



Strategic Investment Pathways: The Zambezi Basin case study

Water resources and the enabling environment for investment that drives sustainable development OECD (2020)

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1 Water as a driver for sustainable growth in Zambia

Introduction

Zambia is one of the fastest growing economies in Sub-Saharan Africa. The country is endowed with rich natural resources: minerals, forests, agricultural land and water resources. The potential of this natural capital contributes positively to Zambia's quest towards reaching middle-income status by 2030. In 2014, natural capital represented 40% of Zambia's total wealth, with renewable resources constituting 73% of this natural capital, valued at USD 644 billion (The World Bank, 2019^[1]). However, only with improved strategic management of these resources, can Zambia realise positive economic growth and sustainable development over the long-term.

Sustaining long-term economic development requires the use of existing natural resources in an effective and efficient way that delivers benefits to communities, economies and the environment. In particular, the use of water resources for productive purposes provides critical revenues for economic growth and poverty reduction. Many of Zambia's core economic activities are dependent on the water resources from the Zambezi River Basin, providing vital support for the country's mining, fisheries, agriculture, tourism and manufacturing sectors (The World Bank, 2010^[2]). A water-abundant country, water availability in Zambia is estimated to be around 8 700 m³ per year, significantly higher than the average for Sub-Saharan Africa (7 000 m³ per person per year) and globally (8 210m³ per person per year). Water resources play a major role in the country's economic performance, especially due to its contribution to energy generation from hydropower, production of mineral resources and tourism (The World Bank, 2019^[1]).

In the Zambezi River Basin, the Kafue Flats, situated between the Kafue Gorge and Itzhi-tezhi Dam, provides a source of food, energy and water for 52% of the Zambian population, including the residents of the capital, Lusaka. The Kafue Flats is also home to over 470 species of birds and provides 50% of the total hydropower in Zambia (WWF, 2017^[3]). Lusaka, as one of the fastest growing cities in the Southern African Development Community (SADC), requires a sustainable and consistent supply of water resources to support livelihoods and economic growth over the long-term.

Water resources are vital for total energy production in Zambia, with around 95% of electricity produced from hydropower (WWF, 2017^[3]). The country's major industries such as mining, agriculture and tourism sector depend on the electricity produced in the hydropower produced in the Zambezi Basin (The World Bank, 2010^[2]). The export of hydropower is also a source of revenue for the country. According to the Zambia Electricity Supply Corporation Ltd. (ZESCO), the value of electricity exports were 55 million USD in 2017, an increase from 45 million USD the previous year (ZESCO, 2017^[4]). The beneficiary countries from Zambia's hydroelectricity exports include the Democratic Republic of Congo, Namibia, Botswana, South Africa and Zimbabwe, based in the order of total export sales. This indicates that water resources not only contribute to the livelihoods of people domestically, but also to promote the long-term growth of the economy regionally.

Zambia is rich with minerals and precious stones, including copper, emeralds, zinc, lead and cobalt. Mining, as a primary industrial sector, is the largest single contributor to the Zambia's economy, representing 15% of the national GDP and 70% of the total exports. Notably around 60% of Zambia's electricity, powered by the water resources, is consumed by the mining industry in the Copper Belt province alone (WWF, 2017^[3]). Water produced by the mining section in the Copper Belt of Zambia is also an important source of the headwaters of the Itezhi-Tezhi Dam.

The country's rain-fed and irrigated agriculture, livestock and fisheries are also dependent on water resources. Agriculture represents 73% of water withdrawals in Zambia, where a great amount of sugar cane, maize and barley is irrigated primarily from water withdrawals of the Kafue Flats. In addition, the largest concentration of cattle grazing is made possible in Kafue Flats with an estimated 20% of the national herd (290 000 cattle) by drawing water resources from the region. Floriculture and horticulture industries are also active as one of the fastest growing industries. Major companies that directly benefit from the water resources include: Zambeef, Zambia Sugar, Zambian Breweries PLC, Coca-Cola Beverages Africa, and many others, which source large proportions of their inputs from the water resources in the region (WWF, 2016^[5]).

The tourism industry also benefits from Zambia's rich ecological endowment. Similar to Tanzania's natural attractions, Zambia has a number of remarkable wildlife and game reserves, which provide the country with abundant opportunities for tourism and earning foreign exchange. The wildlife estate includes 20 national parks, 36 game management areas (GMAs) and a bird sanctuary. Notable examples include Luangwa and Kafue National Parks, which possess some of the most prolific animal populations in Africa.

With these abundant natural resources, the contribution of tourism to the economy has grown from 2.3% of GDP in 2013 to 7.1% in 2018. In particular, expanding travel and tourism activities contributed to Zambia's 6.3% increase in GDP in 2018. Estimates suggest that the direct contribution of tourism to GDP which include economic activity generated by industries such as hotels, travel agents, airlines or other passenger transportation services, will grow at about 8% per annum between 2014 and 2024 (World Travel and Tourism Council, 2019^[6]). Therefore, the maintenance and restoration of healthy ecosystems to support nature-based tourism relies on sound management of water and land resources in the Kafue Flats and, more broadly, throughout the Zambezi Basin (WWF, 2017^[3]).

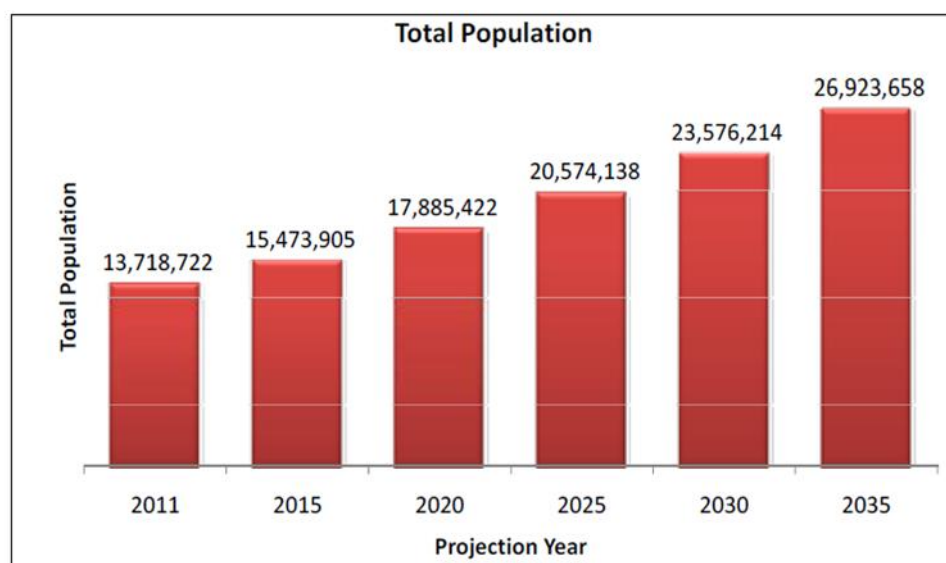
Given the centrality of water resources and natural capital more broadly to Zambia's economy, environment, livelihoods and communities, sound management of these resources is vital to promote sustainable long-term economic growth.

Growing pressures on water resources and challenges

Zambia faces increasing pressures on water resources, which will pose challenges to realising the full benefits of water for the economy, environment and society.

- **Demographic trends:** Zambia's population is projected to nearly double over the course of the 25-years between 2011 and 2035, with an annual average increasing rate of approximately 2.8%. In particular, the Lusaka province will be one of the fastest growing provinces with a rate of 3.6% annual population growth. At the same time, life expectancy at birth is expected to increase by 8.6 years from 52.6 years in 2011 to 61.2 years by the end of 2035 (Central Statistical Office, 2018^[7]). Population growth increases demand for domestic water consumption, energy and food.

Figure 1.1. Total Projected Population for Zambia, 2011-35



Source: Zambia Population and Demographic Projections, 2011-2035

Source: (Central Statistical Office, Republic of Zambia, 2013_[8])

- **Economic growth:** As summarised in Figure 1.2, steady economic growth is forecasted for the coming years, with water-dependent sectors expanding. At the same time, fiscal conditions are projected to tighten, putting further pressure on public budgets. Public debt as a share of GDP is expected to increase from 80% to 86% between 2019-21. Inflation is expected to reach above 10% over the next years.

