



VIA Water

# Water dynamics in the seven African countries of Dutch policy focus: Benin, Ghana, Kenya, Mali, Mozambique, Rwanda, South Sudan

General report and pressing needs

Written by the African Studies Centre Leiden and  
commissioned by VIA Water, Programme on water innovation in Africa.

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## Introduction

This summary report on the contexts of water dynamics in the seven African countries of Dutch development policy focus on water in Africa has been produced by the African Studies Centre in Leiden for the knowledge platform on water and development VIA Water. It was presented in September 2014 as one of the contributions to VIA Water's search for the most relevant Dutch actions to address the most pressing needs in water management and water governance in the selected African countries. It is accompanied by a web dossier that contains lists of literature on water in the seven countries, made by the ASC's Library and Documentation Centre (see [www.viawater.nl](http://www.viawater.nl)). The authors of the reports have made extensive use of these bibliographical lists.<sup>1</sup>

For each country, a separate document has been made (see the seven country reports). Per country, factual information of the following sectors is described:

- Political geography of water
- Demographic situation: population, urbanization, water consumption trends
- Political situation and institutional setting of water
- Economic setting: economic situation, transport system, innovation, ICT
- Agricultural dynamics
- Energy dynamics
- Climate change

The consequences of the factual situation of these sectors for the water situation have been written in blue to make them distinct from the rest of the text. Each country document concludes with a list of most pressing water needs for that country. At the final section of this introduction we bring the pressing needs together thematically.

Two of the documents, the ones on Kenya and South Sudan, are more extensive. The amount of information on the water situation in Kenya is so large that this allowed for an elaborate report on that country. Reversely, South Sudan is such a young (and problematic) country that a lot is still unknown, triggering us to find and analyze as much information on this country as possible.

A knowledge platform on water covers many and very diverse fields of knowledge. On the one hand these are related to watersheds and their management, to the impact of climate change on water availability and distribution in time and space, and to the use of water for different purposes (e.g. irrigation and agriculture in general, hydro-electricity, drinking water). But one can also approach water as a habitat for fish, birds, other animals, plants and other elements of nature and biodiversity, and as an element of people's livelihoods (e.g. fisheries). Water is also a means of transport and rivers, canals and ports are important

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<sup>1</sup> The reports have been realized on the basis of short-term desk research and make no claim of being definitive, complete or scientifically substantiated.

elements of a country's economy and economic geography. And last but not least: water is important as drinking water and, linked with sanitation, as an element of people's health care. We try to cover all these different aspects, and to do so in an organized way. But of course, depending on the countries and the sources of information, there will be different coverage of all these elements, and hence a different emphasis on 'pressing needs'. Given its importance we will briefly highlight drinking water and sanitation here, before summarizing all other 'pressing needs' that have been identified in each of the seven country papers. In the thematic summary of these 'pressing needs' we will not refer to sources anymore. These can be found in each of the country reports, and of course also in the web dossiers on water for the seven countries.

## A comparative note on drinking water and sanitation

In 2013, the ASC produced a thematic map of 'Access and no access to improved drinking water and improvement index in Africa (1990-2011)' (see <https://openaccess.leidenuniv.nl/handle/1887/22221>), as well as a thematic map of 'Access and no access to improved sanitation facility and improvement index in Africa (1990-2011)' (see <https://openaccess.leidenuniv.nl/handle/1887/22222>). The back sides of these maps give excellent information on various countries (including the countries of Dutch policy focus). In the underlying report, we provide tables for the growth of the national, urban and rural population's access to improved and unimproved drinking water sources and improved and unimproved sanitation facilities for the past twenty years (1990-2011), based on the *WHO/UNICEF Progress on sanitation and drinking-water 2013 update* (tables for all seven countries except South Sudan, of which data were unavailable). In the tables we also provide data about the percentage of growth of the people that did **not** have access to improved drinking water sources or improved sanitation facilities.

