International Scholars Journals

African Journal of Water Conservation and Sustainability ISSN 2375-0936 Vol. 13 (12), pp. 001-017, December, 2025. Available online at www.internationalscholarsjournals.org © International Scholars Journals

Full Length Research Paper

Framework analysis of SDG 6.5.1 implementation in Cameroon: Yaoundé city case study

Stephane Lako Mbouendeu[1], Jamiilah Ngougoure Ngapout[2], Celestin Defo[3], Gloria Eneke Takem[4], Wilson Yetoh Fantong[5]

[1]Water For life Cameroon.
[2]Pan-African University, Institute for water and energy sciences (including climate change)
[3]University of Ebolowa, Institute of Agricultural, Wood, Water, and Environmental Sciences.
[4]Water resources and Climate Change Research Center.
[5]Geologic and Mine Research Institute.

Abstract

Received 08 November, 2025; Revised 22 November, 2025; Accepted 23 November, 2025; Published 14 December, 2025

Water resources management literature flourishes on quality, quantity and dynamics texts but few address institutional setting, programs and competences. Moreover, most are global or nation-based. This article seeks to include the subnational level of SDG 6.5.1 implementation analysis in a fast-growing city like Yaoundé. This is done through a framework analysis using strengths-weaknesses-opportunities-threats and program analysis approaches, considering the four pillars of IWRM monitoring, globally agreed and used. Analysis for Yaoundé reveals there is no specific city framework, it aligns with the national framework which is characterized by a strong institutional and regulatory framework with several transboundary, international and national instruments to address water challenges at country level. At city level, awareness about national policy and potential benefit of IWRM is still lagging. Programs analyzed showed that most efforts are geared towards drinking water and flood protection, few initiatives on the last decade addressed favorable environment, participation and institutions. Thus, additional efforts are required to improve on operational mechanisms, planning, investment and programs addressing cities IWRM. Globally, framework analysis can be considered as a complementary approach to SDG 6.5.1 implementation scoring. This helps finetune the identification of key priority actions driving IWRM implementation at city level for less advanced countries.

Keywords: Water management, SWOT, framework analysis, IWRM, Yaoundé, SDG 6.5.1, urban water governance, sustainable cities.

HIGHLIGHTS

- The IWRM framework of Cameroon has strong institutional and legal framework but needs more enforcement, investment and adequate instruments to address IWRM at a subnational level.
- Since 2009, no program in Cameroon addresses IWRM implementation at city level, the focus is mainly on drinking water, drainage, flood protection and capacity building
- Considering the fast-growing pace of Yaoundé city it is crucial and urgent to leverage on existing national IWRM instruments, to set and implement a specific city IWRM plan

Corresponding Author Email: lakostef@yahoo.com

- Framework analysis of SDG 6.5.1 implementation with SWOT, program and specific indicators analysis provide efficient and combined approach to identify entry points for improvement of IWRM and urban water governance at national and subnational levels.

INTRODUCTION

Water is a fundamental resource for human well-being and natural ecosystems. Global water demand is increasing by about 1% per year, driven by population growth, economic development and changing consumption patterns (WWAP, 2018). Faced with this limited availability of water resources and increasing urbanization, amplified by the impacts of climate change, the availability of water inputs in basins is influenced by essential parameters such as precipitation, evapotranspiration, infiltration and runoff (Nwankwoala and Ngah, 2014). Every government in the world is concerned about the sustainable management of its water resources in accordance with the Sustainable Development Goals (SDG) and the principle for integrated planning and development of the resources in line with the United Nations (UN) Rio de Janeiro Summit and the Dublin Conference principles of 1992.

According to these, Integrated Water Resources Management (IWRM) principles and approach constitute a foundation to address the challenges related to sustainable management and protection of water resources for current and future uses. The IWRM Action Agenda (SDG 6.5.1), designed to encourage countries improving their water resource management aims to establish a framework that considers policy objectives, physical state of water, and land-use planning. IWRM can also help to explore adaptation measures to impacts of climate change and a wide range of water-related conflicts that arise between stakeholders around the world (Hamidreza, 2018).

