# IWMI in Africa



A water-secure world



# Why water management matters

I mproved access to safe water can make all the difference between an economy that falters and one that prospers, between a farm community that struggles and one that thrives, between a bright future for youth and one of deprivation, between an ecosystem in decline and one on the mend. Nowhere does water management have more untapped potential to make such a difference than in Africa.

In recent years, many countries of the region have embarked on ambitious programs to mobilize the finances and develop the infrastructure needed to expand water use for irrigation, energy production and other purposes. Conducting research for development, the International Water Management Institute (IWMI) works across the continent to ensure that communities and whole countries get the chance to see what a difference it makes when such initiatives are well managed, leading to water security for all. We pursue this aim through three strategic programs:

- Building Resilience
- Sustainable Growth
- Rural-Urban Linkages

Collaborating with partners from high levels of government to remote rural areas, our researchers help find solutions, create knowledge, strengthen capacities, shape policies and inform investments. Our efforts help release the potential of improved water and land management for addressing key development challenges within the framework of the United Nations Sustainable Development Goals (SDGs). To help chart progress, we contribute to the definition of indicators for the water-related targets of the SDGs.

Central to the success of national and local water initiatives is knowing where and how to intervene for maximum shared benefits. Supplying answers to these questions is what IWMI does best.



Connecting pipes for irrigation of vegetable crops in Ghana's Northern Region.

#### A vast but underutilized resource



### **BUILDING RESILIENCE AGAINST WATER-RELATED HAZARDS**

#### Small is beautiful

Africa's smallholder farmers urgently need water solutions to build resilience against drought and floods. These hazards, made worse by climate change, take a heavy toll on agricultural production, discouraging investments needed to achieve sustainable intensification. In response, IWMI is working on several fronts.

First and foremost, we are testing a wide array of water management options with smallholders, and working with partners across the continent to match these with needs and opportunities. Building on experience in South Asia, we have also begun developing a drought monitoring system for southern Africa. In addition, we offer capacity building in support of national strategies for integrated management of disaster risks.

A key requirement for building more resilience into smallholder farming is to expand both small- and large-scale irrigation, as called for by governments and regional bodies. To meet ambitious targets, they need reliable information about the current extent of irrigation. IWMI researchers are working with national partners to map the irrigated area and pinpoint untapped irrigation potential through a combination of advanced remote sensing with local surveys.

Groundwater is a vital resource for irrigation, as explained on page 4. Another consists of small reservoirs, like the ones West African governments have built across the Sahel and savanna over the last half century in response to successive droughts. Having researched diverse aspects of this intervention, IWMI is well prepared to help plan and monitor future implementation.

Once farmers gain access to irrigation, they must have reliable means of ensuring their crops receive neither too little nor too much water. To this end, IWMI is promoting various options, such as alternative furrow and drip irrigation, which contribute significantly to water conservation. We are also testing a simple and inexpensive device (the wetting front detector) that aids irrigation scheduling by indicating when a crop has received enough water.



Portable solar-powered pump for irrigation at Jawe community in Lemo District of Ethiopia's Southern Nations, Nationalities, and People's Region.

#### Wide scope for increased irrigation



#### Getting a grip on groundwater

Expanding smallholder irrigation in Africa depends vitally on groundwater, which is abundant in many places but generally underused. IWMI research has laid a firm foundation for sustainable management of this resource in sub-Saharan Africa by quantifying groundwater availability regionally, and by identifying technologies and policy options to expand groundwater irrigation.

In North Africa, we are working to curb the overuse of groundwater through intensive engagement with national institutions responsible for its governance. The Groundwater Solutions Initiative for Policy and Practice (GRIPP), a global partnership coordinated by IWMI, enables us to bring knowledge from around the world to bear on Africa's groundwater challenges.

Smallholder farmers are already seizing new opportunities through the use of micro-irrigation technologies with motorized pumps. But they are constrained by high fuel costs and limited access to electricity, which is available to less than a third of the population in sub-Saharan Africa. Against this background, solar-powered micro-irrigation shows much potential.

Having first joined the solar revolution in India, IWMI went on to pilot solar-powered micro-irrigation with Ethiopian farmers. Now, we are developing business models for this and other countries to guide investment in the use of solar power for irrigation and other purposes, such as rural enterprise development. We also have in place the expertise needed to help governments, development partners and the private sector build an evidence base for ensuring that new schemes are sustainable and benefit smallholders with emphasis on gender equality.



Putting in place irrigation pipes in southern Africa's Limpopo River Basin.

### WATER-SMART OPTIONS FOR SUSTAINABLE GROWTH

#### Moving in the right direction

Rapid economic growth is the good news from Africa, heralding progress in the fight against entrenched poverty. But this together with the intensification of agriculture also puts greater pressure on hotly contested water and land resources, raising concerns about the sustainability of this growth.

To guide development toward sustainable and equitable pathways, IWMI helps devise and implement approaches that are water smart. One such strategy involves combining built with natural infrastructure in the construction of large dams, so they can foster growth but at lower costs to the environment and the people whose livelihoods depend on natural resources.

Through another approach, referred to as integrated watershed management, IWMI researchers have devised practical methods for targeting and piloting water and soil management interventions with local communities to enhance rural livelihoods, while curbing land degradation. In addition, recognizing that rural livelihoods depend on many productive and domestic uses of water, we have developed models for provision of multiple-use water services and defined ways to achieve large-scale implementation.