With the exception of Mali and rural Ghana, in all countries there was not only an increase of the number of people with access to improved drinking water, but also an increase of the number of people with **no** access to such facilities. This applies especially to the urban areas, particularly in Kenya and Rwanda.

Also with regard to access to improved sanitation facilities, it can be concluded that, with the exception of rural Rwanda, in all countries there was not only an increase of the number of people with access to improved sanitation but also an increase of the number of people with **no** access to such facilities. This applies especially to the urban areas, but in Benin also for the rural areas (see Table1).

Table 1

1990-2011	NATIONAL POPULATION			URBAN POPULATION			RURAL POPULATION		
Water	% growth population	% growth access to improved water source	% growth NO access to improved water source	% growth population	% growth access to improved water source	% growth NO access to improved water source	% growth population	% growth access to improved water source	% growth NO access to improved water source
Benin	91	237	41	152	198	35	59	255	53
Ghana	69	174	-50	144	170	15	27	181	-60
Kenya	78	152	21	151	126	432	63	166	12
Mali	83	324	-11	178	367	-35	54	309	-9
Mozambique	77	144	42	161	179	113	54	112	36
Rwanda	54	71	26	485	414	1200	31	44	12
South Sudan	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sub-Sah. Africa	70	119	24	125	128	112	49	117	12
Northern Africa	41	49	-13	58	60	32	24	38	-32
Africa	65	98	21	106	106	102	45	95	10
1990-2011	NATIONAL POPULATION			URBAN POPULATION			RURAL POPULATION		
Sanitation	% growth population	% growth access to improved sanitation facility	% growth NO access to improved sanitation facility	% growth population	% growth access to improved sanitation facility	% growth NO access to improved sanitation facility	% growth population	% growth access to improved sanitation facility	% growth NO access to improved sanitation facility
Benin	91	607	128	152	351	120	59	1162	142
Ghana	69	266	56	144	286	124	27	238	20
Kenya	78	106	68	151	199	134	63	96	52
Mali	83	168	68	178	195	170	54	116	47
Mozambique	77	273	57	161	206	137	54	594	43
Rwanda	54	193	-12	485	457	534	31	167	-27
South Sudan	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sub-Sah. Africa	70	96	61	125	120	129	49	88	40
Northern Africa	41	76	-50	58	61	18	24	93	-57
Africa	65	88	52	106	93	123	45	90	32

Source: WHO/UNICEF (2013), Progress on sanitation and drinking-water: 2013 update, pp. 14-35  
Geneva / New York: World Health Organization / United Nations Children's Fund.

## Definitions of terms used in Table 1:

*Improved drinking-water sources:* Piped household water connection located inside the user's dwelling, plot or yard; Public taps or standpipes, tube wells or boreholes, protected dug wells, protected springs, rainwater collection.

*Unimproved drinking-water sources:* Surface drinking-water sources: river, dam, lake, pond, stream, canal, irrigation channels, unprotected dug well, unprotected spring, cart with small tank/drum, surface water, bottled water.

*Improved sanitation facilities:* Flush/pour flush to piped sewer system, septic tank, pit latrine, Ventilated improved pit (VIP) latrine, pit latrine with slab, composting toilet.

*Unimproved sanitation facilities:* Open defecation, pit latrines without a slab or platform, hanging latrines and bucket latrines, shared sanitation facilities.

## Pressing needs

This is a repetition (without the references) of what can be found in the concluding sections of each of the country reports. We present these in a thematic way, highlighting different types of pressing needs. Obviously not every country report has sections on each of the thematic issues, as the authors of each of the country reports made their own choices of 'pressing needs'. Together these give a useful overview, we hope, which could profitably be used by VIA Water in its attempts to formulate its approach for the next few years. But also other users can hopefully make good use of what has been summarized here. In many cases, most pressing needs highlighted in one or more countries, will also be relevant for countries that do not feature in that particular section.