Figure 1.2. Macroeconomic projections for Zambia, 2016-21

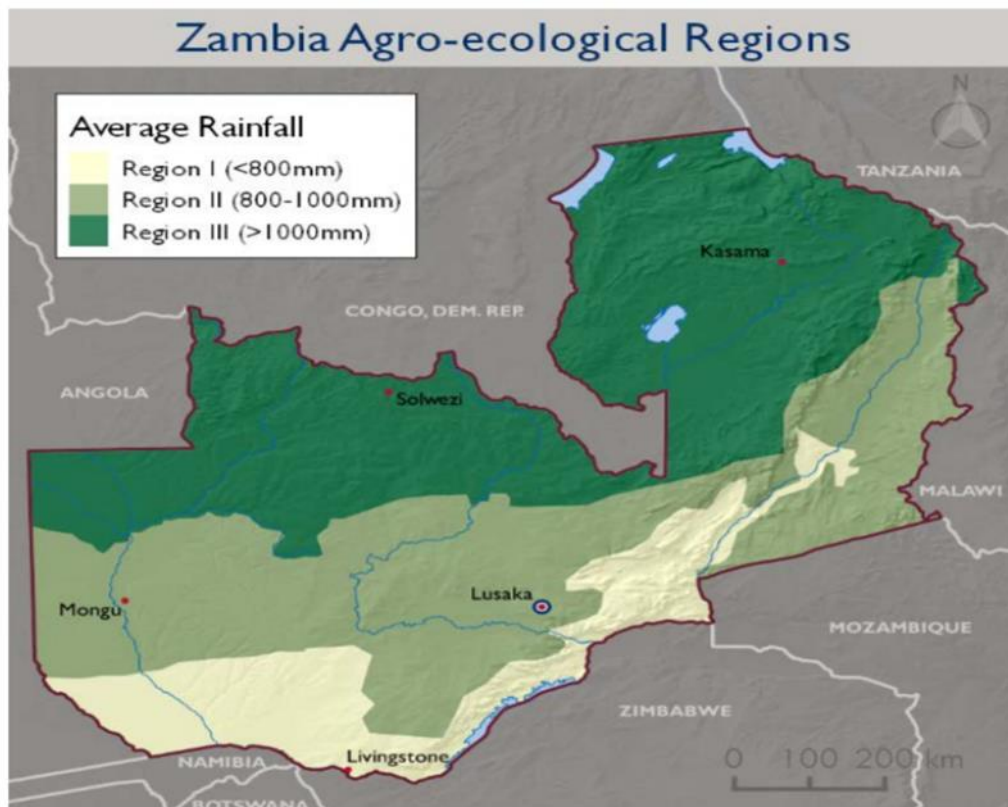
	2016	2017	2018 e	2019 f	2020 f	2021 f
Real GDP growth, at constant market prices	3.6	3.4	3.7	2.5	2.8	2.8
Private Consumption	2.0	3.4	3.5	3.1	3.1	3.1
Government Consumption	2.1	-0.3	1.3	0.5	0.2	2.7
Gross Fixed Capital Investment	1.0	-0.3	4.4	-0.1	0.9	-0.4
Exports, Goods and Services	-10.0	9.8	9.9	10.4	10.3	10.4
Imports, Goods and Services	-10.6	8.5	8.8	9.0	9.1	9.1
Real GDP growth, at constant factor prices	3.6	3.4	3.7	2.5	2.8	2.8
Agriculture	3.7	16.5	-6.5	-6.9	3.6	3.5
Industry	5.6	7.7	5.2	4.0	3.9	4.0
Services	2.5	-0.6	4.4	3.0	2.1	2.0
Inflation (Consumer Price Index)	17.9	6.6	7.2	8.9	10.8	11.8
Current Account Balance (% of GDP)	-3.2	-1.7	-2.6	-3.2	-3.0	-3.0
Net Foreign Direct Investment (% of GDP)	7.5	4.1	4.8	4.9	4.8	4.9
Fiscal Balance (% of GDP): cash basis	-5.7	-7.9	-7.5	-4.5	-5.1	-5.0
Fiscal Balance (% of GDP): commitment basis	-8.9	-4.3	-10.0	-6.5	-6.0	-6.9
Debt (% of GDP)	60.5	64.5	73.1	80.3	84.9	86.4
Primary Balance (% of GDP)	-2.2	-4.0	-2.6	-1.3	-0.6	-0.5
International poverty rate (\$1.9 in 2011 PPP)^{a,b,c}	57.2	57.1	56.8	56.5	56.1	55.9
Lower middle-income poverty rate (\$3.2 in 2011 PI)	74.1	74.0	73.9	73.7	73.5	73.2
Upper middle-income poverty rate (\$5.5 in 2011 PI)	87.1	87.0	86.9	86.7	86.6	86.5

Note: e = estimate, f = forecast.

Source: (World Bank, 2019_[9]).

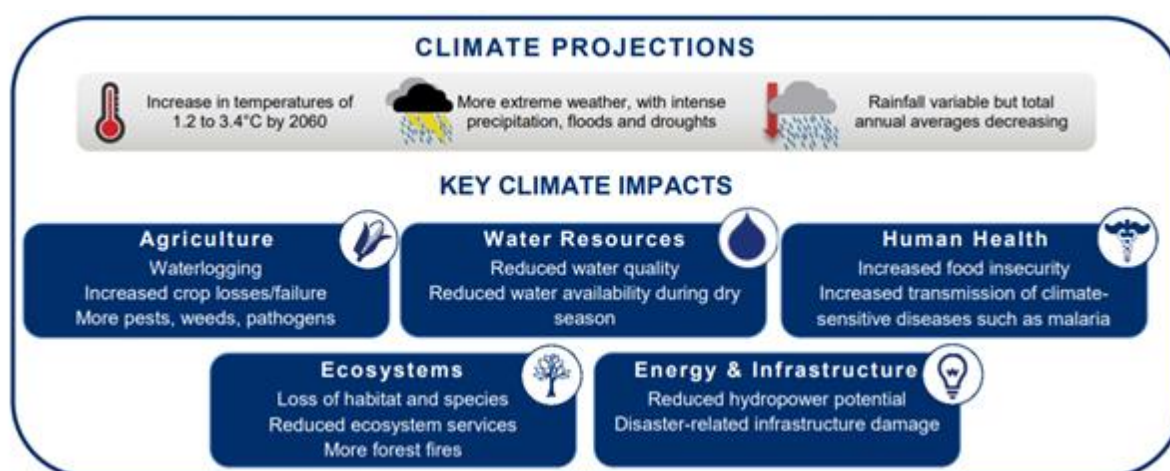
- Climate change:** Climate change is expected to affect rainfall patterns, the frequency and intensity of extreme events (e.g. floods and droughts) as well as the availability and demand for water resources (Figures 1.3 and 1.4 depict average rainfall in Zambia as well as projected climate impacts). According to Zambia's 7th National Development Plan, the impact of climate change will reduce annual economic growth by approximately 0.4%. It is further estimated that without substantial action, increasing rainfall variability alone could lead to losses of 0.9% of GDP growth over the next decade, thereby keeping a significant section of Zambia's population below the poverty line (Ministry of National Development Planning, 2017_[10]). Shifts in the timing and amount of rainfall results in changes in the operating rules of the dams and thus ecological flows. In addition, the increase in temperature leads to growing evaporation, causing water levels to drop and reducing generation capacity of hydropower station (including the Kafue Gorge). Recently, a fall in the country's hydropower generation by about 600 MW was attributed to declining rainfall, with spill over effects on agriculture, manufacturing, mining and other services (Ministry of National Development Planning, 2017_[10]).

Figure 1.3. Average Rainfall in Zambia



Source: (USAID, 2016_[11])

Figure 1.4. Climate projections related to water for Zambia



Source: (USAID, 2016^[11])

- **Increasing competition for water resources:** Growing demand for water resources increases competition among various sectors (energy, agriculture, manufacturing and domestic supply) as well as flows required for the environment to maintain ecological functions. Unstable or unreliable supply of water resources negatively affect hydropower production with cascading impacts to other sectors. Reduced domestic electricity supply constrains production levels or is supplemented by importing power and fuel at a higher cost.
- **Degradation of water quality:** Extensive use of fertiliser in agriculture has led to major eutrophication problems in the Zambezi River Basin, including rapid growth of invasive water hyacinth, which poses detrimental impact on river transport and fish populations, with negative impacts on the fisheries industry and rural livelihoods. In addition, growth in hyacinths can cause blockages in the turbines of the hydropower facility downstream in the Kafue Gorge Dam. In addition, lack of wastewater treatment plants, for industrial wastewater and domestic sewerage negatively affect water quality.

