Implications for Upscaling across Africa

Conservation Agriculture has the potential for upscaling wherever agriculture exists, although model specifics may vary by crop type and ecosystem conditions. For as little as $95 per person, communities increased food security, ecosystem health and climate change resilience through introduction and training in conservation practices. At the same time, 200 families were supplied with cook stoves which will reduce energy costs and improve health.

ZAMBIA

A total of 1500 farmers representing 16% of the total number of direct beneficiaries were trained in Sustainable Organic Agriculture (SOA) principles and practices.

Zambian farmer displays produce gains.

THE CLIMATE CHANGE CONTEXT:

limate change effects have become very prominent in Zambia. The country has experienced an average decline in rainfall of about 58 mm, a general tendency for a late onset of the rainy season and early withdrawal of the rains since the 1980s (Kalala, 2013), along with a mean annual temperature increase of about 1.3°C since 1960. In addition, Zambia has experienced an increase in frequency, magnitude and intensity of floods and droughts over the last two decades (Kalala, 2013).

Climate change-related difficulties are felt the most by rural, agriculturally-dependent communities. Over 80% of Zambia's labor force is dependent on agricultural production. Of these persons, 79% are small-scale farmers (SSFs), 20% are emergent farmers and only 1% are commercial farmers. Most SSFs are found in rural areas where there is widespread dependence on rain-fed subsistence agriculture, severe poverty and chronic food insecurity. As a result, climate change resilience projects must not only enhance ecosystem health in relation to climate change effects, but also ensure that land productivity is at least maintained and potentially enhanced.

THE ADAPTATION SOLUTION:

The project worked to promote Sustainable Organic Agriculture (SOA) techniques among the farmers. The principles and practices promoted were grouped into three broad categories:

- Soil and water conservation
- Soil fertility improvement and management
- Natural pest and disease management

A total of nearly 1500 farmers, representing 16% of the total number of direct beneficiaries, were trained in SOA principles and practices at Kasisi Agricultural Training Centre (KATC) at the beginning of the programme. A number of extension staff from member organizations also received similar training. Follow-up visits were made to farmers trained, to determine if what they had learned was actually being practiced on their small farms.

THE BIG PICTURE, SUSTAINABILITY AND CROSS-CUTTING THEMES:

The project had a total number of 9,498 beneficiaries (direct and indirect) spread across five districts. Follow-up visits concluded that the most commonly adopted techniques/practices included:

- Minimum tillage (mostly basins)
- Composting and application of manure
- No Burning
- Non-usage of inorganic fertilizer
- Crop rotation and diversification

Intercropping: the practice of growing two or more complementary crops within the same space.

It was noted that among those deemed as not having adopted SOA, most were in fact practicing at least one or two techniques associated with SOA. When it comes to agricultural ecosystems, SOA practices and climate change adaptation strategies are mutually supportive. After the project had been implemented, the average area of land cultivated using SOA practices increased from 0.5 ha to 1.3 ha, and there was an increase in the proportion of land under cultivation using SOA techniques from the baseline value of 8.4% to 13.1%. The majority of farmers had allocated a portion of their land to SOA and were otherwise practicing SOA techniques alongside more conventional farming techinques.

Other strong indicators of resilience and adaptability to climate change effects were increased crop diversification and the cultivation of drought-resistance crops/varieties. Fifty-one per cent (51%) of the respondents were found to be growing drought-tolerant varieties of one or more of the following crops: sorghum, millet, local maize, cassava and cowpeas. This reflects an overall increase from the baseline value of 40.5%. There was an increase in the number of households that reported increased yields for three consecutive seasons through drought-resistant crops from 0% to 60%. The number of respondents practicing maize mono-cropping was reduced from 78% to 6%. These figures suggest that the project was highly successful in promoting crop diversification.