## Pressing needs on drinking water and sanitation; and on supply and demand of drinking water and sanitation

### *Benin: Fairer distribution of access to clean drinking water and sanitation*

Access to clean drinking water and sanitation should be more fairly distributed over Benin's population. There has been a massive investment into augmenting the level of coverage of clean drinking water with traditionally a strong emphasis on the rural areas and only in recent years more attention for urban areas. For a fairer distribution of access to these services not only the number of new water sources count but also more qualitative elements should be taken into account like: who profits from this service? Where are these sources located? What exactly is being provided: piped water, wells, pump?

*Benin: Measures to deal with surface water pollution & waste water*

The pollution of bodies of surface water mainly by the non-treatment of an increasing quantity of waste water poses problems now and in the future. The growing urbanization is a substantial contributing factor in this context. To avoid environmental catastrophes, waste water policies should be formulated and measures should be taken.

*Kenya: Measures to deal with population growth*

Population growth figures paint a picture of the likely pressure on productive resources if the country is challenged to remain food secure with increased numbers to feed. Population growth, although slowing down, will make Kenya [like many other African countries] in the next decade become even more water scarce. The growth of the Kenyan population of over a million citizens annually translates in a growing scarcity of (renewable) annual water availability per person to slightly over 517 m<sup>3</sup>. Kenya faces a serious challenge to provide sufficient amounts of water for drinking as well as production of food and other needs. This will add pressure on an economy that needs high growth figures to provide jobs for a young population eager to enter the (formal) job market. Lack of data hampers the analysis of poverty trends but the World Bank estimates that national poverty has fallen to 39% in 2012/13. The continuing structural economic shift from agriculture to services and sustained economic growth in Nairobi and its expanding suburban areas have been particularly important drivers to lower poverty rates. However, inequality in Kenya is relatively high: Kenya's 2006 Gini coefficient of 47.7 was higher than that of neighbours Ethiopia, Tanzania, and Uganda. The strategy's target of adding one million jobs per year, if achieved, would give a big boost to reducing inequality. Recent plans to provide opportunities for graduates to engage as volunteers exemplifies the need and difficulty to meet the target of creating one million jobs annually.

*Mali: Improvement of drainage and waste system management*

Groundwater is still regularly (directly) used as drinking water, while recent reports have shown that at least around Bamako the groundwater is contaminated by heavy metals and other toxic substances. A lack of organization and investment in waterworks and drainage systems could worsen the situation: investments and waste control are desirable.

*Rwanda: Improvement of access to drinking water and sanitation*

The Government of Rwanda seeks to increase the rate of access to drinking water and sanitation to 100% by 2020, a hugely ambitious goal. The estimated costs to achieve these targets are approximately \$820 million. Water availability is pro-

jected to decrease in the near future: while in 2008 the average annual amount of renewable internal freshwater resource per capita was approximate 977 m<sup>3</sup>, this amount will decrease to 875 m<sup>3</sup> by 2015. Thus, the government's efforts to reach its targets will have to be enormous. Meanwhile the government increasingly outsources the operational management of their water management to decentralized public-private-partnerships. For example in the city of Kigali and other urban centers in Rwanda, the water-supply is provided by RECO-RWASCO. This utility, however, is struggling to produce and distribute enough water to satisfy urban demand due to commercial and technical constraints, exacerbated by droughts that have greatly reduced the amount of water in the country's reservoir lakes.

*Rwanda: More efficient water usage*

Innovative reforms should be implemented to ensure sustainable water management. For example, increasing training programmes to reduce non-revenue water and constructing water saving mechanisms will increase efficiency in water usage.

*South Sudan: Smart operation and maintenance*

There is an urgent need to build local capacity. Selection of smart technologies will be crucial. It is estimated that about 11,000 new rural water supply schemes will be constructed to attain access levels of 65% by 2020. A major challenge will be to come up with sustainable formats of both operation and maintenance. The AfDB doubts whether this can be done by local communities though, and it calls for the private sector to step in. In the urban setting, a mix of surface and ground water will be used to supply the state capitals. In another group of at least 50 small towns the use of water yards is suggested. This should improve water access from 15 to 70% by 2020. Lack of investment funds (needed: US\$ 2 bn), and internal or external conflicts will undermine development of the water and sanitation situation in the country.