Ensuring that water resources continue to contribute to Zambia's economic, environmental and social development will require significant investment. How these investments are designed, sequenced and financed will influence their capacity to deliver on Zambia's development objectives in a sustainable manner over the long-term. This paper provides a diagnosis of key barriers and opportunities to strengthen the enabling environment for investments that contribute to water security and sustainable growth in the country.

Scaling up financing for investment will require a pipeline of bankable projects. This paper argues that such a pipeline of projects should be situated within a strategic investment pathway, which takes a long-term and basin-wide approach in order to ensure that investments deliver benefits for the environment, the economy and society over the long-term.

2 Strategic investment pathways in the Zambezi Basin

Rationale for a strategic investment pathways approach

Water is generally an under-valued and under-priced resource. That situation contributes to a persistent financing gap for water-related investments, globally. Better valuing water requires recognising the full range of direct and indirect benefits and risks associated with water, which may be cultural, spiritual, economic, environmental or social. By doing so, valuing water can promote efficiency, innovation, and better policies by exposing the short- and long-term costs of pollution, waste and misallocation of the resource, thereby facilitating investments that contribute to water development and mitigation of water-related risks, at the local, landscape or global levels.

While financiers typically focus on the availability of a pipeline of bankable projects, government authorities and project developers should also situate these pipelines within broader strategic investment pathways to ensure they are resilient and contribute to water security and sustainable growth over the long term. A long-term strategic approach can ensure that assets deliver anticipated benefits over their operational lifetime and avoid premature obsolescence or costly retro-fitting in the future. Such an approach would also help to secure a stable flow of returns for investors.

In addition to taking a long-term view, strategic investment pathways should be designed with a basin-wide perspective. Individual water projects may be bankable, but could still contribute to the deterioration of shared water resources. For example, a narrow focus on investments in water use efficiency for particular users may or may not improve the overall sustainable management of the resource, potentially affecting other benefits. A basin-wide perspective recognises the positive or negative impacts that investments can have on other users of a shared resource. It can also open up the potential to exploit interdependencies among related investments, for example, where upstream investments can unlock opportunities for downstream investment.

Enabling environment for water-related investment in Zambia: A diagnostic

Long-term vision and planning

Long-term strategic planning of investment pathways comprises of a sequence of investments in infrastructure, policies, institutions and information systems that better reflects the value of water and ensures investments maximise benefits for communities over the long-term.

Zambia's 7th National Development Plan (NDP) from 2017-21 outlines the country's aspiration to enhance welfare and quality of life for the population. The goal of the plan is to create a diversified and resilient economy for sustained growth and socioeconomic transformation driven by, among others, agriculture, tourism, manufacturing and mining. The plan is implemented through clusters designated for each pillar, which may include a range of relevant stakeholders. Working groups within each cluster develop specific programmes.

The plan highlights how Zambia's endowment of renewable and natural resources contributes to its comparative advantage, notably:

- A good climate and soils are conducive for organic and climate-smart agriculture and processing;
- Natural beauty and ecological heritage provide unique tourism experiences;
- Forestry and fisheries have high potential if sustainably managed;
- Renewable energy generation from hydro and solar are competitive sources of energy for domestic use and export.

The plan explicitly recognises water resources as a contributor to sustainable economic growth and development. Notably, key sectors targeted in the plan are all dependent upon and/ or have significant impacts on water resources. The planning authority views the existing policy and regulatory framework for water resources management as sufficient to achieve national development objectives (Ministry of National Development Planning, 2017_[10]). Ensuring coherence among the NPD and related sectoral development plans will be an important factor in determining the effectiveness of the plan's implementation.

The plan consists of five strategic pillars, two of which are directly relevant to water: (1) economic diversification and (2) human welfare, for which expanding access to safely managed water supply and sanitation is critical. Table 2.1 summarises key dimensions of the 7th NDP that are directly relevant for water resources and services and for which water-related investment will be required.

Table 2.1. Zambia's 7th National Development Plan: Key linkages to water resources and services

Strategic areas of the 7NDP	Specific development outcomes	Relevance for water resources and/ or water supply and sanitation services
Economic Diversification and Job Creation	Development outcome 1. A diversified and export-oriented agriculture	Agriculture is a major user of water resources; agricultural production impacts on water quality
	Development outcome 2. A diversified and export-oriented mining sector	Mining impacts on water resources (quantity and quality); groundwater uses in mining production feeds headwaters
	Development outcome 3. A diversified tourism sector	Water resources impact habitat quality for biodiversity
	Development outcome 4. Improved energy production and distribution for sustainable development	Hydropower production a major source of energy for domestic use and export; Allocation of water resources for hydro-production impacts timing and quantity available for environmental flows
	Development outcome 6. Improved transport systems and infrastructure (strategy 4. Construction and rehabilitation of maritime and inland waterways)	Impacts on ecological quality of water bodies and flow regime
	Development outcome 7. Improved water resources development and management	Links water resources management to economic development across a number of key sectors (e.g. agriculture, energy, mining tourism, etc.)
Enhancing human development	Development outcome 3. Improved access to water supply and sanitation	Requires development of water supply and sanitation infrastructure to increase access to quality services for the population; Expanded access to services increases demand for water resources

Source: Authors, based on (Ministry of National Development Planning, 2017_[10]).

For the pillar on economic diversification, the NDP places emphasis on water resources infrastructure

development through construction of small, medium to large dams to meet increasing water demand for energy and agricultural production as well as domestic supply. Inter-basin water transfer schemes are promoted to transfer water resources from water-abundant parts of the country to more water-scarce regions (Ministry of National Development Planning, 2017_[10]). This supply-driven approach focused on infrastructure development is likely to be significantly more costly in terms of infrastructure investments and related externalities relative to demand-management approaches that focus on robust water allocation arrangements and more efficient use of existing water resources.

For the pillar on enhancing human development, expanding access to water and sanitation services is a central component. The access gap for services is significant and will be further compounded by population growth. In 2015, 40% of households in Zambia had access to improved sources of sanitation. Additionally, 27% of people in urban areas and 85% in rural areas had no access to improved sources of sanitation. Access to improved sources of drinking water increased from 63% of the population in 2010 to 67.7% in 2015. Households in urban areas had more access to improved sources of drinking water at 89.2% compared to 51.6% of households in rural areas in 2015 (Ministry of National Development Planning, 2017_[10]).

The NDP7 prioritises infrastructure development in rural areas, where the majority of poor live as well as investments in services in urban areas. Efforts to improve resilience of water and sanitation services as well as education to promote behavioural change to improve health outcomes are also covered in the plan.

There is a recognition that public budgets alone will not be adequate to fund all of the programmes under the National Development Plan. Various approaches to financing will be required. The promotion of alternative finance for water and sanitation services as well as water resources management is explicitly referred to in the NDP7. To be effective, the NDP would need to be backed by a robust and realistic financing strategy.

Economic, fiscal and investment conditions

Zambia experienced solid economic growth in the 2000s with the GDP averaging more than 7% a year between 2000 and 2010. This growth was supported by high prices for copper, which account for 80% of exports. Official Development Assistance (ODA) as a share of national incomes declined from 27% in 1995 to just 5% by 2010. The economic boom ended in 2011 with the fall of copper prices (The Economist, 2018_[12]). The deterioration of copper prices is further expected from higher global supply and slower growth in China in the next coming years (The World Bank, 2019_[11]).

Since Zambia received debt forgiveness in 2005-06, the government has pursued an ambitious infrastructure investment programme. An estimated 2/3 of that spending was financing through foreign debt (including USD 3 billion of bonds issued in Europe). Overall, public debt increased from 21% of GDP in 2011 to 59% at the end of 2017. A significant share of this debt is estimated to come from Chinese lending.¹ Debt service now accounts for the largest share of government spending at nearly of a quarter of public budgets (The Economist, 2018_[12]).