According to IWRM action hub "*What is not measured cannot be managed. Designing and implementing an effective and efficient monitoring and evaluation (M&E) system for water policies, plans, programs and strategies is crucial to inform decision-making and enhance progress on IWRM*". SDG 6 indicator 6.5.1 assesses globally the level of IWRM implementation under the leadership of United Nations Environment Programme (UNEP) and Global water Partnership (GWP) who set a monitoring scheme since 2017. This scheme provides a monitoring framework built on four pillars: Enabling environment, Institutions and participation, Management instruments and Financing

The 2023 global IWRM implementation report reveal that, in most developed countries, IWRM is fully implemented, while developing countries are still struggling to align with IWRM standards (Collado *et al.,* 2023). Furthermore, in 2020, only 171 countries made significant efforts to respond to survey 6.5.1, with most organizing multi-stakeholder consultation processes. According to AMCOW (2018), more than 80 per cent of African countries have institutionalized IWRM but 70% have inadequate capacity to effectively implement most IWRM elements, and many activities are undertaken on an ad hoc basis with unsustainable financing. Some years later, while the aspirational global SDG target is to achieve 'very high' implementation (91-100%) by 2030, none of the African subregions are on track to meet this (AMCOW, 2025). Despite the progress, 48% of countries (25) with low and medium-low IWRM implementation are unlikely to advance sufficiently on the required governance frameworks to balance demands and sustainably develop and manage their water resources by 2030.

Cameroon, a Central African country, has undertaken initiatives to integrate IWRM into its national water management strategy since 2005. Progress made through drafting a National IWRM plan in 2009, developing a IWRM roadmap in 2020, monitoring implementation of IWRM since 2017 (03 reports) yielded an improvement of Cameroon score from 34% in 2017 to 49% in 2023 (MINEE, 2023). It also led to the recently published (2025) national water policy built around IWRM. Though, considerable effort is still needed in the areas of enabling environment, financing, and subnational investment. With the Law N° 2004/017 of 22 July 2004 defining the orientation of decentralization in Cameroon, updated by Law N° 2019/024 of 24 December 2019 stating the general code of local councils, Article 157 transfers responsibilities for water resources management, protection, and development to the subnational level (regions and councils). However, planning and managing water resources at the subnational level is challenging under a weak regulatory framework. As cities are expected to host 50–60% of the world's population, it is worth questioning the appropriate accelerator measures to ensure sustainably managed urban water resources in a fast growing and changing environment. Unfortunately, most assessment tools, like the SDG 6.5.1 implementation four pillars assessment method, are still nation-based, there is no specific city led methodology or tools.

In order to address this and identify key action points for the city of Yaoundé, this article made use of the framework analysis approach focused on SWOT (strengths weaknesses, opportunities, threats) and program analysis. Indeed, according to Hassan (2022) framework analysis is a robust and systematic method for qualitative data analysis, especially in applied research. Its flexibility and structured approach make it ideal for studies that require detailed comparisons, transparency, and practical outcomes. As such, both SWOT and program analysis are particularly useful in identifying areas that need improvement.

The overall aim of this paper is to contribute to efficient and sustainable management of water resources in developing countries, like Cameroon at the city level for greater impact on people, nature and resources.

MATERIALS AND METHODS

1. Description of the study area

Yaoundé, the political capital of Cameroon is located in Central Africa region between latitudes 3° 50′ to 3° 55′ N, and longitude 11° 27′ to 11° 35′ E (Figure 1). It is the second largest city in the country after Douala with 304 km^2 of which 60% is urbanized. Located 240 km from the Atlantic coast, it is surrounded by seven hills, the highest of which are on the west and northwest sides: Mount Mbankolo (1,075 m), Mount Messa (1,025 m), Mount Febe (1,025 m), and Mount Nkolondom (1,200 m). Yaoundé is home to the country's main political and administrative institutions, including the Unity Palace, the official residence of the President of the Republic, as well as the offices of ministries, the Parliament, and the Supreme Court.