*South Sudan: Measures to deal with population movements*

South Sudan is among the least populated countries in Africa. However, the huge influx of returnees as well as the large numbers of IDPs due to conflicts within the country puts severe pressures on water resources in certain areas, notably in the fast growing urban centres. Likewise during periods of drought, which might increase in the years ahead due to rising temperatures and dropping rain quantities, especially pastoralists face problems over access to water for their herds, leading to additional local resource conflicts. These conflicts could sometimes be prevented through provision of water sources. Yet care has to be taken as new

water sources may also trigger battles over newly opened grazing areas. Decent studies and thorough consultations by all potentially involved groups should be done ahead of providing new water schemes in these settings. As long as Nile waters stream into South Sudan at current rates the country is not water stressed or water scarce. However, without the Nile waters South Sudan would be water stressed from 2015 onwards.

## Pressing needs on water usage by agriculture; irrigation

### *Kenya: Sustainable economic growth and agricultural productivity*

The ambitions for the 2013-17 period are high and aim to move average annual real GDP growth rates up to 8.2%, even reaching double digit growth in 2017. This would require a significant acceleration from the recent growth levels, especially in agriculture which is projected to grow by 6.5 percent on average annually, compared to an average of 3.5 percent during 1997-2012. But the structure of the economy faces many challenges to be dealt with in the years ahead: low agricultural productivity, a narrow export base, high energy costs and a declining manufacturing sector besides major economic and social disparities. Higher productivity is key and to that end investment in physical infrastructure (including ICT and science) and human capital, as well as through reforms in the public sector, security, land, education, and drought risk management are needed. A major issue will be how to fund this growth keeping debt sustainable. IMF suggests seeking innovative funding mechanisms including public-private partnerships, besides domestic revenue mobilization and efficient public spending. For agriculture, in particular, IMF officials urge to promote private sector participation in management of the irrigation schemes to be established foremost in the semi-arid regions. The recent withdrawal of a large number of private companies from the Tana delta shows, however, that within these dry zones delta's and wetlands might not be the easiest places to engage in given opposition from nature conservation groups and local people. Still, care is needed to understand motives for resistance or support as these are place and group specific. (Examples are available whereby nomadic pastoralists and farmers welcome investors under certain conditions and for a wide range of reasons in certain locations, while nearby places, especially crucial dry season grazing areas, will be no-go zones for irrigated agriculture in the view of local livestock owners). Young agriculturalists, by contrast, are less negative as they hope to be able to acquire a wage employment opportunity instead of trying to make ends meet as a small scale farmer. Meeting all these demands for (productive) water and jobs will be a balancing act. The rise in the use of irrigated agriculture, using both surface and groundwater, using greenhouses seems to provide an opportunity also to assist



youth groups to create jobs for themselves. However, if groundwater abstractions through deep boreholes go beyond the point of sustainable use, there is a risk that nearby shallow aquifers will be drained beyond restoration. The recent trend to move into mining of groundwater (both rural and urban) should be conducted with great care and in a sustainable manner only.

*Mali: Improvement and efficiency of irrigation systems*

With an increasing human population and (urban) consumption levels and a shift from millet to rice production, more irrigated land is needed. For the expansion of irrigated land, improvement and efficiency of the irrigation systems is both essential and conceivable.

*Rwanda: Reformation of the water resource management in agriculture*

Growing demographic pressure leads to a rapidly increasing demand for agricultural output. This necessitates significant reforms and improvement of the (water) resource management in the next decade. The irrigation system is insufficiently developed; hence agriculture depends on rainfall. Moreover, technical innovation in Rwandan agriculture is lacking and absence of alternative income opportunities outside of the (subsistence) farming activities results in increased social tensions. Demographic pressure also evokes competition over natural resources, most notably over accessible water sources and cultivable land.