Whether such interventions yield the benefits they should depends to a large extent on making them gender equitable. For this purpose, IWMI researchers analyze and promote changes in the norms that govern access to water through infrastructure and technology, with the aim of empowering women to secure their water rights.

So that both women and men reap greater benefits, we pursue a value chain approach, with emphasis on building the capacity and knowledge rural communities need to access farm inputs and services, while marketing their produce on more favorable terms. Improved irrigation for the production of fruit, vegetable and animal fodder in Ethiopia, for example, has enabled farmers to boost incomes from a more business-oriented agriculture.



Sprinkler irrigation in Mozambique's eastern highlands.

#### Big on basins – science for shared management of natural resources

IWMI scientists have worked steadily over the last decade or so to help improve the governance and management of waters shared between two or more countries, providing a stronger basis for cooperation. In support of these efforts, we have built a rich store of knowledge on Africa's transboundary river basins (especially the Nile, Volta and Zambezi) as well as on many national basins and watersheds. A mainstay of economic development, providing water and hydropower for cities, major basins also sustain the livelihoods of millions of rural people.

IWMI research addresses the whole range of issues involved in developing river basins and groundwater resources. We assess their changing biophysical, socio-political and economic conditions, and help chart sustainable pathways to sustainable growth, offering pragmatic solutions to transboundary challenges. This work includes a major effort to measure "environmental flows," which helps countries determine whether specific areas or basins have enough water for ecosystem services that are essential for fulfilling the SDGs. In addition, we examine the institutional and policy environments of water management, and simulate future development scenarios in light of climate change.

To foster a collective search for solutions, we enter into strategic alliances (transboundary, national and local); convene fora to promote more informed decision making and public discourse; and strengthen national capacity to analyze and interpret the changes unfolding in Africa's transboundary basins. These efforts are essential for ensuring that basin resources generate lasting and equitably shared benefits, as the pressure on them continues to rise – driven by population growth, economic development and climate change.



White Volta River in Ghana's Northern Region.

#### **Under pressure**

#### As a result of climate change,

West Africa's Volta River Basin, will provide only 75% of annual irrigation water demand and 52% of potential hydropower by 2050.



# WATER SOLUTIONS TO STRENGTHEN RURAL-URBAN LINKAGES

## Turning waste from a threat into an asset

Rapid urbanization in Africa has profound implications for its water resources. How will countries deal with growing volumes of waste and worsening water pollution? How will they meet the demand of expanding cities for adequate supplies of safe water and food? And what can they do about the health and environmental threats posed by the use of contaminated wastewater to irrigate food crops?

IWMI is engaged in a pioneering search for answers to these questions at its West Africa base in Ghana. This research focuses on areas where rural and urban settings merge, which are hotspots for food and water security as well as waste treatment. We believe it is possible to address these problems all at once by recovering and reusing resources like nutrients from fecal sludge (human waste). This effort has come to fruition in the form of business models for converting waste into useful products, which offer wide scope for generating revenue to recover some of the costs of waste treatment, while also creating employment.

IWMI recently launched the JVL Fortifer Compost Plant in Accra, Ghana, with an alliance of public and private sector partners. The plant will produce signficant quantities of an affordable new organic fertilizer, *Fortifer*<sup>™</sup>, which is made through processing of human and other organic waste. While monitoring the progress of this first plant, we will strive to scale it up in Ghana and beyond. In addition, we will further develop and implement other options, such as fuel briquettes and wastewater aquaculture.



Bagged *Fortifer*<sup>™</sup> pellets at the JVL Fortifer Compost Plant in Ghana's Greater Accra area. A joint venture between the Tema Metropolitan Assembly and Jekora Ventures Ltd (JVL), this is the country's first public-private enterprise dedicated to producing the affordable new organic fertilizer.

#### A dire threat to food safety

Up to 90% of vegetables likely to be consumed raw (like lettuce, cabbage and spring onion) in Accra are grown in or near the city under irrigation with highly polluted water.



### **IWMI AND AFRICA'S DEVELOPMENT AGENDA**

IWMI helps attain the objectives of the Comprehensive Africa Agriculture Development Programme (CAADP), collaborates with the Secretariat of the African Ministers' Council on Water (AMCOW) and supports various regional initiatives as well. These include the agricultural policy of the Economic Community of West African States (ECOWAS), the Agriculture and Rural Development Strategy and Food Security Action Plan of the East African Community, and the Regional Indicative Strategic Development Plan (RISDP) of the Southern African Development Community (SADC).

At the national level, IWMI works with government ministries and agricultural research institutes as well as with a wide array of development partners, including private enterprises. In addition to conducting research with them, we provide capacity building and training on diverse topics, while also supporting master's and doctoral students.

IWMI is a CGIAR center focused on research for development to deliver new evidence-based approaches that address key water-related challenges. CGIAR is a global research partnership for a food-secure future. Its work is carried out by 15 centers in close collaboration with hundreds of partners across the globe. IWMI contributes importantly to CGIAR Research Programs that prioritize Africa's needs and potential: leading Water, Land and Ecosystems (WLE) and playing an active role in Climate Change, Agriculture and Food Security (CCAFS); Policies, Institutions and Markets (PIM); Fish; and Livestock.



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