Kingdom of the Netherlands

TRAIDE

Investment Opportunities in the Ethiopian Water Sector

TRAIDE Ethiopia

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Authors: Thijs de Klein, Sander de Raad, Elham Mohammed, Hiwot Tadesse

Contributors: Jelmer van Veen (First Secretary for Water Affairs, Embassy of the Kingdom of the Netherlands in Ethiopia), Wim Klaassen (Strategic Advisor on Water for Ethiopia, NWP/RVO), Stefan de Wildt (Acacia Water), Thijs Merton (Aqua for All Ethiopia)

Editor: Trevor Anderson

Layout, illustration: Erika Endrődiné Benkő

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Management summary

Ethiopia is one of the fastest growing countries in the world. Economic development and population growth strain the already limited water resources, a situation which will become further aggravated by climate change impacts. The Government of Ethiopia (GoE) has embarked on a long-term strategy to address water-related challenges and to improve the sector's overall performance. The GoE aspires to provide safe water to all Ethiopians, reduce the impact of wastewater on natural resources, and to increase the uptake of enhanced irrigation techniques to increase food production. The Dutch water sector has a long history of co-operation with Ethiopia and can provide technologies and services to address Ethiopia's water challenges. To this end, there is a broad a range of opportunities for private sector solutions in different water sub-sectors:

OPPORTUNITIES IN DIFFERENT WATER SUB-SECTORS IN ETHIOPIA

CATCHMENT MANAGEMENT

- Hydro(geo)logical assessments
- Consultancy on catchment approaches and degradation measures
- Catchment measuring and monitoring (including remote sensing)
- Capacity building

IRRIGATION

- Consultancy on irrigation water availability (feasibility studies)
- Capacity building related to water efficiency in irrigation
- Irrigation equipment and spare parts
- Measuring and monitoring equipment, tools and services (including remote sensing)

FLOOD RISK REDUCTION

- Technical advice (e.g. through hydrological modelling)
- Flood forecasting and early warning systems
- Flood defence structures
- Nature-based solutions

WASTEWATER TREATMENT

- Construction (industrial as well as municipal)
- Equipment and technologies
  - Important industries: leather, textile, food and beverages, chemicals, pulp and paper, and mining/metal
- In-situ wastewater treatment facilities (e.g. containerised systems)

GROUNDWATER

- Hydrogeological assessments (including borehole mapping)
- Measuring and monitoring equipment
- Capacity building on sustainable management
- Recharge, Retention and Reuse (3R) solutions

DRINKING WATER

- Construction of water delivery systems
- Off-grid water delivery systems (drinking water or multiple use)
- Measuring and monitoring equipment
- Large-scale purification systems
- Household purification systems
- Capacity building on utility service delivery strategies

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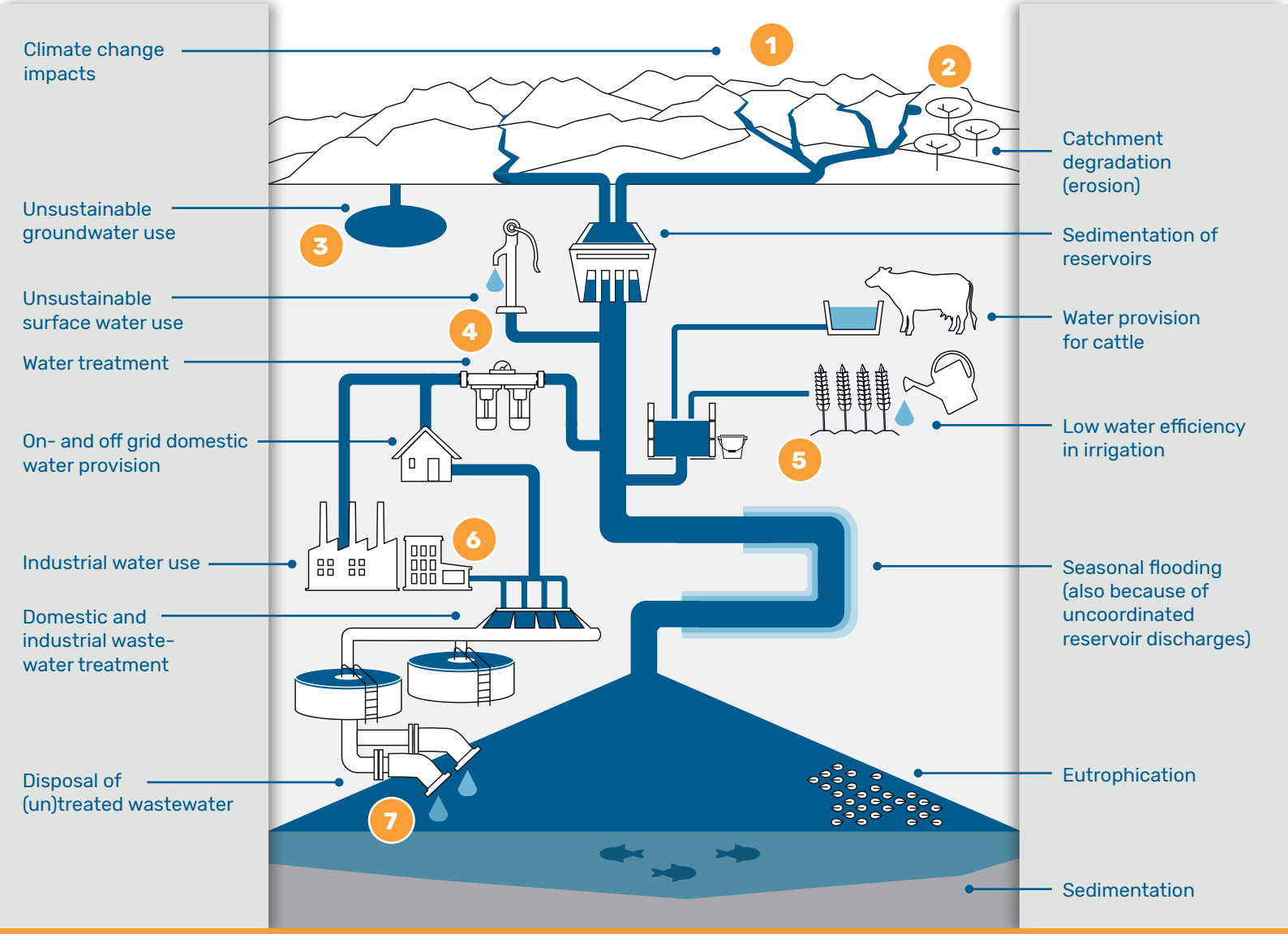
OVERVIEW OF THE WATER SECTOR IN ETHIOPIA



CHALLENGES

1. CLIMATE CHANGE IMPACTS

- Increased evaporation (higher temperatures)
- Longer drought periods
- Increased flood risks (higher rainfall inensity)

2. CATCHMENT DEGRADATION

- Erosion
- Sedimentation & eutrophication of reservoirs

3. GROUNDWATER

- Lack of data on availability and use
- Unregulated groundwater development

4. DRINKING WATER

- Low access to at least basic drinking water services (especially in rural areas)
- Drinking water pollution (especially high salinity and fluoride)

5. IRRIGATION / AGRICULTURE

- Low water use efficiency
- Unregulated water use
- Flooding

6. INDUSTRY

- Discharge of untreated waste-water
- Insufficient enforcement of pollution regulations

7. FOR BOTH HOUSEHOLDS & INDUSTRY

- Insufficient municipal waste-water treatment facilities
- Insufficient cost recovery of water supply

1. General overview

The Federal Democratic Republic of Ethiopia is a landlocked country, split by the Great Rift Valley, in the Horn of Africa. The Ethiopian highlands' water resources are the most important contributor to the Nile Basin (Ethiopia's tributary basins provide 86% of the Nile's annual outflow[3]), providing livelihoods for hundreds of millions of people both upstream within the country and downstream in Sudan and Egypt.