## Pressing needs related to the use of water for energy purposes

*Kenya: Proper water governance and transparency in the energy sector*

The energy sector has reached a crucial moment in time. Oil exploration might create benefits for the (local) economy and create jobs, but will also put more pressure on nearby water resources. This is equally true for biofuels. Transparency stands out as a crucial factor. For hydropower development the need for proper water governance should be added to make sure downstream users are not affected negatively.

## Pressing needs related to climate change

*Ghana: Differentiated climate resilient measures*

The first and perhaps most important challenge to water supply in a country with less efficient water technology is water availability. Rainfall patterns in Ghana show a general decline in rainfall over the last 40 to 60 years largely resulting from climate change. However, as climate change impacts on both environmental

and social-economic systems, it does not only shape the prospects for water availability but also access to it. The impacts of climate change in Ghana are therefore expected to significantly aggravate water stress, thereby reducing food security and the energy generation capacity of the country. In the recent past, the incidence of floods and droughts have risen with resulting loss of life and property, reduction in gross domestic product and crisis in the generation of power from the country's hydro-electric plants. The effects of climate change in the country are spatially differentiated. The northern area is experiencing more debilitating consequences than the rest of the country, yet it is the region most likely to bear the brunt of climate change. In addition, climate models generated locally point to a drying thesis for this part of the country. Some other models project that wet areas in the southern part of the country might become wetter. The high vulnerability of the northern part of Ghana to the current and projected water stress is not only as a result of its location but also as a result of high levels of poverty. People in this part of the country are relatively poorer than those in the southern part. As a result northern Ghana is expected to bear the brunt of climate change. It is thus imperative to give attention to differential vulnerabilities to water stress in policy decision making.

*Mozambique: Measures to deal with rainfall reduction and natural hazards*

Strategies to deal with the expected impacts of climate change need to be designed: increasing numbers of droughts, floods and cyclones will occur while overall water availability per capita will decrease as a result of climate change and population growth.

*Rwanda: Measures to create a climate-resilient agriculture*

Small semi-subsistence farm households are vulnerable to climatic conditions. The IMF identifies climatic vulnerability, such as flooding, as the main internal risk to growth and poverty reduction in Rwanda. The objective is to create a more climate-resilient agriculture, for example through the construction of extensive irrigation facilities. In the EDPRS II, Rwandan authorities aim to develop a total of 100,000 ha under irrigation (of which 65,000 ha marshland and 35,000 ha hillside irrigation) to increase food production and thus obviate demographic pressures.

## Pressing needs related to water governance, connecting international and national levels of scale

### *Mali: Regional agreements on responsible Niger river water use*

The Niger River is a lifeline for the numerous countries along its shores, whether it be for infrastructure, irrigation, energy generation, ecosystem services (including fishing), or other reasons. To deliver all these services the Niger river needs minimum water levels, while these same services consume water thereby limiting the water quantities of the river. With a still increasing human population and (urban) consumption levels, the demand will further grow. An effective regional management plan in which all the Niger river bordering countries are involved is needed to assure responsible and sustainable use of the Niger river. The construction of a large dam in the Guinea part of upstream Niger River will have dramatic consequences for downstream users, both people and migratory birds.

### *Mozambique: Coordination and compliance of policies*

There is a need for achieving coordination and clear direction in the crowded donor/lender landscape for rural water and sanitation. This is a significant challenge for [Mozambique's] relevant agencies. Achieving institutional change is difficult as concluded by an evaluation of Dutch development assistance to (among others) Mozambique because "in many cases organisations in recipient countries were unable or reluctant to adapt their structures or mandates." It is also a major challenge to deal with regional water issues, particularly with neighbouring South Africa and Zimbabwe.