The Zambian economy has experienced consistent fiscal challenges since 2013. Large fiscal deficits have particularly affected economic developments, driven by three factors: first, the expanding public investments in infrastructure, notably roads, relating to an average structural deficit of 6.9% of GDP between 2013 and 2017. Second, the drop of copper prices and sluggish GDP growth that led to a decrease in revenue. Lastly, the expensive external borrowing from non-concessional sources, followed by a currency depreciation in the second half of 2015, increased interest payments (e.g. from 6% of domestic revenue in 2011 to 26% in 2018) (The World Bank, 2019_[11]). At the end of 2018, external public

¹ Estimates from the China Africa Research Initiative at Johns Hopkins University indicate that Zambia had accumulated loans from China totalling almost 6.4 billion USD at end-2017, accounting for an estimated 44% of total debt (including state guaranteed loans) in China (Ofstad and Tjønneland, 2019_[25])

and publicly-guaranteed debt had reached 43% of GDP, reflecting large disbursements of external debt amplified by the depreciation of the local currency, kwacha. Total public and publicly-guaranteed debt has estimated to have increased to 73.1 percent of GDP in 2018 from 63.4 percent in 2017.

In recent years, Zambia's sovereign credit rating has been downgraded by Moody's, S&P and Fitch (along with several other African countries) due to rising debt burdens and emerging macroeconomic risks (OECD, 2017^[13]). Of the 75 countries whose bonds are included in the Bloomberg Barclays Emerging Markets Index (a basket of sovereign debt), Zambia performed the most poorly in 2018 (The Economist, 2018^[12]).

The finance, insurance and pension sector, meanwhile, grew strongly with an average growth of 31% in 2018 in contrast to a contraction of 5.9% in 2017. This was stimulated by the significant growth of insurance and pension funds in the country. Average non-performing loans remained elevated above 11% of GDP (Bank of Zambia, 2018^[14]), as some suppliers owed by the government are finding it difficult to service loans.

Although Zambia has experienced solid economic growth in recent years, significant fiscal pressures due to public indebtedness limit the role public debt could play as an option to finance water-related investments.

Policy framework and institutional arrangements

Legislation, regulations and policies

Generally, Zambia has a well-developed legislative framework for the sustainable management of environmental resources, including water resources. This includes a range of policy instruments and approaches: water abstraction licenses, abstraction charges, protected areas, licenses and fees related to use of national parks, tariffs to contribute to cost recovery for water supply and sanitation services. The Polluter Pays Principle is a recognised principle in Zambia law.

The Water Resources Management Act no 12 of 2014 set out new legislative requirements for water allocation, including licensing requirements for water abstraction and the engagement of stakeholders. Notably, boreholes now require a license with associated abstraction charges. The creation of the Water Resources Management Authority (WARMA) as a statutory body under the Water Resources Management Act of 2011 was an important step forward in strengthening the management of water resources and the allocation among competing uses. WARMA serves as the regulatory body for the management and development of water resources nationwide and ensures equitable access to water for the various stakeholders. The agency is working to finalise catchment management plans for all basins.

There are provisions for the decentralisation of responsibilities related to water management competencies. Water Users Associations contribute to locally informed water resources management. Local Government Act designates a number of responsibilities related to water services and resources to local authorities ("councils"). These include maintaining public watercourses, providing water supply and sanitation services, and preventing pollution of water supplies. Further Councils are responsible for the regulation and monitoring of industrial and sewerage effluent according to specific standards set out in the Local Government Act.² (Republic of Zambia, n.d.^[15]).

The Protected Places and Areas Act and related Orders provides a legislative basis for limiting human activity in specific parts of the country (Ministry of Legal Affairs, n.d.^[16]). The Wildlife Act of 2015 provides a broad legislative basis for the management and sustainable use of Zambia's ecological resources. The

² As per the Zambian Local Government Act, "No person shall, without the written permission of the Council, discharge any trade effluent in any water course or on any land in the area". Councils have the authority to determine when and how much effluent is disposed of into a sewerage system (Republic of Zambia, n.d.^[15])

Act established the Department of National Parks and Wildlife in the Ministry responsible for tourism. The Department has responsibility for the establishment, control and management of National Parks, bird and wildlife sanctuaries and for the conservation and enhancement of wildlife ecosystems, biological diversity as well as objects of aesthetic, pre-historic, historical, geological, archeological and scientific interest within National Parks. Further, the Act provides for the sustainable use of wildlife and the effective management of the wildlife habitat in Game Management Areas (GMAs), which includes the involvement of local communities (Republic of Zambia, 2015^[17]).

Recent amendments to Zambia's Public-Private Partnership (PPP) Act in 2018 have strengthened the legislative framework for public-private partnerships. Notably, a dedicated Public-Private Partnership Department was established in the Ministry of Finance. Specific functions of the new department include:

- Developing technical and best practice guidelines in relation to all aspects of PPPs (standardised bidding docs, etc.);
- Assessing project proposals to ensure value for money for the Republic, optimising transfer of technical, operation and financial risks to the concessionaire;
- Ensuring requests for proposal confirm with legal and regulatory requirements; monitoring competitive selection process;
- Facilitating training and advisory services to contracting authorities (Republic of Zambia, 2018^[18])

Institutional arrangements and key stakeholders

A wide range of government authorities (across ministries and levels of government), private sector actors, development co-operation partners, NGOs and other stakeholders have a role to play in the sustainable management of water resources. Table 2.2 provides an overview of key government authorities with competencies related to water resources management.

Table 2.2. Key government authorities influencing water resources management in Zambia

	Institution	Key activities/ role related to water resources
Central government	Ministry of Water Development, Sanitation and Environmental Protection	Responsible for the development and management of water resources, provision of water supply and sanitation as well as environmental management.
	Ministry of Finance and National Planning	Coordinates national planning and economic management, manages public resources in a transparent and accountable manner for sustainable national development.
	Water Resources Management Authority (WARMA)	Mandated by the Zambian government through the Water Resources Management Act No. 21 of 2011 to manage all water resources in Zambia. The agency is responsible for the allocation of water resources and enforcement of related regulations.
	Ministry of Fisheries and Livestock	Responsible for preserving natural waters in order to increase household incomes and reduce poverty through sustainable fisheries sector.
	Ministry of Tourism and Arts, Department of Tourism	Responsible for developing, managing and coordinating the implementation of compatible tourism policies and strategies that facilitate the activities
	Ministry of Justice	Responsible for facilitating the administration of justice and promoting the rule of law related to water resources.
	Ministry of National Development Planning	Coordinates the national vision, goals and development priorities and oversees statistical activities in the country through the Central Statistical Office and
	Ministry of Mines and Minerals Development	Responsible for the development and management of mineral resources in a sustainable water use and management
Regional or Local government	Water Users Association	Responsible for local water resource management of water users, including irrigators, who pool their financial, technical and human resources for operation of a local water system
	Zambezi River Authority (ZRA)	Manages the Zambezi waters for socio-economic development by satisfying relevant stakeholders and bringing out the natural advantages of the Zambezi River.
	National Water Supply and Sanitation Council	Increases access to affordable safe water and acceptable sanitation; and regulates the provision of water supply and sanitation services
	Water and Sanitation Association of Zambia (WASAZA)	Contributes towards access to modern, affordable and appropriate water and sanitation processes and technologies for urban, peri-urban and rural communities

Source: Authors.

Table 2.3 includes major corporates with direct operations dependent on the Kafue Flats or supply chains located there.

Table 2.3. Key private sector actors benefitting from water resources management in Zambia

Company	Key impact(s) on water resources
Zambia Electricity Supply Cooperation Limited (ZESCO)	Beneficiary of the largest water allocation in the Zambezi; dam operating rules to drive hydropower production influence the timing, flow and availability of water resources for other users, including ecological functions.
Zambia Sugar	Largest sugar producer in the region, producing for domestic and export markets. Associated British Foods owns Illovo Sugar; which in turn owns a majority share in Zambia Sugar.
Zambian Breweries	Significant water user and source some production inputs (sugar) from the Kafue Flats. Owned by SABMiller.
Coca-Cola Company	Large water users in Lusaka to produce the beverage, including supply chain of ingredients.
Lafarge	Steel plants operate on the banks of the Kafue.
Private tourism operators
Floriculture and horticulture companies	Industry that sources cut flowers and vegetables from water resources. Khal Amazi receives 90% of export roses from Zambia. York Farm Limited receives vegetables for export.