Ethiopia is one of the fastest growing countries in the world, in terms of both economic development and demographic dynamics. Naturally, with a growing population, ongoing urbanisation and more industrialisation, the pressure on existing natural resources rises. Due to Ethiopia's geographical location and its diverse territory, the country is often faced with natural calamities such as periods of prolonged droughts and flooding – extreme weather events that are forecast to happen more frequently because of ongoing climate change. This results in an accelerated need for infrastructure that enables a sustainable use of water. A range of legislative, organisational, technical and financial hurdles have yet to be overcome in order to meet this goal.

To address the water-related challenges, the Government of Ethiopia (GoE) has embarked on a long-term strategy to improve the sector's performance, with the objective of safely supplying water to all Ethiopians, reducing the impact of wastewater on natural resources, and safeguarding food production through enhanced irrigation methods. Alongside broader economic reforms, the role of the private sector is being increasingly considered in Ethiopia. The demand for high-quality equipment and services grows, with users ranging from individual consumers to the private and public sectors, as well as international donor organisations.

The Netherlands is a world leader in water management. Being a relatively small, low-lying, densely populated deltaic region comes with its challenges, and over the decades, the Dutch have mastered the art of flood protection and water supply and treatment. Living in such a challenging and vulnerable environment spurs innovation and co-operation. More recently, the Dutch have started to develop their capacity to moderate the effects of drought, the occurrence of which has increased due to the changing climate; other developments in the Dutch water sector include the implementation of circular water management to achieve sustainability goals.

Besides governmental institutions, the private sector in the Netherlands has well-developed expertise and solutions for all water-related challenges, and the available knowledge and tools are continuously improved due to the high level of innovation. These Dutch private sector solutions could also be used to address water-related challenges abroad, and Ethiopia provides excellent opportunities for this, given the nature of the challenges and the long history of co-operation between both countries. Therefore, this Business Opportunity Report has been produced to elaborate on water-related challenges within Ethiopia and the opportunities these provide for the Dutch water sector.

1.1 SURFACE WATER RESOURCES

Precipitation ranges from 2,700 mm/year in highland areas in the southwest and can be as low as 100 mm/year in the Afar lowlands in the northeast. Parts of Ethiopia have a bimodal rainy season, known as *belg* (February to May) and *kiremt* (June to mid-September), however the amount and seasonality differs greatly between regions. Most of the western parts of the country have a unimodal rainfall pattern with rains from February to October, while the central (Addis Ababa) and northern parts have one shorter rainy season with a peak in July/August; the eastern and southern parts have both *belg* and *kiremt* rains, with the southern part having a more distinct dry period between both rainy seasons.[4,5]

The Nile Basin generates about 70% of the country's renewable surface water, and consists of the Abay (Blue Nile), Baro-Akobo, Mereb, and Setit-Tekeze/Atbara basins. Lake Tana, Ethiopia's largest lake, is a critical source for the Nile River. Other surface water resources are located in the Rift Valley basins (over 20% of national surface water resources), primarily the Awash River and the numerous lakes within the Rift Valley (Ziway, Abaya, Chamo), although most of these are saline. Furthermore, Ethiopia has 1.8 million hectares of wetlands and floodplains, which are concentrated in the Nile and Rift Valley basins. Other major basins are the Shebelle-Juba Basin, containing just 8% of Ethiopia's surface water and almost no perennial rivers, leaving much of eastern Ethiopia without reliable surface water. The North East Coast Basin encompasses the Ogaden and Aysha, but they are considered dry basins with rivers that flow only after rainfall.[6]

Figure 1. MEAN MONTHLY PRECIPITATION FOR ADDIS ABABA (top left), GIMBI (WEST OROMIA REGION) (top right), HARAR (NORTHEAST OROMIA REGION) (bottom left) AND YEBELO YABELO (SOUTH OROMIA REGION) (bottom right)[5]

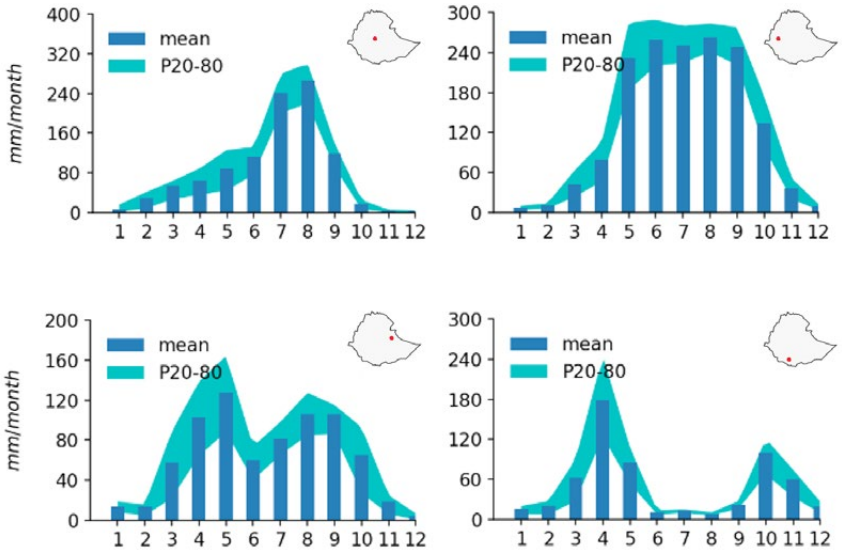
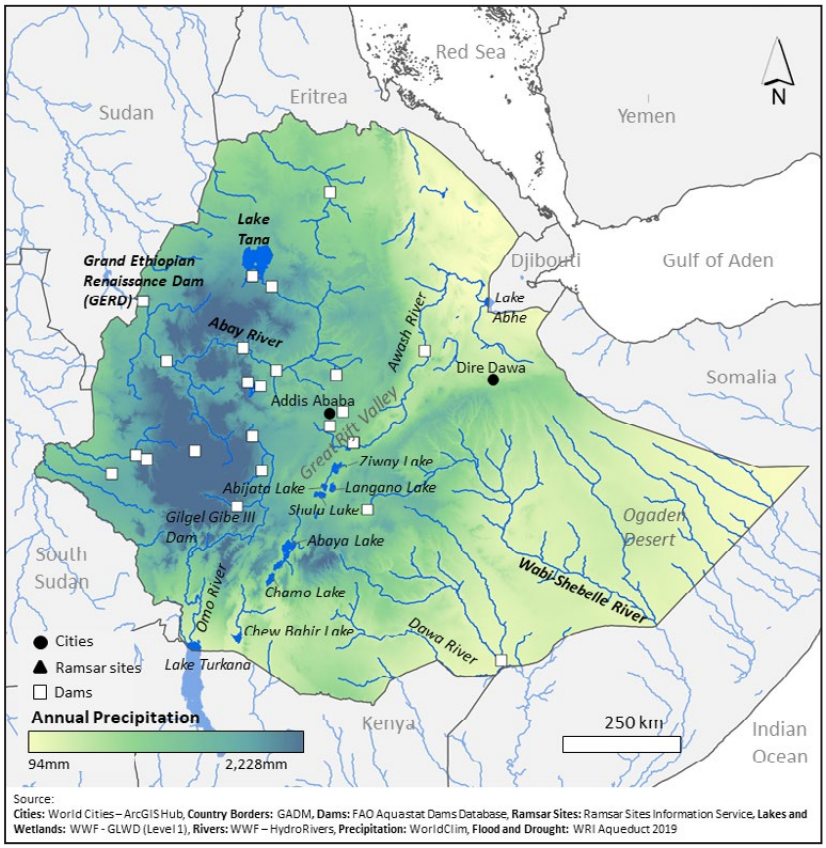


Figure 2. AVERAGE ANNUAL PRECIPITATION AND SURFACE WATER RESOURCES IN ETHIOPIA[6]