## Pressing needs related to water governance, connecting local and national levels of scale

### *Benin: Promotion of a culture of, and mechanisms for good governance*

This has two dimensions: i) between the national (central) government and the local level (municipalities) and ii) between the state and non-state actors in the water sector. The first dimension aims at the discrepancy between on the one hand the tasks and the responsibility handed over in the decentralization process from the national to the local level, and on the other hand the lack of skills and knowledge at the local level to deliver the services effectively and efficiently. The second dimension corresponds with the necessity to include (representatives of) civil society in the coordination and monitoring of water services.

*Benin: Strengthening the authority and capacity of local communities and municipalities*

On paper nothing withholds municipalities to plan, initiate and coordinate local water-related projects; however in reality project finance and management often remains at a national (central) level. Local authorities lack budgets, but also the skills and knowledge to start projects themselves. However, within Benin's political landscape of decentralization policies, the future of effective and efficient water-management lies at the local level.

*Ghana: Improvement of water governance*

The provision of water for various uses in the country will in addition to water availability depend on the effectiveness of water governance. As stated before, present water policy in Ghana has sought to achieve more local decision making power in water management, improved access and sustainability in water supply. This objective has generally been achieved through the National Community Water and Sanitation Program (NCWSP). The program ensured that the ownership and management of water pumps and small town water systems constructed by the Ghana Water Company were handed over to communities. Following this, local users have created various rules and regulations to manage these facilities often reflecting local livelihood dynamics, local power dynamics and norms. These management systems have, however, been relatively more successful in the case of rural small pumps than in the case of small town water systems. Unfortunately, the reasons for this difference are unclear yet. A likely reason could be the more homogenous nature of rural communities as against the more heterogeneous nature of small towns. Diversity, logically, constrains the formulation and success of binding rules and regulations or management strategies regarding common properties. One aspect of this diversity in the facet of livelihoods is the linkage between water and economic activities which could result in various power interactions and tensions.

*Ghana: Improvement of institutional capacity*

In addition to the gap between knowledge and decision making, the institutions charged with the mandate of managing Ghana's water resources are under-resourced and lack the capacity to effectively carry out their mandate under a political atmosphere characterized by legal pluralism and weak governance. Weak institutional capacity of the Water Resources Commission, the leading institution, constrains its ability to ensure effective management of local water resources to the extent that there is the danger that local and national interest groups influence the reforms to legitimize their vested interest, thereby excluding others. The main objective of the WRC to ensure integrated water management

could therefore become a mirage if steps are not taken to strengthen its capacity as well as those of related key institutions, and remove legal constraints to its mandate particularly that relating to the overlap of functions.

*Kenya: Smart technology and institutional frameworks*

There is a need for smart and cheap technologies and institutional frameworks to create lasting business cases that can fulfil the demand for affordable and secure water. At the moment though, businesses are started in rural areas that harm the environment even further (charcoal production through felling of riverine trees, sand harvesting from the river bed for the construction industry, collecting rocks from rivers allowing too fast runoff during times of rain, mining and selling of groundwater and brokering of land to industries that pollute the environment). In urban settings, like Nairobi, the use of groundwater seems to have increased rapidly since the drought of 2009, especially in well-off neighbourhoods where individual households have drilled boreholes in their backyards. Smart rain water harvesting should be promoted in urban areas. Serving the less well-off could be an interesting option for innovative businesses. In Mombasa, a Dutch entrepreneur has put up a company that is using high-end technology machines to recycle and clean waste water into bottled water at the same time creating employment. Making Kenya more investment friendly would be one aspect that needs attention, but unfortunately latest reports indicate that it has become less easy to acquire work permits for foreigners. The use of mobile phones to pay water bills, report leakages and inform customers on availability and prices of potable water might also be a field for further scrutiny. Likewise, the rising shortage and costs of fertilizer might allow for projects that improve sanitation in the urban slums of the country, and make use of human waste as bio-fertilizers.