Source: Authors, based in part on (WWF, 2016^[5])

Concluding remarks

Overall, interviews with government authorities, key stakeholders and experts confirm that there is a well-developed legislative basis and policy framework for the management of water resources. However, in practice, there are limitations of the legislative and regulatory framework and its implementation. Notably, the lack of adequate resources (constrained government budgets and capacity) limits the extent of monitoring and enforcement of existing laws and regulations. Gaps in monitoring and enforcement of water abstractions limit the effectiveness of existing water allocation arrangements. Protected areas and GMAs are loosely controlled. Encroachment of the local population, including animal grazing is an on-going issue. Issues with land tenure exacerbate challenges. Local villages want grazing for cattle. Local fishers' seasonal camps are becoming permanent.

In addition, fragmentation of roles and responsibilities related to water management across government ministries and levels of government (national, regional, local) generates challenges for co-ordination and effective implementation. In some instances, unclear mandates and roles contribute to weak implementation. The clusters established to promote co-ordination among government actors and stakeholders under the NDP7 could work more effectively.

Enforcement is often the responsibility of local officials with insufficient resources to carry out their required tasks. In some cases, funds are budgeted but not dispersed at anticipated levels. Authorities face political pressure to weaken enforcement.

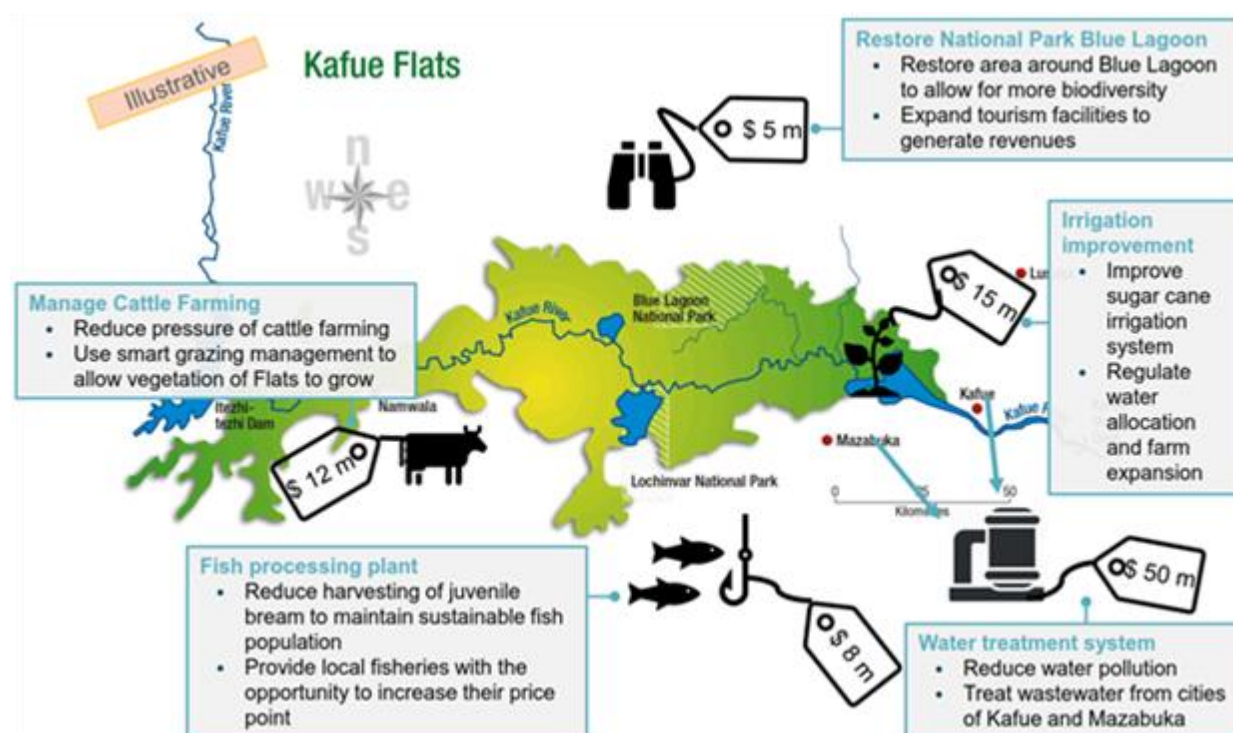
In practice, incentives for compliance with existing laws and regulations are weak. For examples, there are no sanctions for illegal wells. Where sanctions exist, monetary fines are often very low, undermining incentives to comply. There are significant gaps in data and information systems, with a lack of hydrological mapping.

3 Options for mobilising investment

Sequence bankable projects in a strategic investment pathway and link to the National Development Plan

As set out in the previous sections, the sound management of water resources and natural capital more broadly, is central to the sustainable economic growth and development in Zambia. The centrality of water and land management to a range of economic activities across key sectors provides ample opportunities for designing investments that can deliver both financial returns as well as environmental and social benefits. Figure 3.1 provides an illustration of possible bankable water solutions in the Kafue Flats.

Figure 3.1. Illustration of possible bankable projects in the Kafue Flats

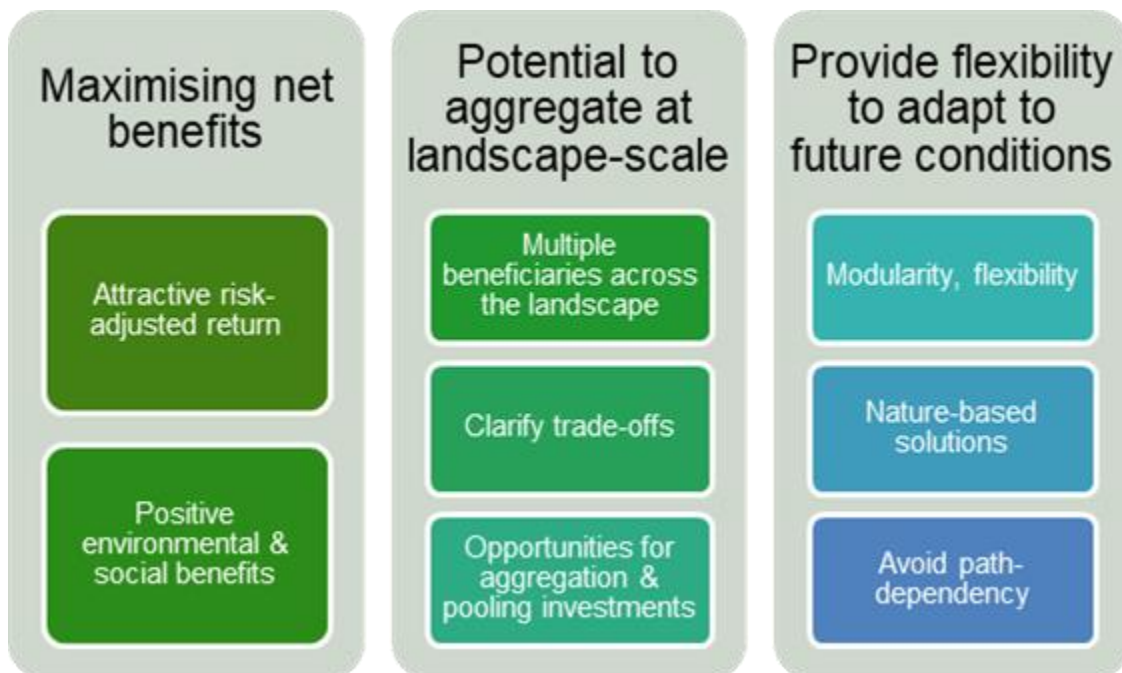


Source: WWF.