1.2 GROUNDWATER RESOURCES

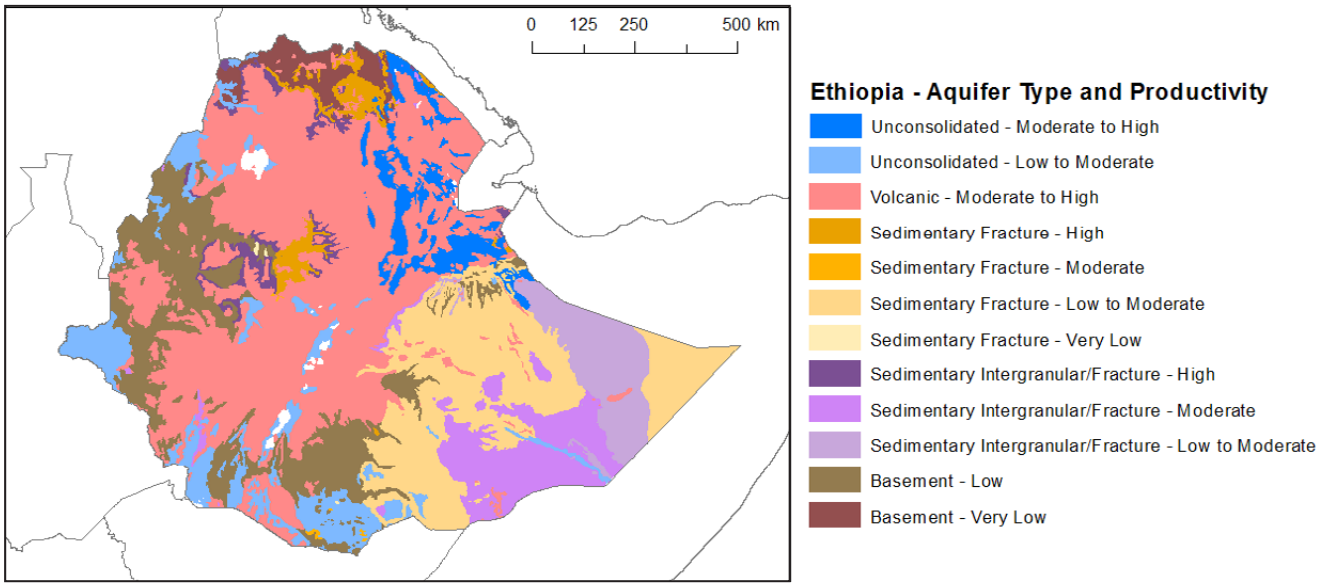
Groundwater is highly variable and aquifer systems are complex. Aquifers can be broadly characterised as volcanic, basement, sedimentary rock or alluvial. Volcanic aquifers are the most common and are located in highland areas throughout central and western Ethiopia. Volcanic aquifers can be thick (500–1,000 metres), have moderate to high depths to groundwater (50–250 metres), and are among the highest yielding. Sedimentary rock aquifers are widespread in the lowland areas of eastern Ethiopia and have low to moderate productivity, low recharge (30 mm/year), and are among the deepest (200–400 metres). Alluvial and basement aquifers are less common. Both are located in the southern and western regions. Basement aquifers are also located in the far north and alluvial aquifers in the northeast. Groundwater availability is lowest in basement aquifers and highest in alluvial aquifers, and both systems can be accessed at relatively shallow depths.[7] According to several estimates, the annual groundwater recharge of the country is about 2.6 billion m³; nevertheless, some other recent studies show that this figure is underestimated, and the actual amount could be much higher.[8] There is a clear lack of detailed studies and information regarding the groundwater resources of the country. So far, most of the area of the country does not have detailed hydrogeological studies. Accordingly, there absence of a comprehensive monitoring and regulatory framework in developing and managing groundwater resources. The GoE has attempted to resolve the issue by implementing different nationwide programmes, including the shallow aquifer mapping initiative, launched by the Ethiopian Agricultural Transformation Agency (ATA) in 2013 across selected areas in Ethiopia.[9] This mapping exercise is based on acquiring extensive field data of shallow aquifers, remote sensing, and modelling to promote smallholder irrigation.

1.3 CLIMATE CHANGE IMPACTS

Climate change will increase rainfall amounts and intensity, although higher temperatures will also increase evaporation. Ethiopia has naturally high inter-seasonal rainfall variability. The driest regions in the east also have high interannual variability. By 2060, climate change will increase average temperatures by 1.2–2.6°C and a precipitation change between -17 and +27 mm/year, with an average increase in precipitation between September and December. However, higher evaporation losses due to increased temperatures will offset most of these gains.[10]

The main climate change impact for Ethiopia will be an increase in the frequency, magnitude and scale of droughts, raising the risk of famine and major economic losses, especially in eastern Ethiopia. The *belg* rains, in particular, have been increasingly unpredictable, which negatively affects growing cycles and thereby staple food production.[11] Drought risks are high in most eastern basins and almost 90% of drought-prone regions are in lowland areas. Over the past 30 years, Ethiopia has had seven major droughts, resulting in five famines. Prolonged drought between 1983 and 1985, coupled with political instability and conflict, caused Ethiopia's worst famine in a century and led to the deaths of over 1 million people.[12] The 2015 drought was one of the worst in recent history, with precipitation 65% below average in the north-eastern and central regions. By 2016, over 10 million people required emergency assistance, as 1 million livestock and 75% of croplands were lost in the worst affected areas.[13] Besides droughts, climate change will also lead to heavier rainfall and increased flood risks, particularly in the Awash and Wabi-Shebelle basins, and in parts of the Great Rift Valley.

Figure 3. AQUIFER TYPE AND PRODUCTIVITY IN ETHIOPIA[7]



1.4 WATER USE IN ETHIOPIA

When looking at the water footprint (the amount of local water resources used to produce goods and services within the country) of agriculture, industry and domestic water use, the total annual water footprint of production in Ethiopia is 77.2 billion m³. As much as 98% of this is green water footprint, that is the use of rainfall or soil moisture by vegetation. The remaining 2% of the water footprint is the use of surface water and groundwater (blue water) for agriculture (irrigation), industry and domestic water supply. Of the green water footprint, 25% is used for grazing, while 75% is consumed in crop production. Around 98% of the green water footprint is used for the production of products used within Ethiopia, with the remaining 2% consumed for export products. Of the blue water footprint, 34.5% is used for animal water supply, 63.6% is used for producing crops, 1.8% is used for domestic water supply and 0.1% is industrial water use. A total of 84% of the annual blue water footprint is for domestic production, with the remaining 16% for export products.[14]

Although Ethiopia's water footprint is thus largely dependent on green water, blue water scarcity is increasingly becoming a problem in many parts of the country. Blue water scarcity compares the blue water footprint with the blue water available after environmental flows are met. Figure 4 indicates that, in large parts of Ethiopia, the blue water footprint is exceeding water resources on an annual level (when blue water scarcity > 1), with the north and east experiencing significant (orange) and severe (red) scarcity, while the south also has to cope with moderate (yellow) scarcity.[15] This situation, in combination with climate change effects, will increasingly call for a focus on water efficiency within production systems.

Table 1. WATER USE IN ETHIOPIA, QUANTIFIED FOR DIFFERENT PURPOSES

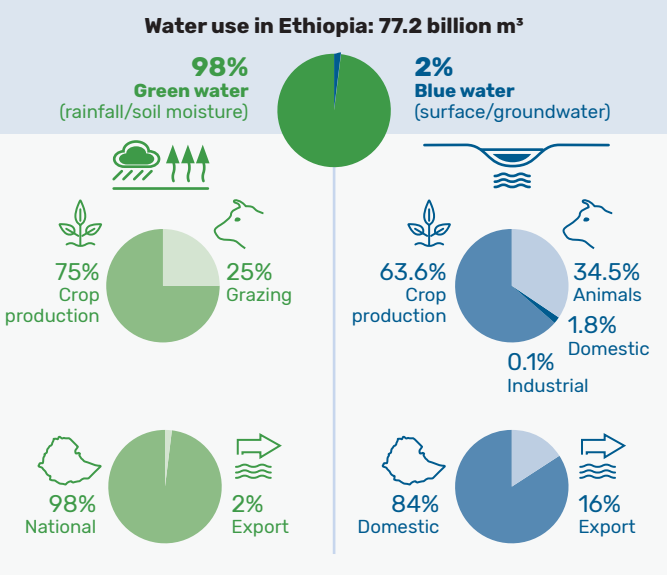
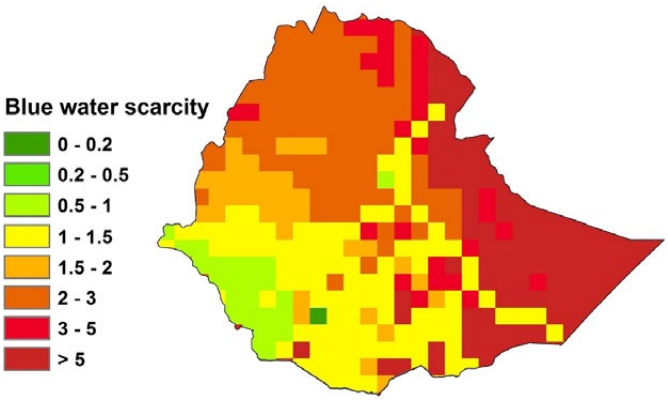