The city is also home to numerous foreign embassies and international organizations, reinforcing its diplomatic and influential role in decision making for Cameroon's development. Making it attractive to close to 4,9 million inhabitants (Yaoundé Population 2025).

The climate of Yaoundé is classified as transitional subtropical, with annual rainfall ranging from 1 083 to 2 196.7 mm (based on records from 1964 to 2020) and an interannual average of 1 562 ± 271 mm. No significant discontinuities are observed, but a downward trend of about −3.35 mm/year has been reported (Nsangou *et al.,* 2024). Clear seasonal variations are evident, with two distinct rainy periods: the first from March to June, and the second from September to November. January and February are the driest months, while September and October are the rainiest.

2. Description of the regulatory and institutional framework

Based on a thorough literature review of existing strategic documents, specific reports and studies, information about existing regulatory and institutional framework were collected and structured for a sound analysis. These fed the subsequent SWOT and program analysis.

Regulatory documents were classified in five categories: international agreements, laws, decrees, orders and strategic planning documents.

Institutions were grouped into four categories: international and regional institutions, national institutions, subnational institutions and finance institutions.

3. IWRM SWOT analysis

Previous work has been conducted on SWOT analysis of integrated water resources management, and the authors were able to develop strategies adapted to local contexts. In general, strengths and weaknesses are internal factors that confer advantages or disadvantages to the management of water resources. While, opportunities and threats are external factors that influence the internal systems. The SWOT analysis guide in the determination of appropriate measures for balancing the needs of people and the environment (Petousi *et al*., 2017), define and prioritize adaptation activities to increase resilience to climate change effects (Hamidreza, 2018), as well as identify drawback factors hampering IWRM implementation (Collado *et al*., 2023) and analyze sustainability factors (Xueping *et al*., 2017). The SWOT analysis relies on expert opinion of a selected group versed with the topic and having authoritative ideas about this. These were selected based on their extensive contribution to water policy, water related policies, SDG 6.5.1 implementation monitoring and their acquaintance with urban development.

The SWOT analysis of the institutional and regulatory framework of IWRM in Yaoundé showed that there was no specific framework at the city level, so the analysis was run at the country level considering it applies to the subnational level.

The information for the SWOT analysis were collected from expert consultation with interviews of 21 key stakeholders, involved in the development or management of water resources in Yaoundé. These included policy decision makers, technical partners, finance institutions, subnational public institutions and university. The interview focused on their knowledge, analysis and perspective of the IWRM framework and implementation regarding the four pillars of IWRM: enabling environment, institution and participation, management instrument and financing.

Data and information gathered were structured around the four pillars of IWRM monitoring for SWOT analysis. For each pillar, key information under that topic were classified as strength, weakness, opportunity or threat, then screened and analyzed. This helped identifying areas of improvement on each pillar.

4. Analysis of water resources programs in Yaoundé

An inventory of implemented and planned programs to develop, protect or manage existing water resources in Yaoundé city sustainably has been carried out through web search and literature review. The pillars (enabling environment, institutions and participation, management instrument and financing) of IWRM to which each contributed were identified and analyzed. The main domain of intervention and principal field were also checked to understand the current priorities of city and government decision makers. Several qualitative criteria were used:

- **Major dimensions:** water development, water protection, water management, water governance;
- **Principal fields:** hydro-electricity, drinking water, sanitation, drainage, flood, water pollution, local water management;