*Kenya: Improvement of (urban) water governance*

Despite the far-reaching water reforms laid down in the Water Act 2002 and the National Water Resources Management Strategy 2006-2008, water governance in Kenya still faces a myriad of challenges. In relation to urban water supply, researchers list the following:

- It is not clear whether the water companies are private or public. Whereas under the Companies Act, water and sanitation companies are registered as private, limited liability companies, they are 100% publicly owned by the local authorities and are managing public assets to give an essential public service.
- The water and sanitation companies have inherited old, dilapidated and in some cases obsolete infrastructure from the local authorities, the National Water Conservation and Pipeline Corporation and/or the Ministry of Water and Irrigation. So far, rehabilitation of the existing infrastructure is yet to be fully achieved.

- All the water companies have inherited employees previously employed in the Department of Water and Sewerage of their respective local authorities or from the Ministry of Water and Irrigation. Only the directors and managers have so far been hired competitively.
- Inadequate capacity to manage the increasing demand for water. The populations in Kenya's urban centres have increased and will continue to do so. A major challenge to the water companies will be to provide enough water, in quantity and quality, to the increasing population.
- Limited resources and high costs of operation and maintenance. As much as the water companies are supposed to run as commercial enterprises, they are incurring very high operation and maintenance costs, compared to the revenue they are collecting.
- Local political interference and corruption. In its strategic plan (2007-2012), Kisumu Water and Sewerage Company points "local political interference" as one of the risks towards good governance, financial resource mobilization, promotion of efficient utilization of resources and effective communication to stakeholders and customers.
- Inherited debts, liabilities and too many fees to be paid.
- Extension of water services to the low-income neighbourhoods. Poor planning has made it difficult for municipalities to put up a water infrastructure, especially in the mushrooming informal settlements. Their illegal status – at least according to the municipal authorities – has hindered the expansion of municipal services to serve them.
- Lack of autonomy to do major investments. Since the companies do not own the assets, they are only allowed to do minor investments. Water Services Boards who own and manage the assets are the ones responsible for investment.
- Flat rate tariffs will continue to persist as long as the problem of lack of meters and malfunctioning meters is not addressed.
- Despite the efforts towards controlling, reducing and stopping this unsustainable habit from the consumers, water companies are faced with the persistence of illegal connections, not only in low income areas as one would expect, but also in other parts of the city.

*Mozambique: Involvement of communities & improvement of governance*

One major challenge is to actually reach the various targets set by the government. This requires, among others, creating meaningful community participation, particularly in rural water management. Insufficient involvement and commitment of community leaders can lead to shortfalls in the desired behavioral. Researchers have noted that for farmer-led irrigation to be a success provision of inputs/maintenance is not sufficient but 'supportive social networks' (links to [traditional] authority) are also essential. It also requires improving governance and institutions; getting private sector involved for direct service provision and reconcile this with the limited financial opportunities rural citizens have to contribute to this. In urban areas the provision of water services has become a major challenge, due to the rapid growth of Mozambique's cities and the complex arrangements of water provision in the diverse urban communities, particularly in

Maputo. Some researchers ask for specific attention for the role of women as water providers in a city like Maputo and point at the need to curb the considerable water losses in the major cities.

*Rwanda: Integration of national and communal interests & involvement of communities*

First of all, national ambitions of the Rwandan regime often deviate with local realities and communal interests. For example, the economic importance regarding the increase in hydropower diverges with local interests in agricultural subsistence farming. Communities are often scarcely involved in managing their own local water resources. There is a need to integrate local communities in capacity building efforts, while monitoring the effects of national projects on local realities. An example of local capacity building is the Water Sanitation & Hygiene (WASH) service, formulated by UNICEF and SNV. Through enhanced cooperation between ministries and public and private stakeholders, proper guidelines for development projects can be established. Unfortunately, at the moment there is inadequate funding, lack of collaboration among stakeholders and a lack of public involvement.

*Rwanda: Measures to create balanced regulations and policies with respect to land rights*

Insecure regulations on land rights and access to water remain problematic for younger generations, as ownership is often concentrated among the older population. In many areas farmlands are small and, due to conventional inheritance rights, increasingly shrinking while the population is growing. Therefore, clear policies and regulations need to make sure a careful balance is created in the distribution of land.