To contribute to long-term viability of water-related investments as well as identify opportunities for scaling up investments, investments in individual projects should be sequenced along a strategic investment pathway and be combined with efforts to strengthen the enabling environment for investment. Criteria for prioritising projects to be considered include (see Figure 3.2):

- Projects that maximise net benefits for society and the environment over the long-term (e.g. as assessed through cost-benefit analysis and/ or multi-criteria analysis, where benefits are difficult to monetise).
- Projects that have potential to be combined with others within the landscape, to aggregate benefits and beneficiaries and capture opportunities for pooling capital to fund investments. Water resources are systemic in nature; actors impacting water resources (via abstractions, discharges, pollution, etc) can create positive and/ or negative externalities on other users and the environment. A landscape-based perspective can help to identify synergies for financing investments in two distinct ways:
 - Mapping the impacts (positive or negative) of interventions related to the sustainable management of water resources and how they impact on other activities in the basin. This exercise could help identify activities with multiple beneficiaries and/ or clarify trade-offs.
 - Identify opportunities for aggregating projects that could facilitate pooled investments at a scale attractive to investors.
- Projects that provide flexibility to adapt to future conditions, including (but not limited to) climate change. Such projects avoid lock-in to undesirable path dependency and reduce the risk of stranded assets in the event of water scarcity. This may privilege projects that employ nature-based solutions (in combination with or as an alternative to conventional grey infrastructure) and smaller, modular projects that can adapt over time as conditions change.

Figure 3.2. Framework for selecting projects in a strategic investment pathway



Source: Author.

Investments in infrastructure should be combined with investments in strengthening the enabling environment (policy framework, institutional arrangements and information systems). These complementary investments in “soft” measures a usually small ticket items, but essential to ensure that larger capital-intensive investments deliver expected benefits over their operational lifetimes and reduce the risk of premature obsolescence.

Strategic investment pathways should be explicitly linked to and co-ordinated with programmes and investments under the National Development Plan. In particular, the clusters established to engage stakeholders and implement projects can provide a platform for co-ordination among public and private actors. Engagement in the NDP clusters also provide a means to contribute to the development of the next NDP, which begins roughly 2 years before the next plan will be adopted. In addition, the Lusaka Water Security programme is seen as a valuable platform for co-ordinating efforts to improve water security among government, development actors and the private sector.

Build on existing policy framework to strengthen enabling environment for investment

Strengthening the enabling environment for investment is needed in order to provide incentives for the sustainable management of water resources, minimise overall investment needs and reduce the risk of investments failing to deliver expected benefits. Investments in infrastructure should be combined with investments in strengthening of the enabling environment (policy framework and institutional arrangements) as well as information systems (monitoring and data for water abstractions, pollution, ambient quality, etc.).

The range of options considered in the NDP7 to improve the sustainable management of water resources could be expanded to place emphasis on demand-management approaches, with a key focus on robust and flexible water allocation arrangements and more efficient use of resources. By comparison, expansion of storage and inter-basin transfer infrastructure included in the NDP7 will be more costly and generate significant impacts on the resource, including water use for existing users and other economic activities (e.g. tourism). It creates further path-dependency and risks maladaptation to future water demand and availability.

A central role for more robust water allocation arrangements

Water resources allocation arrangements determine who is able to use water resources, how, when and where. Most allocation regimes around the world are strongly conditioned by historical preferences and usage patterns, tracing their roots to previous decades or even centuries. They have often evolved in a piecemeal fashion over time and exhibit a high degree of path dependency, which manifests in laws and policies, and even in the design and operational rules of long-lived water infrastructures. This means that water use may be “locked-in” to uses that are no longer as valuable today as they were previously, curtailing the value (ecological, socio-cultural, or economic) that water users and society obtain from water (OECD, 2015_[19]).

In order to reap greater benefits from water resources, an allocation regime needs to have two key characteristics: it should be robust by performing well under both average and extreme conditions and demonstrate adaptive efficiency in order to adjust to changing conditions at least cost over time. These two characteristics become even more important in light of shifting hydrological conditions due to climate change. Further, the challenges for allocation regimes are aggravated by the entrenchment of weak water policies (under-pricing water or an absence of regulation on use), which can contribute to structural water scarcity, increasing the risk of shortage for users and for the environment. Without stronger enforcement of existing limits of abstraction and sanctions for non-compliance, users lack incentives to comply with abstraction licenses (OECD, 2015_[19]).

Given the centrality of water resources to many key economic sectors in Zambia, how water is allocated among competing uses, including the environment, strongly influences the benefits derived from water and water-related investments. Scarcity of water resources has direct and indirect economic and environmental costs. Currently, needs for hydropower dominate the timing of flows to support ecological functions and other users in the Zambezi Basin. Ensuring that sufficient water resources reach the Kafue Gorge is key to the hydropower generation that fuels the economy. Further, given that current levels of hydropower production are at 1 760 MW out of an estimated 6 000 MW of hydropower potential, the influence of the

sector on overall water allocation is likely to increase in the future (WWF, 2017^[3]). These needs will need to be balanced with growing demands from other users (agriculture, industry, domestic use and the environment).

The periodic review of existing allocation arrangements can help identify how fit Zambia's allocation regime is to meet current and future challenges and identify areas for potential improvement. OECD's "Health Check" for water resources allocation can provide a useful tool for such a review (see Annex A).

Stronger monitoring and enforcement of water policies and land management

As noted above, despite a solid legislative and regulatory framework for water resources and land management, the lack of adequate resources limit the extent of monitoring and enforcement of existing laws and regulations. Gaps in monitoring and enforcement of water abstractions and land use limit the effectiveness of the existing policy and regulatory framework. Due in part to the fragmentation of roles and responsibilities as well as political pressure in some cases, weak enforcement undermines effective management of environmental resources. The private sector (further discussed below) has an important role to play in supporting effective compliance and demonstrating how well managed water resources contribute to private sector productivity, employment, investment and contribution to government tax revenues.

Strengthening environmental enforcement and compliance is key to a stronger enabling environment for investment. In practice, cost-effective approaches to compliance monitoring could target the largest users (e.g. industries, large farms) or polluters. There is no need to monitor compliance of small water-right holders, unless they are very numerous and collectively affect the resource. Experience from South Africa in strengthening and better targeting enforcement may provide inspiration (Box 3.1).

Box 3.1. Strengthening enforcement and compliance: South Africa's "Scorpions"

In South Africa, effective enforcement of the new generation of environmental policies was significantly strengthened by the creation of an Environmental Management Inspectorate (EMI) in 2005 with an amendment to the National Environmental Act. The Inspectorate has uniform powers at the national, provincial and local levels, including wide criminal enforcement powers similar to those of the South African police services.

Since the inception of the EMI in 2007, the number of environmental management inspectors (EMIs, often informally referred to as "Green Scorpions") has nearly doubled, reaching 1 399 in 2012. The vast majority of EMIs (603) work in South African National Parks; just over 60 inspectors work for the DEA's Legal Authorisations and Compliance Inspectorate; and others work for provincial environmental departments, as well as parks and tourism authorities. A small number is assigned at the local level.

The Green Scorpions conduct compliance monitoring and enforcement under the NEMA, the Biodiversity Act and the Protected Areas Act. However, many important environmental laws remain outside the mandate of the EMIs, especially the regulation of water and mining pollution, which are enforced by other authorities with inspection powers:

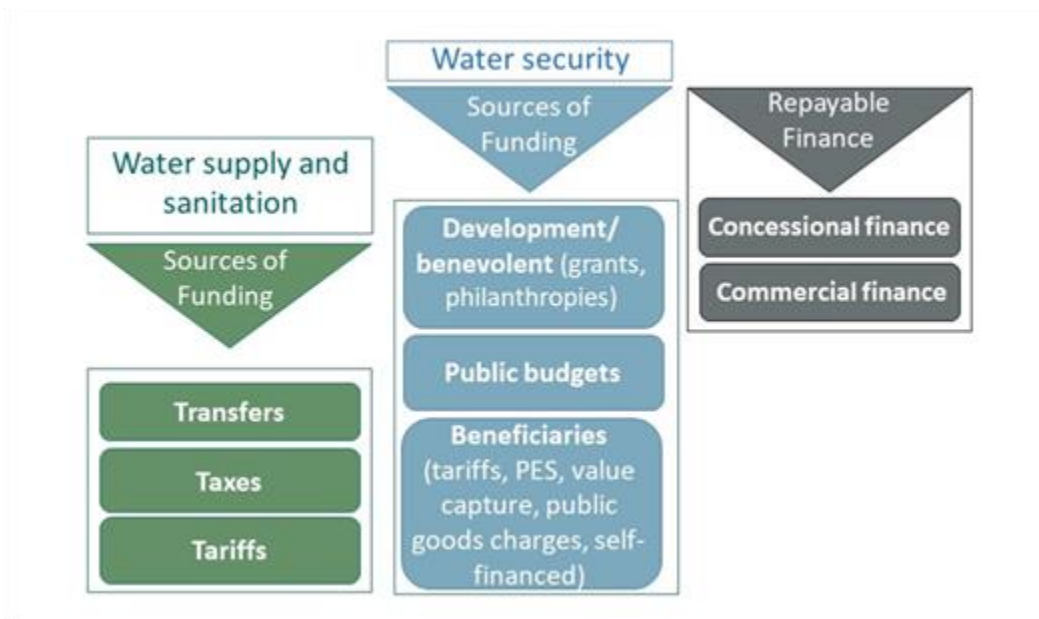
- The Compliance Monitoring and Enforcement Directorate of the national DWA employs environmental inspectors ("Blue Scorpions") at its national and nine regional offices. These inspectors enforce compliance with water-use licences under the National Water Act. However, their number is clearly insufficient and they do not have the criminal investigation powers of EMIs.
- The Department of Agriculture, Fisheries and Forestry has a Directorate for Monitoring, Control and Surveillance with inspectors fighting against illegal fishing and other offences against the marine environment.
- The Department of Mineral Resources has its own environmental inspectors (in addition to safety inspectors) in the regional offices who monitor compliance with the 2002 Minerals and Petroleum Resources Development Act and enforce environmental requirements of mining permits.