Figure 4. BLUE WATER SCARCITY IN ETHIOPIA[14]



1.5 POLICIES AND DEVELOPMENT PRIORITIES

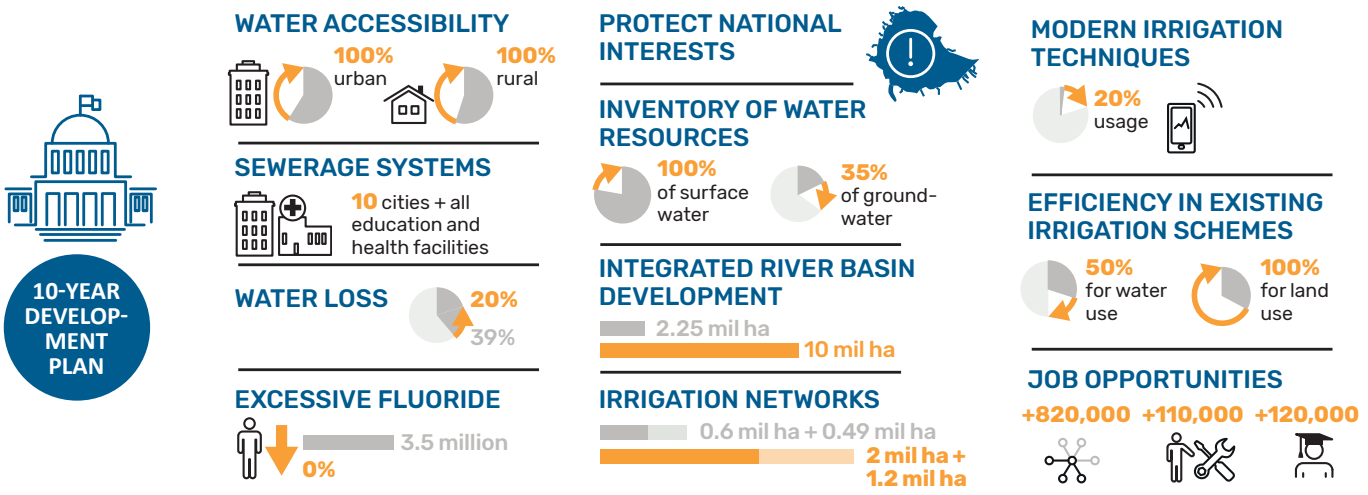
1.5.1 Policies

In terms of key policies, the Ethiopian Water Resources Management Policy dates from 1999 and is currently under revision. The EWRMP adopts basin and sub-basin management approaches, and outlines national goals, objectives and guiding principles for water resources management by prioritising water use for economic development and poverty alleviation. In the new water policy (expected in 2022, currently under review in parliament), more emphasis will be placed on private sector development and Integrated Water Resources Management (IWRM) as a guiding principle. Other key policies, laws and regulations include the Water Sector Strategy (2001, currently under revision), which outlines the national approach to irrigation, water and sanitation, and hydropower, and addresses transboundary water management and environmental mitigation for hydraulic infrastructure; and the Water Resources Management Regulations (2005), which establishes the rights and obligations of water users and government entities for water use and effluent discharge permits, water works construction, and well installations.[6]

1.5.2 Development plans

To reach Ethiopia's development goals, the country has embarked on an ambitious 10-year plan in which several water-related goals have been outlined. The principal objectives of this water resources development plan are to ensure equitable provision and accessibility of potable water, sanitation and hygiene services that meet quality standards; and to enhance the development and utilisation of the river basin and irrigation resources of the country. The main targets to be reached by 2030 that have been laid out in the development plan are to:[16]

- Expand **water accessibility** and supply coverage:
  - increase the share of rural residents with access to 25 litres of water per person per day, of which 50% is tap water, within 1 km, from 55% to 100%
  - increase the share of urban residents with access to 40–100 (depending on the city) litres of tap water per person per day, from 59% to 100%
  - provide multi-village water supply systems that are resilient to drought in 100 frequently vulnerable *woredas* (districts).
- Build integrated basic **sewerage systems** for 100 cities and ensure all rural villages have access to toilets, and provide potable water and sanitation services to all education and health facilities.
- Reduce the rate of **water loss** from 39% to 20%.
- Reduce the number of people drinking water containing **excessive fluoride** from 3.5 million to zero.
- Increase the coverage of **integrated river basin development** from 2.25 million hectares to 10 million hectares, and the number of eco-hydrology demonstration centres from 10 to 55.
- Fully protect national interests with respect to boundary and **trans-boundary rivers**.
- Increase the **inventory of surface water flows** from 78% to 100% and that of **underground water resources** from 18% to 35%.
- Raise the study and design of medium- and large-scale **irrigation networks** from 600,000 hectares to 2 million hectares, and their construction from 490,000 hectares to 1.2 million hectares.
- Increase the application of **modern irrigation techniques** from 2% to 20%.
- Increase **water use efficiency** from 30% to 50%, and land use efficiency from 33% to 100%, in 20 existing irrigation schemes.
- Create 820,000 **job opportunities through irrigation** network expansion, 110,000 job opportunities through irrigation infrastructure maintenance, and 120,000 new job opportunities for graduates.



1.5.3 Stakeholders

The federal constitution provides for five levels of government: federal, regional, zonal, *woreda* and *kebele* (sub-division of district, a neighbourhood), along with specific powers and functions at each level. Several water sector institutions have been established at federal, regional and zonal level under the regionalisation and decentralisation policy. With relatively old federal policies that comprise little operational details and traditionally strong regional roles, the distribution of responsibilities is sometimes unclear, resulting in an overlap of tasks and activities between the federal, regional and zonal governments. The regional role is particularly paramount in the regulation of tariffs, quality standards and other directives for the water sector that are largely decided at the state level. At the federal level, the public institutions involved in water resources development and management include:[6]

- The **Ministry of Water and Energy** (MoWE), which is the primary entity in charge of water resources management, water dispute resolution, designing water policy and legal frameworks, conducting basin studies, operating water infrastructure, and monitoring and regulating water quality.
  - On a basin level, currently three **Basin Development Offices** (BDOs) exist for the Awash, Abay and Rift Valley basins. These BDOs are executive organs, accountable to MoWE, and prepare basin management plans, issue water use permits and collect water use fees.
- The **Ministry of Irrigation and Lowlands** (MILLs) is responsible for the planning, construction and management of irrigation dams, as well as lowland research and development activities.
- The **Environmental Protection Authority** (EPA) is responsible for the preparation of environmental protection policy, laws and directives. It is also in charge of evaluating the impact of social and economic development projects, particularly irrigation and hydropower projects, on the environment. EPA furthermore collects water quality data, and performs the administration of environmental regulations relating to surface water pollution.

At regional (sub-national) level, Regional Water Bureaus (RWBs) plan and develop regional water supply projects and provide oversight and technical support to water service providers. They also oversee sub-regional Woreda Water Offices and Zonal Water Bureaus.[6]

1.5.4 Investment incentives in the Ethiopian water sector

The following investment incentives are currently applicable to all sectors:

- Corporate income tax exemption.
- Duty-free importation of capital goods and construction materials necessary for the establishment of a new enterprise or the expansion or upgrading of an existing enterprise.
  - This includes machinery, equipment and their accessories needed to produce goods or render services, as well as workshop and laboratory machinery and equipment.
- Duty-free importation of spare parts if their value is not greater than 15% of the total value of the capital goods within five years from the date of commissioning of the project.
- Duty-free importation of some vehicles.

This means that most water-related goods ((waste)water treatment systems, irrigation equipment, etc.) are exempt from import tax.