*South Sudan: Maintaining water as a government priority (in competition with other needs)*

Several government and donor groups have been soliciting views and ideas among communities and professionals which actions should be given priority to improve the well-being of the people of South Sudan. A World Food Programme survey among local communities gave seven top priorities: health services/assistance (31 percent), food assistance (24 percent), water provision (10 percent), education services (8 percent), security and peace (8 percent), agricultural inputs (6 percent) and road construction (5 percent). By contrast a 2013 World Bank survey among individuals working in government and non-government circles in South Sudan enquired about the most pressing needs the country was facing. Some bias existed towards the background of the respond-

ents (mostly in education) and location (Equatorial states), but the outcome revealed that for specific themes such as poverty reduction, economic growth, general development as well as the sector the World Bank should work in, education was among the top three in each case. Other priorities mentioned were foremost agriculture, security, transport and health. Water and sanitation scored from place 13 up to 20. However, professionals with a background in water were mostly lacking. It seems that the abundance of (Nile) water and reasonable precipitation is sufficient (for the moment and in most places). However, the government has earmarked the water and sanitation sector as one of its six priority areas in the 2011-2013 development plan. In the next 5 to 10 years an annual doubling of new rural water supply schemes (from 300 to 600) through hand-dug wells (5%), boreholes with hand pumps (75%), water yards (10%) and surface sources (e.g, ponds) (10%) is aimed for. In addition, rehabilitation of existing schemes and reducing non-functionality of schemes is a priority.

*South Sudan: Other pressing needs*

- Water for arid zones to overcome conflicts over water resources
- Need for proper understanding of the issues at stake as water development could open up new grazing areas and cause more problems over the long run
- Water/sanitation especially for fast growing urban centres and for IDPs (smart technologies)

## Pressing needs related to data availability and interpretation

*Benin: Maintaining and extending databases*

The BDI (*Banque de Données Intégrées*), under the responsibility of the DG Eau in Benin, should be kept up to date and extended. This is essential to monitor the socio-economic and environmental effect of water policies on a local, regional and national scale. Furthermore, an extended database allows for an analysis – and subsequently the formulation of policies - of the consequences of climate change for the provision of water in Benin.

*Ghana: Improvement of availability and usage of data*

The emergence and uptake of new livelihood options such as irrigation, sachet and bottle water production (mainly through the development of underground water), small scale mining (that pollute water bodies) and small scale agricultural processing are examples of the increasingly diverse livelihood portfolios of some rural and urban areas. A true understanding of water management regimes via research is therefore required in charting future pathways that will effectively



deal with the growing demand for water in an era of growing water scarcities in the country. Water governance is contingent on effective information flow and acquisition of knowledge. Unfortunately, Ghana's situation reflects one of a disconnection between information flow, knowledge acquisition and decision making. For example,) in the Upper East region, one of the catchment areas of the Volta River, the flow of collected data is not only inconsistent and often parallel but also disconnected and slow, which results in a gap between knowledge and decision making. The critical analysis of knowledge flow is crucial in addressing this gap as a means to ensure effective water management in the country particularly at a time when water resources are not only being diminished by the effects of climate change but under much pressure due to increasing population and livelihood diversification into water intensive economic strategies.

*Mozambique: Improvement of availability and usage of data*

Collection, reliability/quality, availability and usage of data on water and sanitation on all levels needs to be improved. Costs made related to WASH programs are often aggregated to such a level that they are of limited use to policy making; budgeting, monitoring and reporting capacities need to be built further.

*South Sudan: Knowledge and data gathering on climate change and wetlands management*

Given i) the growing demand by upstream countries as well as by South Sudan itself for expansion of water use in agriculture (irrigation), ii) the Jonglei canal question and iii) other uncertainties linked to the Nile Basin Treaty, knowledge gathering of the impacts of these water demanding developments is crucial. For a better understanding of climate change in South Sudan it is also essential to improve data gathering.

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