Source: (OECD, 2013^[20])

Capture sources of funding and explore innovative financing for water-related investment

The OECD makes a distinction between the three ultimate sources of funding (revenues from tariffs, taxes, transfers from the international community; the so-called "3Ts") and other sources of repayable finance (loans, bonds, etc.). The 3Ts provides an appropriate distinction for the financing of water services, but is more limited when considering the range of possible funding sources for water security, as illustrated in Figure 3.3. For the range of investments that contribute to water security, source of funding can come from three broad categories: (1) development/ benevolent sources, including grants and funding from philanthropies; (2) public budgets, and (3) funding provided by beneficiaries via a range of channels (e.g. water tariffs, abstraction charges, public good charges, value capture schemes, payment for ecosystem services, self-financing, etc.). In addition, these sources of funding can be used to mobilise repayable finance at concessional or commercial rates. Repayable sources of finance require a creditworthy borrower, which can provide a financial return.

Figure 3.3. Sources of funding and financing for water-related investments



Source: Authors, adapted from (OECD, 2010_[21]).

Zambia's existing legislative framework recognises the Polluter Pays Principle, which gives scope to authorities to apply policy instruments (such as pollution taxes and charges) to provide incentives for reducing pollution as well as a source of funding to contribute to the costs of water management. In the case of abstraction charges and water supply and sanitation tariffs, these instruments reflect a Beneficiary Pays Principle, providing incentives for rational water use as well as a source of funding to recover costs (within limits of affordability) of water management and water services provision. Similar instruments applied to land management include licences and permits from Game Management Areas and related activities covered in the Wildlife Act. Ring fencing or earmarking the revenue from these instruments would help to ensure that funding raised is used for environmental management activities, rather than accrue to the general government budget. However, from a public finance perspective, earmarking revenue from such instruments may be contested by the Treasury.

As set out in Zambia's 7th National Development Plan, there is interest to explore a wider range of financing sources and approaches, including institutional investors (e.g. pension funds) (Ministry of National Development Planning, 2017_[10]). Notably, the energy sector, is exploring how to leverage public funds to mobilise private capital. For example, some investments in renewable energy have successfully mobilised private capital from local pension funds. In the context of the NDP, authorities strive to find a balance between delivering public goods and an appropriate risk-adjusted financial return that can attract commercial finance. Lessons learned from this experience could provide insights for similar approaches for water-related investments. In addition, innovative financing approaches documented by UNDP's Biodiversity Finance Initiative (BIOFIN) could provide a source of inspiration.

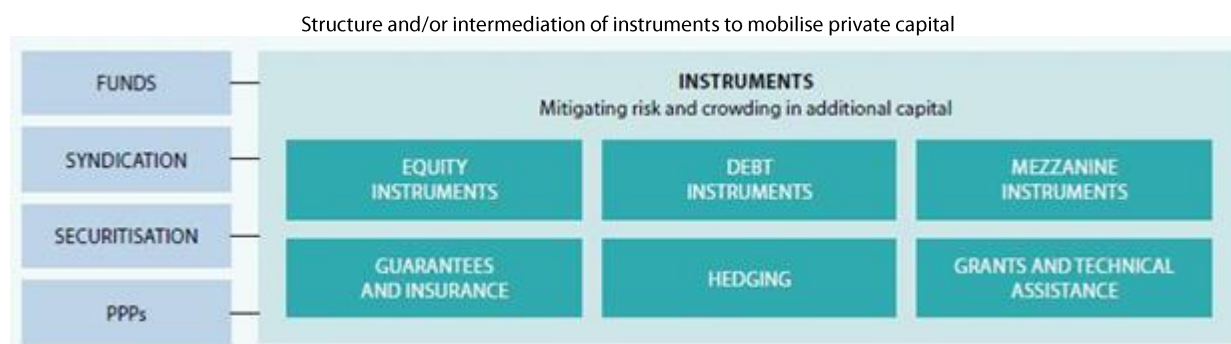
Exploring blended finance to scale up financing and encourage market building

Investments in water and sanitation services and water resources management have historically been financed by the public sector, with concessional finance playing an important role in developing countries. The mobilisation of private finance for the water supply and sanitation has been limited to date. Risk-return considerations and structural issues related to profitability of operating business models often undermine commercial investment in the sector. While finance from domestic public budgets and development

finance, particularly concessional finance, will continue to have an important role to play in the sector, these flows are not sufficient to address total financing needs (OECD, 2019^[22]).

Blended finance is one option that could play a critical role in mobilising commercial finance as well as strengthening the financing systems upon which water-related investments rely. The OECD defines blended finance as the strategic use of development finance for the mobilisation of additional finance towards sustainable development in developing countries (OECD, 2018^[23]). Figure 3.4 provides a summary of various instruments and mechanisms that can be employed in blended finance approaches.

Figure 3.4. Blended finance instruments and mechanisms

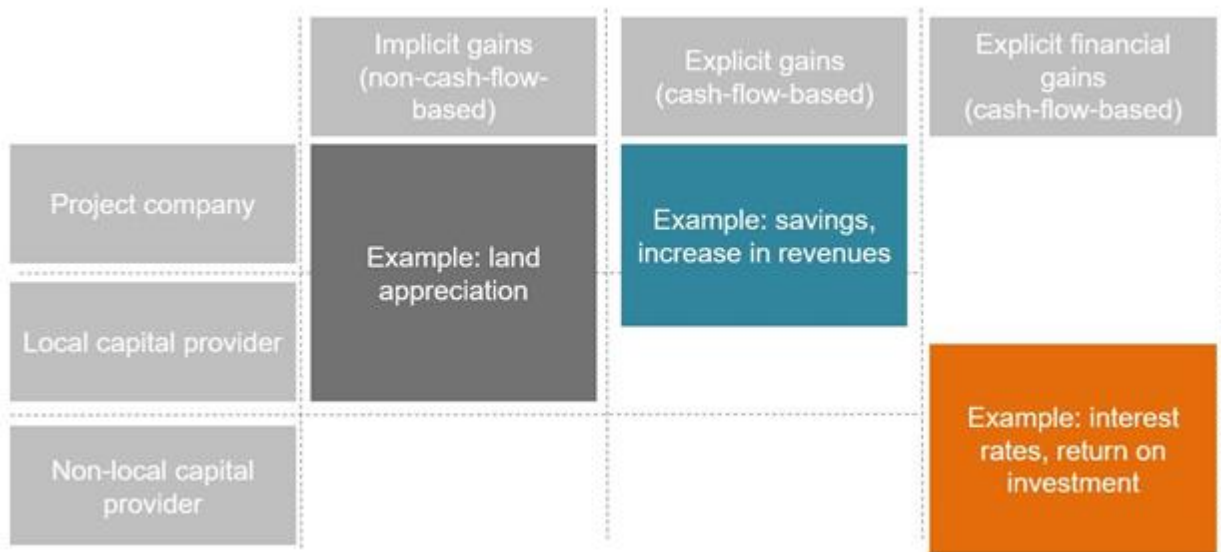


Source: (OECD, 2019^[22])