N.B. These incentives are for investments, limited to a specific period (depending on the investment activity) and strictly dependent on the approval of the Ministry of Finance. The Dutch Government also provides instruments to insure export contracts. A good example would be the instruments of Atradius DSB (www.atradiusdutchstatebusiness.nl/en/). Please reach out to TRAIDE for more questions about (Dutch) instruments relevant to your business case.

1.5.5 Water-related imports

In 2020, the total value of water sector-related imports exceeded US$300 million, with the hydraulic power engines and motors and pumps categories having the highest total import value. Other important water-related import goods are hydraulic turbines, tubes, pipes and hoses, and water filtering equipment. In terms of countries, China is clearly dominating the market, with over US$150 million of export value to Ethiopia, followed by the United States (US$46 million) and the United Kingdom (US$35 million). Dutch exports to Ethiopia amount to approximately US$2 million, mostly consisting of mechanical appliances for projecting/disbursing/spraying water.[17]

Figure 5. VALUE OF DIFFERENT CATEGORIES OF WATER SECTOR-RELATED IMPORTS TO ETHIOPIA

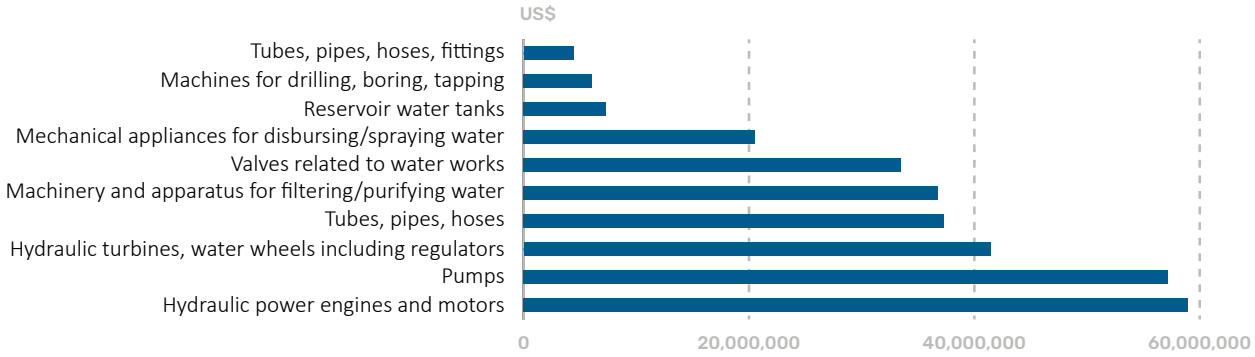


Figure 6. VALUE OF DIFFERENT CATEGORIES OF WATER SECTOR-RELATED IMPORTS FROM THE NETHERLANDS TO ETHIOPIA

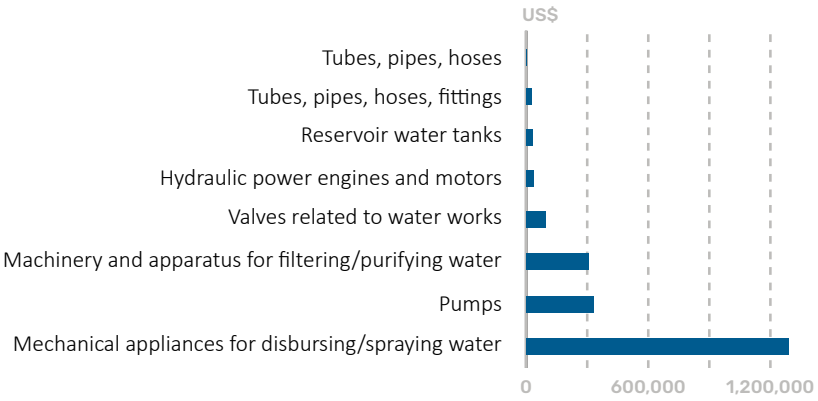
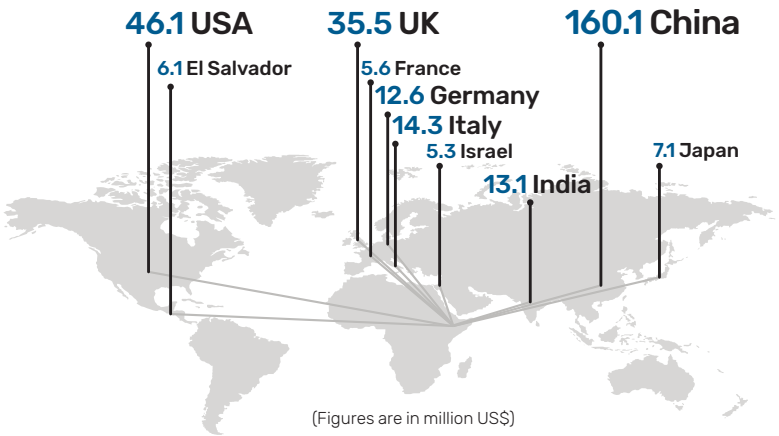
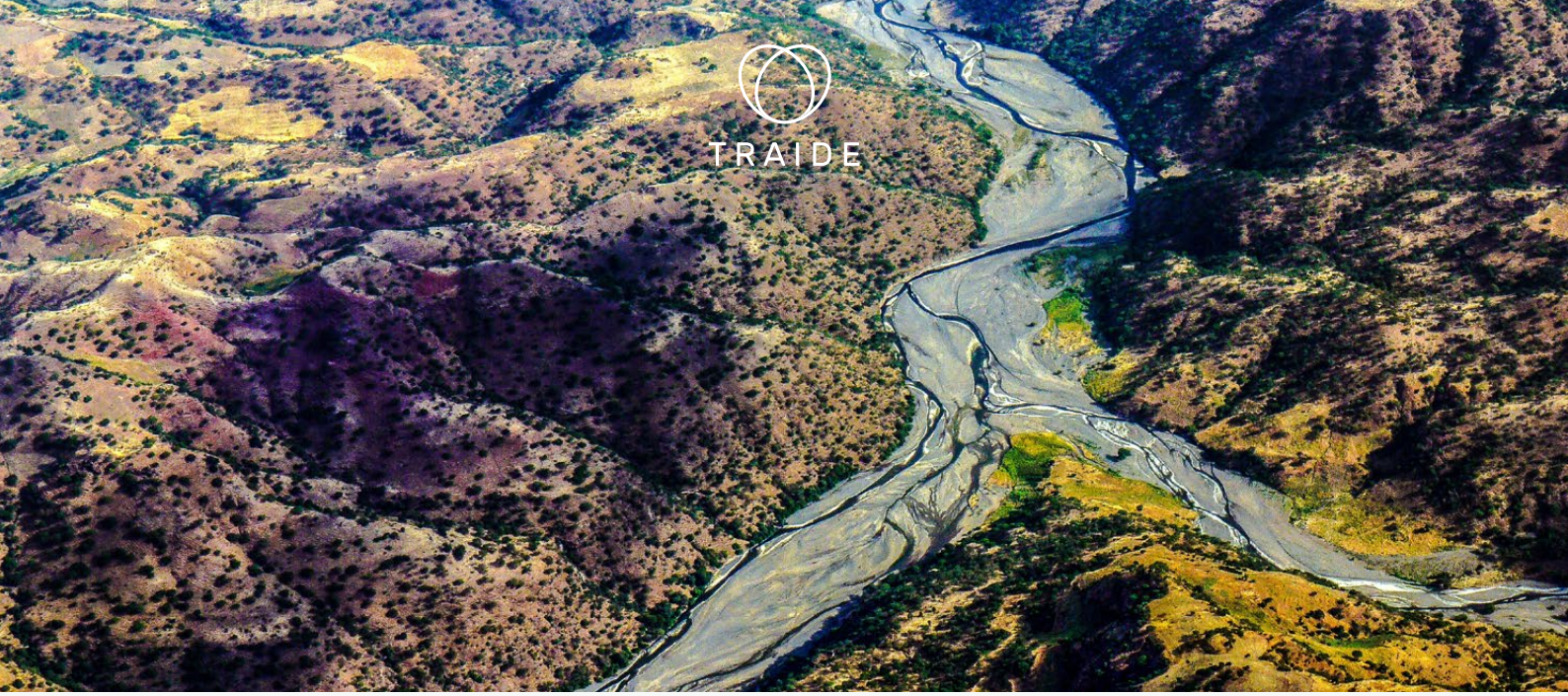


Figure 7. TOP EXPORTING COUNTRIES OF WATER SECTOR ITEMS TO ETHIOPIA





2. Sub-sectors

2.1 INTEGRATED WATER RESOURCES MANAGEMENT

Integrated Water Resources Management (IWRM) is increasingly acknowledged as a guiding principle within Ethiopia's water resources management policies, such as in the National Integrated Water Resources Management Program (2019).[18] Moreover, there is a well-defined, community-based, participatory, watershed development guideline, which outlines information on how to plan, design and implement community watershed development activities.[19] A more integrated approach to water-related problems is necessary, given the most pressing issues in Ethiopia's river basins: catchment degradation, seasonal flooding and inefficient groundwater management.