Food Security Contributions

Farmers reported significantly higher yields for maize from SOA, with an average output of 2,408 kg/ha; the average maize output from conventional agriculture was 1,175 kg/ha. There was evidence of increased yields even among those who were practicing just one or two SOA techniques. The number of farmers who reported an increase in production as a result of using SOA practices increased from 2.3% to 75%. Food and nutritional security were assessed in terms of the number of months in a year that households had staple food from their own production, and in terms of how diverse the household diets had become. A general increase in household food security, with staple crops lasting up to 9.5 months of the year compared to 6.5 months previously was indicated. However, there were also some significant regional differences.

Additionally, there was an increase in the number of participating households with one or more surplus farm products for sale, from 25.9% to 69%. Sixty-one per cent (61%) of the households reported that sales of surplus farm products were contributing 50% or more of their income. This was an increase from the original figure of 18.9%.

Ecosystem Rehabilitation and Protection

The project emphasized and created awareness of the need to rely on locally-available resources, as opposed to external inputs. The engagement of government extension staff, combined with the sensitization of traditional leaders and policy-makers, made it possible for the programme to have a country-wide effect, contributing to the rehabilitation of greater portions of land in Zambia.

Cross-cutting Issues: Gender and HIV/AIDS Considerations

Cross-cutting issues such as gender issues, HIV/AIDS and climate change were taken into account, and the ratios of persons present at the training sessions reflected gender and HIV/AIDS considerations.

Implications for Upscaling across Africa

There is very high potential for the replication and upscaling of the initiative in Zambia. The fact that SOA builds on indigenous knowledge, rather than introducing practices that are totally new to an area, makes it an easily-adaptable and sustainable alternative to complex, technical or mechanized techniques. An investment of $207 per person significantly increased crop yields and the amount of data that will be available as evidence for future efforts. As a result of the positive impacts, a follow-up programme ("Kulima") is currently underway and being implemented in Zambia, Burundi and Malawi.

Concluding Remarks

The adaptation actions captured in this booklet demonstrate that integrating adaptation into national development policies can strengthen and enhance the resilience of countries and communities against the impacts of climate change through targeted activities, while also contributing to the realization of the Millennium Development Goals (MDGs). The adaptation examples have provided countries in sub-Saharan Africa with concrete climate change adaptation actions that will continue to sustainably provide them with resilient livelihoods under a changing climate. The merits of the adaptation approach are evident. The engagement of local communities, use of appropriate local materials and keeping the implementation process simple make adaptation actions more efficient, effective, affordable, equitable and environmentally sustainable.

In addition, the adaptation actions conducted by countries have proven that concrete actions have potential to offer evidence-based information for institutional and regional policy processes. Their successes also provide incentive for action and build confidence through a "learning-by-doing" approach. These adaptation actions also provide economic incentives for public or private sector investment by showcasing the contribution to human welfare, poverty alleviation, job creation (specifically "Green Economy" jobs) and strengthened ecosystems, which are pathways towards achieving the proposed SDGs. Through this approach, national strategies have greatly benefited from the identification of constraining barriers and by the development of targeted actions that swiftly and precisely remove those barriers. This has helped pave the way for wider actions that can stimulate, catalyze and amplify positive results over a larger scale and more rapidly, saving money and reducing delivery time. The adaptation actions described in this booklet demonstrate that it is possible to achieve consolidated solutions that simultaneously serve local communities and national priorities for adaptation to climate change.

Grace Boit-a community leader from Kipilat village who works on a voluntary basis to conserve the Mau Forest Complex. Photo: Riccardo Gangale.

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With the African population expected to increase to 2 billion by 2050, and nearly 65% of African livelihoods directly linked to agriculture-dominated landscapes, it is critical to provide targeted solutions that stimulate action, build resilience and provide emerging opportunities.

This publication reviews the current context and future implications of Climate Change impacts in Africa. It highlights the impact these changes have had and will have on the people of Africa. It then reviews solutions for responding to the challenges posed by climate change. Solutions include sustainable approaches to enhancing environmental/ecosystem resilience to Climate Change such as buffer strips, on-site water conservation, use of native species, change in cropping systems, landscape-scale management, protection of water resources, use of natural infrastructure and the incorporation of local knowledge into agro-ecological production systems.

This publication provides a pictorial and easy-to-reference summary for policy-makers and the public alike.

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