For landscape-based approaches, blended finance can potentially operate as a fit-for-purpose financing instrument as it brings together different stakeholders responding to their individual investment preferences. Landscape-based approaches can capture additional revenues and returns across the value chain to raise further types of financing. That is, successful landscape-based blended finance approaches can unlock commercial investment by applying an integrated approach across the value chain of water-related investments. Explicitly valuing the benefits of water-related investments and related beneficiaries can create more opportunities to profitable investments by monetising often implicit returns in addition to more explicit returns (OECD, 2019^[22]). While developments related to blended finance for landscape-based approaches remain at very early stages of development, recent OECD research highlights several key findings:

- Development financiers are gaining experience with landscape-based approaches, which can mobilise local actors with a stake in improved water resources management. Moreover, nature-based solutions are also attracting increasing interest, as a complement to conventional grey infrastructure to deliver multiple water-related benefits.
- Technical assistance and pooling mechanisms are prevalent blending instruments in landscape-based approaches, which have mainly attracted public funds and corporate philanthropy to date, rather than commercial finance. The use of blended finance remains at an early stage. A functioning model thus far has been to source grant funding from commercial actors.
- Landscape-based approaches need innovative techniques to quantify and value often implicit revenue streams, such as land and other asset appreciation (see Figure 3.5). For example, Water Funds build on the implicit gains for locally-based actors (e.g. water utilities and corporates) who benefit from avoided costs due to improved watershed management in the spatial area (OECD, 2019^[22]).

Figure 3.5. An investor perspective on sources of returns in landscape-based approaches



Source: (OECD, 2019^[22]).

Engage the private sector as a contributing partner at local and global scales

The role of private sector is crucial, as major beneficiaries of sustainable water management and as stakeholders potentially exposed to risks of water shortage, pollution and overall water insecurity. Corporates with operations and supply chains in the region should have a clear stake in the effective management of the water resources. Further, as beneficiaries of water resources, corporate actors could be potentially be a source of capital for future investments.

As noted in Section 2 (see Table 2.3), there are a number of corporate actors with direct operations in the Kafue Flats and those with their supply chains located there. In turn, a number of local subsidiaries with operations or supply chains in the Kafue are owned by foreign multi-nationals, many of which have major water stewardship initiatives. A stronger alignment between global strategic activities and local subsidiaries’ engagement could provide a basis for more substantial contributions to the development of water-related investments in the area. Enhanced water security in the Kafue Flats can mitigate the risk of water-dependent investments in the region (agricultural production, industry and tourism). Contributing to improved water security would align with water stewardship principles as well as provide benefits for corporates operating in the region.

Annex A. OECD's "Health Check" for Water Resources Allocation

OECD's "Health Check" for water resources allocation is designed as a tool to review current allocation arrangements in a specific context to check whether the elements of a well-designed allocation regime are in place and to identify areas for potential improvement. Since the risk of shortage is dynamic, in both the short-run and the long-run, a well-designed allocation should have two key characteristics: it should be robust by performing well under both typical and extreme conditions and demonstrate adaptive efficiency with the capacity to adjust to changing conditions at least cost over time (OECD, 2015^[19]).

The Health Check can be applied to various scales of water governance, depending on the context. For example, it can be used at the national, provincial/state, or river basin level, or used for a specific irrigation district. Used iteratively, the Health Check can be used to drive further improvements and refinements to more fully reap the benefits of a well-designed allocation regime and to adjust to changing circumstances. Box A.1 provides a summary of the Health Check. Further details and guidance to implement the checks are available in the 2015 OECD report *Water Resources Allocation: Sharing Risks and Opportunities*.

Box A A.1. OECD “Health Check” for Water Resources Management

Check 1. Are there accountability mechanisms in place for the management of water allocation that are effective at a catchment or basin scale?

Check 2. Is there a clear legal status for all water resources (surface and ground water and alternative sources of supply)?

Check 3. Is the availability of water resources (surface water, groundwater and alternative sources of supply) and possible scarcity well-understood?

Check 4. Is there an abstraction limit (“cap”) that reflects in situ requirements and sustainable use?

Check 5. Is there an effective approach to enable efficient and fair management of the risk of shortage that ensures water for essential uses?

Check 6. Are adequate arrangements in place for dealing with exceptional circumstances (such as drought or severe pollution events)?

Check 7. Is there a process for dealing with new entrants and for increasing or varying existing entitlements?

Check 8. Are there effective mechanisms for monitoring and enforcement, with clear and legally robust sanctions?

Check 9. Are water infrastructures in place to store, treat and deliver water in order for the allocation regime to function effectively?

Check 10. Is there policy coherence across sectors that affect water resources allocation?

Check 11. Is there a clear legal definition of water entitlements?

Check 12. Are appropriate abstraction charges in place for all users that reflect the impact of the abstraction on resource availability for other users and the environment?

Check 13. Are obligations related to return flows and discharges properly specified and enforced?

Check 14. Does the system allow water users to reallocate water among themselves to improve the allocative efficiency of the regime?

Source: (OECD, 2015^[19])

References

- (n.a.) (n.d.), *Water resources allocation : sharing risks and opportunities..* [24]
- Bank of Zambia (2018), *Monetary Policy Committee Statement.* [14]
- Central Statistical Office (2018), *Zambia in Figures 2018.* [7]
- Central Statistical Office, Republic of Zambia (2013), *Zambia Population and Demographic Projections, 2011-2035.* [8]
- Ministry of Legal Affairs (n.d.), *The Protected Places and Areas Act, Chapter 125 of the Laws of Zambia.* [16]
- Ministry of National Development Planning (2017), *7th National Development Plan 2017-2021.* [10]
- OECD (2019), *Making Blended Finance Work for Water and Sanitation: Unlocking Commercial Finance for SDG 6*, OECD Studies on Water, OECD Publishing, Paris, <https://dx.doi.org/10.1787/5efc8950-en>. [22]
- OECD (2018), *Making Blended Finance Work for the Sustainable Development Goals*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264288768-en>. [23]
- OECD (2017), *African Economic Outlook 2017 : Entrepreneurship and Industrialisation.*, OECD Publishing. [13]
- OECD (2015), *Water Resources Allocation: Sharing risks and opportunities*, OECD Publishing, <https://doi.org/10.1787/9789264229631-en>. [19]
- OECD (2013), *Environmental Performance Review of South Africa*, OECD Publishing, <https://doi.org/10.1787/9789264202887-en>. [20]
- OECD (2010), *Innovative Financing Mechanisms for the Water Sector*, OECD Studies on Water, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264083660-en>. [21]
- Ofstad and Tjønneland (2019), *Zambia's looming debt crisis – is China to blame?*, <https://www.cmi.no/publications/6866-zambias-looming-debt-crisis-is-china-to-blame#ftn13> (accessed on 23 March 2020). [25]
- Republic of Zambia (2018), “Public-Private Partnership Act Ammendments”. [18]
- Republic of Zambia (2015), *Zambia Wildlife Act.* [17]
- Republic of Zambia (n.d.), *Local Government Act.* [15]

- The Economist (2018), *Zambia slumps towards another debt crisis*, [12]
<https://www.economist.com/middle-east-and-africa/2018/09/13/zambia-slumps-towards-another-debt-crisis>.
- The World Bank (2019), *Zambia Economic Brief. Wealth Beyond Mining: Leveraging Renewable Natural Capital*. [1]
- The World Bank (2010), *The Zambezi River Basin: A Multi-Sector Investment Opportunities Analysis*. [2]
- USAID (2016), *Climate Risk Profile: Zambia*. [11]
- World Bank (2019), *Poverty & Equity and Macroeconomics, Trade & Investment Global Practices*. [9]
- World Travel and Tourism Council (2019), *Zambia 2019, Annual Research: Key Highlights*. [6]
- WWF (2017), *Water Situation Analysis of the Lower Kafue Basin Socio-Economic Development and Climate Change: Risks and Opportunities*. [3]
- WWF (2016), *Water in the Zambian economy : Exploring shared risks and opportunities in the Kafue Flats*, WWF-Zambia Country Office. [5]
- ZESCO (2017), *Integrated Report 2017*. [4]