2.1.1 Catchment degradation

Ethiopia is dealing with severe catchment degradation: unsustainable farming practices and deforestation cause increased soil erosion levels, which causes soil fertility loss, lower infiltration levels (impeding groundwater recharge) and sedimentation of reservoirs and lakes. Agricultural activity throughout the Rift Valley is causing sedimentation and eutrophication in downstream reservoirs, lakes and wetlands, thereby deteriorating the availability and quality of these water sources. Agricultural clearing, natural steep topography, and high precipitation intensity cause almost 2 billion tons of soil erosion annually.[20] Croplands in highland areas deliver twice the sediment and nitrates as grasslands, which increases downstream turbidity and eutrophication risks at the Legedadi, Aba-Samuel, and Gilgel Gibe I Reservoirs.[21] Direct cultivation in wetlands also threatens biodiversity and water quality. The Shesher and Wallala wetlands around Lake Tana have become fragmented and smaller in size after *teff* cultivation, a cereal grain, increased. Runoff from wetland agriculture has contributed to widespread eutrophication in lakes and caused fish populations to decline. Increasing fertiliser application rates and livestock waste are key contributors to elevated concentrations of phosphorous and nitrogen in surface waters, which cause regular algal blooms.[22]

OPPORTUNITIES

Assistance regarding measures to tackle catchment degradation can be provided in the form of hydro(geo)logical assessments, consultancy on catchment management plans and capacity building for management agencies. In the execution of management activities, there is a need for catchment monitoring tools and equipment, including remote sensing-related services. Community-based watershed approaches can further be developed to counteract catchment degradation processes.

2.1.2 Flooding

Seasonal floods caused by heavy rainfall are already an issue, and will be aggravated by climate change effects. Flood impacts are already severe, especially in lowland areas, due to naturally high rainfall intensity and steep topography, as well as upper basin land use changes and deforestation.

Between 1991 and 2019, floods resulted in 3,000 deaths, displaced 1.3 million people, and the loss of 250,000 cattle and half a million hectares of cropland. The most serious flood problems are found in the Awash River Basin. Irrigation development in this basin is quite advanced and is located in the flood plains on either side of the river, with close to 70% of the country's large-scale irrigated agriculture; thus, high economic damage occurs during flooding. It is estimated that in the Awash Valley almost all of the area delineated for irrigation development is subject to floods; this amounts to an inundated surface of some 200,000–250,000 ha. during high flows. In terms of flood protection, some farm areas are protected by dikes along the river, and flood damage has been further mitigated by the construction of several dams. Currently, no flood forecasting and warning mechanism exists in Ethiopia.[23,24]

OPPORTUNITIES

Possible opportunities include technical advice, such as GIS mapping and hydrological modelling, linked to land use planning and water management. Besides flood mitigation activities, adaptation-related efforts such as flood forecasting and early warning mechanisms are also needed. Other opportunities exist in infrastructure development (flood protection levees, damming). In particular, nature-based solutions (such as the 'Room for the River' approach) provide promising approaches to flood risk management in the Ethiopian context.

2.1.3 Groundwater

Although groundwater is abundant in some areas, management issues – such as a lack of data, unregulated groundwater development, and lack of coordination between different users and management entities – lead to ineffective and sometimes unsustainable use of this resource. Studies on groundwater sustainability and abstractions are generally limited. Groundwater accounts for 90% of domestic/municipal and industrial supply. Around 70% of rural water supply is from groundwater, with comparable usage rates (60%) in Addis Ababa. Groundwater dependency is highest in the more arid Wabi-Shebelle and Ogaden basins, although groundwater is not very accessible in some regions due to its depth. Pastoralists in these basins also depend on groundwater for livestock watering and agriculture to complement ephemeral surface water sources. Groundwater use in irrigation is low.[25]

OPPORTUNITIES

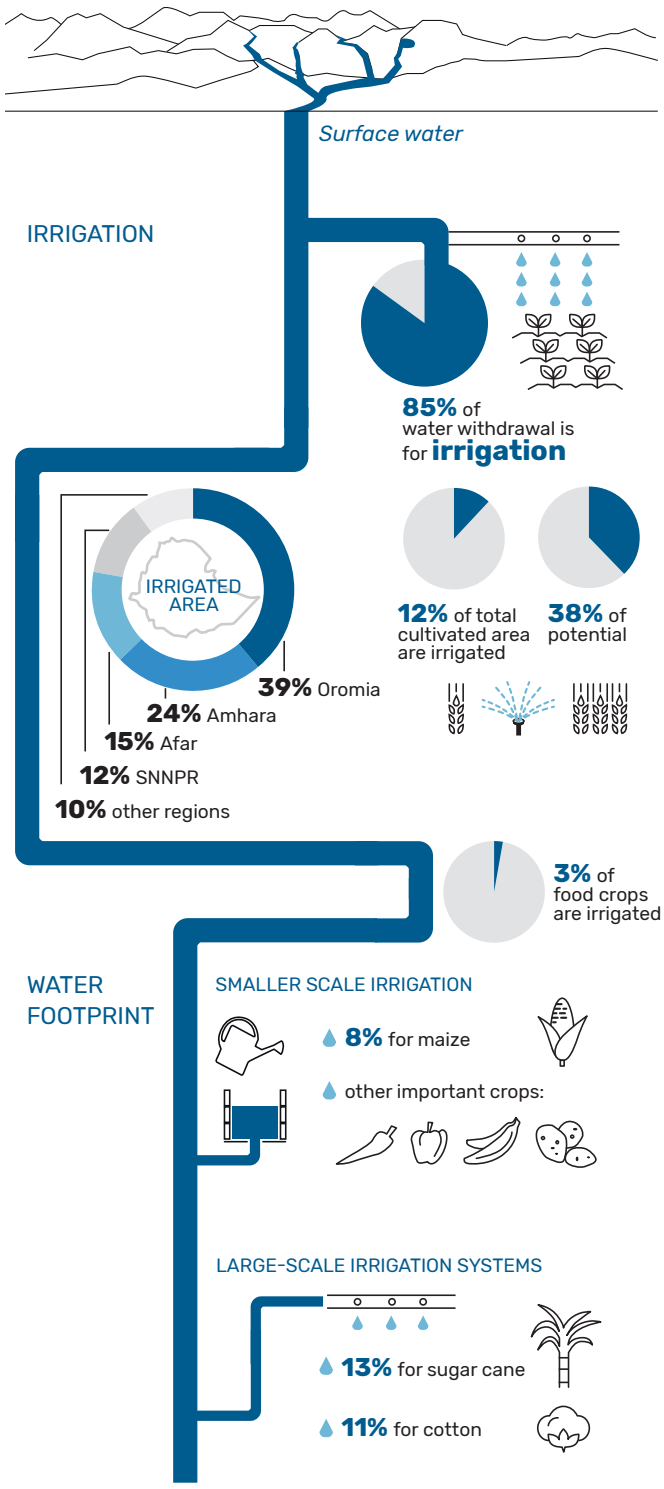
Hydrogeological assessments and borehole mapping studies are needed, next to monitoring equipment and capacity building relating to groundwater management. Exploring 3R (Recharge, Retention and Reuse) solutions to enhance rainwater harvesting and sub-soil infiltration as alternative water source provides another opportunity, especially in the arid lowland areas.

CATCHMENT CASE STUDY | Awash Basin

In the Awash Basin, in particular, there is an increased focus on solving catchment issues using an IWRM approach, given the severity of water-related issues in the basin. The Awash Basin has low water supply, high demand, limited water storage capacity, and is vulnerable to both floods and droughts. Approximately 19 million people reside in the Awash Basin, which features Ethiopia's largest cities, including Addis Ababa. Almost 200,000 hectares of irrigated farmland, two-thirds of national industries, and over 34 million livestock are located in the basin. The Aba Samuel, Gafarsa, Koka, Kessem, and Tendaho Dams provide water storage for municipal and agricultural use, as well as hydropower. Additional storage is needed, as sedimentation has reduced reservoir capacity. Sedimentation has inhibited hydropower generation and reduced the capacity of Addis Ababa's largest and most important reservoir at Koka Dam (original capacity 1,900 million m³) to 40% of its original capacity since it was built in 1959.

2.2 IRRIGATION

Irrigation is the largest source of demand for surface water. Approximately 85% (around 9,000 million m³ per year) of all water withdrawals are for irrigation, mostly from surface water. Only 10% of municipal and industrial withdrawals are from surface water. Almost 2 million hectares are irrigated, mainly in the Omo-Gibe and Rift Valley basins, although most irrigation is seasonal. This amounts to 12% of the total cultivated area, and about 38% of the total irrigation potential (5.3 million ha) in Ethiopia.[20] Region-wise, about 39% of the irrigated area is in Oromia in central Ethiopia, followed by 24% in Amhara in the north, 15% in Afar in the northeast and 12% in SNNPR, while the remaining 10% is in the other regions. Most irrigated land is supplied from surface water, while the use of groundwater has only recently started. Both irrigated and rainfed agriculture are important. Virtually all food crops in Ethiopia come from rainfed agriculture, with the irrigation sub-sector accounting for only about 3% of the food crops. Medium- and large-scale irrigation schemes are managed by government enterprises or private farms. The management of small-scale irrigation schemes is the responsibility of the farmers themselves. Drainage is as important as irrigation, particularly in the highlands of Ethiopia. Drainage is not yet given the required attention in rainfed agriculture, where farmers construct traditional drain ditches commonly diagonal to the main slope of the farmlands.[25,26]



2.2.1 Crops and irrigation technologies

In terms of blue water footprint (the volume of surface or groundwater evaporated or incorporated into a product), sugar cane (13%), cotton (11%) and maize (8%) are the crops using the largest amounts of irrigation water. Other important irrigated crops are chilies and peppers, bananas, potatoes, and other vegetables.[14] Sugar cane and cotton, in particular, are often irrigated using large-scale surface irrigation systems or overhead sprinkler installations, while maize and other crops are typically irrigated on a smaller scale. For most irrigated crops, water efficiencies are rather low for a variety of reasons (inappropriate technologies, low input use, management issues) and leave ample room for improvement to increase food security in the country.[27]

2.2.2 Irrigation development

The GoE is increasingly aiming at irrigation as a pathway for agricultural and economic development. In the Ten Years Development Plan (2021–2030), the design and construction of medium- and large-scale irrigation systems is stressed, as well as the application of modern irrigation techniques (sprinkler, drip) and increased water use efficiency. Moreover, the establishment of a new, separate Ministry of Irrigation and Lowlands stresses the increased attention on irrigation. In addition to state-planned irrigation, there is a high and growing number of small-scale commercial farmers who, in total, use considerable amounts of water. There are about 3 million smallholder farmers, with an average farm size from 0.5 hectares to 2 hectares, currently producing 95% of the country's food crops.[28]

OPPORTUNITIES

The increased focus on irrigation presents opportunities to integrating agricultural activities and water management to ensure sustainable development. **Availability mapping** of (ground)water resources and advice on their use and management is necessary for sustainable resource development. In addition, there is a need for **capacity building on sustainable water use**, focusing on water efficiency in the agriculture and horticulture sector, among large-scale irrigation operators and smallholder irrigators alike. Further consultancy opportunities exist in **monitoring agricultural water use**, in terms of tools and advice, both in-field and using remote sensing techniques. Moreover, **irrigation equipment and spare parts** are vital to develop and sustain the irrigation schemes. The fast-growing agricultural export businesses (fruit, vegetables, flowers and cuttings) also present business opportunities for irrigation equipment and **water monitoring tools**. All agriculture machinery and equipment, including pumps and spare parts, necessary to produce export products are tax exempt and imported through suppliers' credit. Additional tax incentives may be available for export products.[28]

2.3 WASTEWATER TREATMENT

Ethiopia aims at being a manufacturing hub at the forefront of light industry, particularly in textiles. The groundwork has been laid by the country's affordable electricity prices, one of the cheapest workforces worldwide, and the politically backed establishment of export-oriented industrial parks in different parts of the country. Other important (exporting) industries in Ethiopia are the leather, food and beverage industries. With generally stringent water pollution guidelines outlined in the water, environment and health legislation, actual law enforcement has yet to catch up. The high costs of installing treatment systems and the, at times, inadequate enforcement, lead to mixed results in an otherwise developing sector. On the positive side, with mounting pressures from the affected population that is basing their demand on existing regulations and policies, water polluters are increasingly obliged to invest in treatment infrastructure, especially companies seeking to export goods which need to comply with international standards for environmental safeguarding. On the other hand, loopholes are being sought and wastewater treatment plants are badly designed, operated only irregularly, or poorly built.[29]

2.3.1 Industrial parks

Ethiopia strives for world-class industrial parks with complete infrastructure to improve the investment climate, promote the manufacturing sector in the country and enhance the country's exports. In 2014, the GoE established the Industrial Parks Development Corporation of Ethiopia (IPDC) with a mandate to develop and operate industrial parks in the country. To date, IPDC has developed 13 industrial parks.[30] Private initiatives to set up industrial parks complement the efforts on Ethiopia's pathway to industrialisation. With the goal to meet international environmental standards, each of the publicly run industrial parks is equipped with internal wastewater treatment plants. Oftentimes, the design comprises of treatment for both domestic and industrial wastewater.

OPPORTUNITIES

The ongoing development of industrial parks (IPDC aims to have completed the construction of 30 parks by 2030) presents good opportunities for the construction of industrial wastewater treatment equipment and technologies. However, wastewater treatment plants to be constructed as part of these parks are often contracted as turnkey projects, which are mostly sourced from Asian countries, making project access challenging. These civil works are often undertaken by foreign contractors (mostly from China and India) sourcing equipment from their home markets. This makes access to these markets challenging for other companies, while contract partnerships with these foreign contractors could be sought as another option to enter the market.

2.3.2 Other industrial wastewater treatment facilities

The significance of wastewater treatment has gained traction among private industrial parks, as well as domestic industries operating outside of these parks.[29] However, many of this latter group (such as local tanneries, paper, food and beverage factories) are still discharging untreated wastewater effluent directly into the environment, a striking example being the Akaki River in Addis Ababa. It is also recognised that many of the standalone textile and garment factories in Ethiopia do not have any effluent treatment plants as part of their waste disposal processes.[31,32,33] Another issue is degrading surface water quality caused by large-scale gold mining in the south and artisanal gold mining nationwide.[6]

OPPORTUNITIES

Promising opportunities exist in providing industrial wastewater treatment equipment and technologies (including measuring and monitoring equipment) for high-end exporting industries, most notably in leather, textile, food and beverages, chemicals, pulp and paper, and mining/metal industries.[6] These industries have to comply with international environmental standards, and have fewer problems with foreign currency availability to invest in wastewater treatment facilities from foreign companies. Another opportunity is to implement circular approaches where treated wastewater is reused for a variety of purposes (within or outside the industry).

2.3.3 Municipal wastewater treatment

Municipal wastewater treatment plants (MWWTPs) are designed and constructed to treat wastewater originating from residential buildings, non-industrial businesses, and institutional sources. They may also handle industrial wastewater after pre-treatment. The Addis Ababa Water and Sewerage Authority is the dominant player in this sub-sector and operates over 17 MWWTPs, although many of these are currently not operating at full capacity.[34] Other cities in the country do not have a conventional wastewater treatment plant.[29]

OPPORTUNITIES

The absence or poor condition of municipal wastewater treatment facilities in many cities creates opportunities for installing in-situ solutions, such as compact containerised water treatment systems, but also solutions like reed-bed systems, which can treat the effluent before it is discharged into local ecosystems. Moreover, improved sludge management can be geared towards the production of briquettes and fertiliser. This would provide an additional source of income and diminish a potential environmental risk of pollution by uncontrolled discharge of sludge.

2.4 DRINKING WATER

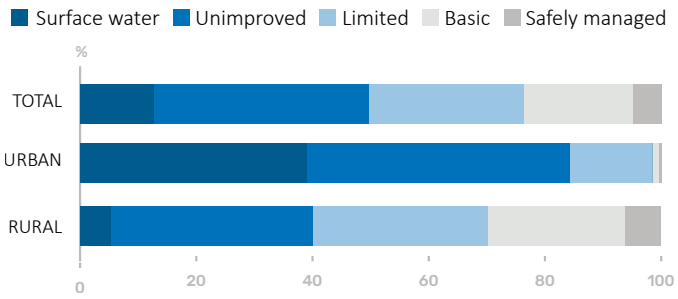
According to UNICEF and WHO data,[35] roughly half of the total population in had at least a basic supply of drinking water in 2020. Access to drinking water that is considered safe by international indicators is only available to around 13% of the population. The latter covers a total of 39% of those living in urban areas, and only 5% of rural livelihoods. The rest of the population uses water access methods considered unsafe, e.g. surface water abstraction or rainwater harvesting, as the chart below shows. In Addis Ababa, the Water and Sewerage Authority currently cannot meet the demand of more than 75% of the city's population, and distribution is rationed in most areas.[36]

2.4.1 Developments in access to water supply

In recent years, the country has made considerable progress in ensuring that larger parts of the population gain access to safe drinking water. Nevertheless, despite a significant increase in access to safely managed drinking water in absolute numbers, the constantly high population growth has diminished some of the progress made if measured on a percentage base. The portion of the population with at least limited access to drinking water in their households is estimated to stand at around 76%. Nevertheless, the supply and quality standards vary. Partly because of this, bottled water is in high demand, although the production capacity of bottled water is too low, with the existing companies supplying only 5% of the projected total consumption required in Ethiopia. Many of the over 100 bottling companies have stopped operations due to lack of forex to import raw materials.[28]

With more domestic and international funds channelled into the water sector, the number of people with access to safely managed drinking water has been constantly growing in recent years and is expected to continue doing so. A notable programme is the government-led initiative called 'One WASH', which has committed significant funds to improve sanitation infrastructure throughout the entire country, focusing on urban and rural areas, as well as building stronger resilience against the adverse effects of climate change.[37] Although promising, targets have not been reached due to major funding gaps and a lack of implementing capacity.[38] Another notable project is the World Bank-funded Second Ethiopia Urban Water Supply and Sanitation Project with a budget of over US$500 million.[39]

Figure 8. SERVICE LEVELS IN ACCESS TO DRINKING WATER IN ETHIOPIA (2020)[35]



OPPORTUNITIES

The ongoing efforts to increase drinking water availability present opportunities in urban, large-scale water service delivery settings, as well as for small-scale household drinking water solutions. In rural settings, smart low-tech solutions for water abstraction and treatment are needed. In these areas, people are often widely dispersed and communal water systems might therefore not be feasible. Conflict over water could also increase due to less predictable rainfall patterns, water pollution or contamination and limited access to water sources. This calls for climate-smart, decentralised solutions for water supply and treatment, for both productive and domestic purposes. Especially in remote areas where fuel shortages pose problems for pumping systems, off-grid solutions (solar, wind) are promising options. Such solutions could also be used for multiple-use water systems, with domestic water provision being combined with water for agricultural purposes (livestock or irrigation).

2.4.2 Drinking water pollution

Naturally occurring fluoride is widespread in the Great Rift Valley and poses serious health risks. Around 30% of Ethiopia's groundwater has naturally high salinity and fluoride. Concentrations of fluoride are nearly three times the WHO guideline value for fluoride in drinking water (1.5 mg/L) in approximately one-third of boreholes and one-half of shallow wells in the Great Rift Valley. The highest concentrations measured are over 50 times the guideline value. High levels of salinity are found in volcanic aquifers throughout the Great Rift Valley, and in the sedimentary aquifers in the south, southeast and northeast. Other limited studies have identified arsenic in some parts of the Great Rift Valley.[6]

OPPORTUNITIES

In urban settings, opportunities exist for large-scale drinking water treatment facilities and technologies. In rural settings, household purification technologies are needed to provide safe drinking water.

2.4.3 Cost recovery

Tariff setting for water supply in Ethiopia is among the lowest in the world. In Addis, small consumers pay only 2.5 Birr per m³ (€0.04), while the cost of supplying water to consumers is 27 Birr per m³, so the tariff is insufficient to cover operations.[40] Another challenge is non-revenue water (NRW) in piped water provision. The coverage of both piped and non-piped has been steadily increasing over the years, especially piped water in urban areas. However, one of the major issues affecting water utilities in Ethiopia is the considerable difference between the amount of water put into the distribution system and the amount of water billed to consumers (i.e. NRW). High levels of NRW reflect huge volumes of water lost through leaks, not being invoiced to customers, or both.[41] In the capital in particular, there is increased attention on this issue, since the Addis Ababa Water and Sewerage Authority (AAWSA) recently signed an agreement with the Japan International Cooperation Agency (JICA) to strengthen its capacity regarding NRW.[42]

OPPORTUNITIES

To improve cost recovery, several types of innovative solutions are needed: measuring and monitoring equipment, but also capacity building and consultancy related to utility service delivery strategies.

INFO BOX | Sources for tenders and other business opportunities in Ethiopia

NEWSPAPERS

- **Addis Fortune**
- **The Reporter**
- **Ethiopian Herald**

OTHER

- **2Merkato**
- **World Bank**
- **United Nations**
- **GIZ**
- **African Development Bank**
- **African Union**

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ANNEX 1 | About Ethiopia

OFFICIAL NAME
Federal Democratic Republic of Ethiopia

LOCATION
Ethiopia is in the north-eastern part of Africa known as the 'Horn of Africa'. It enjoys a unique location at the crossroads between Africa, the Middle East and Asia.

CAPITAL CITY
Addis Ababa. Both the African Union (AU) and the United Nations Economic Commission for Africa (UNECA) are headquartered in Addis Ababa.

AREA
1.13 million square kilometres

ARABLE LAND
513,000 square kilometres (45%)

POPULATION
Ethiopia is the second most populous nation in Africa, after Nigeria, with a population size of 114,963,583.[1]

PEOPLE LIVING IN EXTREME POVERTY
23,703,403 (21%)

POVERTY THRESHOLD
US$1.90

CURRENCY
Ethiopian Birr (ETB)

FOREIGN CURRENCY
The National Bank of Ethiopia is the central bank of the country which, among other activities, regulates foreign currency matters. Traders as well as manufacturers face difficulty obtaining foreign exchange to import goods for domestic sale and manufacturing inputs. The forex shortage is aggravated by the low export performance of the country and international debt.
In the foreign currency sector of the country, it is important to keep in mind that the National Bank of Ethiopia regularly announces changes in foreign currency management and utilisation regulations. In recent years, this has been an ongoing an issue for traders, manufacturers and other businesses.

LANGUAGE
Amharic is the working language of the federal government. Oromiffa, Tigrigna, Somali, Sidaama, and many other languages, are widely spoken. English is taught in schools and is the main business language.

POLITICAL SYSTEM
Federal state with a multi-party system

CORRUPTION PERCEPTION INDEX
87th out of 180 countries[2]

POLITICAL STABILITY
Ethiopia has been troubled by unrest since 2015. A range of actors have been trying to gain control of the political landscape, which has repeatedly affected peace and stability. The resulting social unrest has affected (Dutch) businesses in different ways. The recent conflict in the northern region of Tigray has had significant country-wide socioeconomic impacts, and peace and reconciliation efforts have been slow to materialise. Although doing business in Ethiopia is not easy, there are ample examples of (Dutch) businesses expanding their operations. These companies have proven to be knowledgeable about the local context and have mitigated risks through their Responsible Business Conduct (RBC).

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