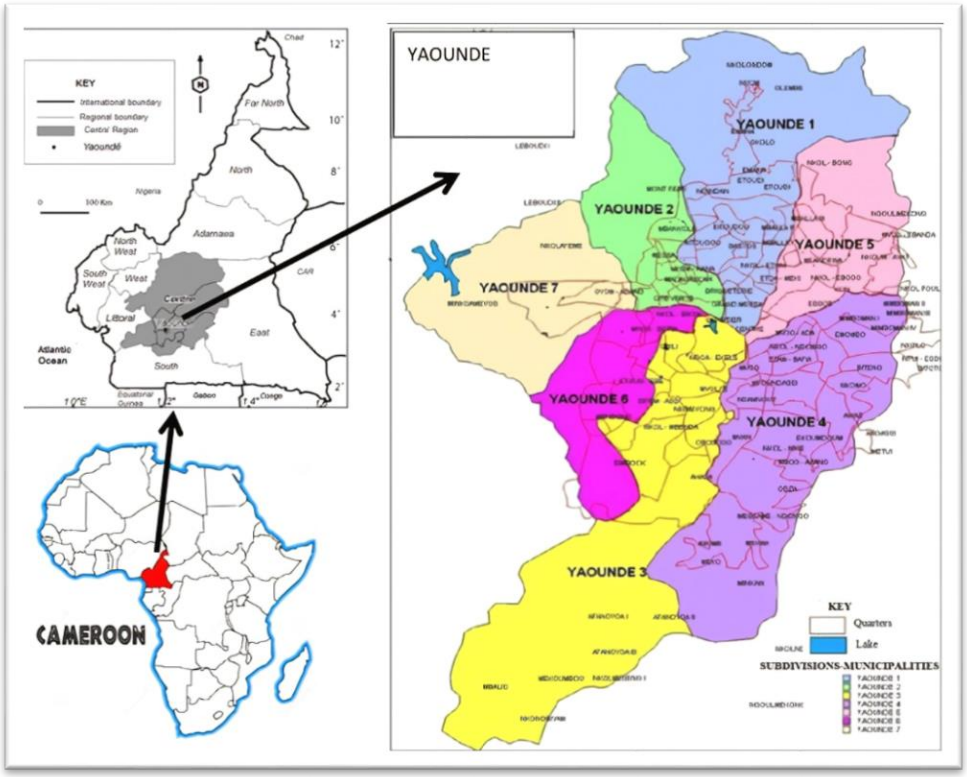

Figure 1: Location of Yaoundé city and its administrative organization.

- **Contribution to IWRM:** No, low, moderate, significant, focus.

RESULTS AND DISCUSSION

1. Institutional framework of IWRM in Cameroon

Douglas (1991) defines institutions as "*human-designed constraints that structure political, economic, and social interactions*." These constraints include both formal rules (such as laws and constitutions) and informal norms (such as customs and traditions), which together shape the behavior of individuals and organizations within a society. As such, the term "*institutional framework*" encompasses the structures, rules, norms, and practices that govern social, political, and economic interactions within a society. According to GWP (2009), the institutional framework of the water sector in Cameroon is structured around three main groups of actors: (i) the government and its main branches (Ministry of Water Resources and Energy, organizations under its supervision, other ministerial departments and decentralized local authorities); (ii) private sector and civil society; (iii) cooperation partners. Since 2012 with the revision of the organigram of the ministry of water resource and energy (MINEE) a specific department in charge of water resource management was created. At national level, multilateral and bilateral agencies play a key role in financing water infrastructure and water management. More generally, they provide financial and/or technical support to the country's entire water sector.

1.1. International and regional institutions

Cameroon has adhered to several subregional, regional, and international consultative and management frameworks aimed at promoting better water resource management, such as the United Nations Environment Program (UNEP), the Economic Community of Central African States (ECCAS), the International Commission for the Congo-Oubangui-Sangha Basin, the Niger Basin Authority, and the Lake Chad Basin Commission (LCBC). As a country member of UNEP, Cameroon benefit from the IWRM support program since 2017 to monitor implementation of several water related sustainable development indicators SDG 6.5.1, SDG 6.5.2 and SDG 6.4. This is implemented with co-support (technical and financial) from Global Water Partnership Central Africa.
At the regional level, Cameroon is part of the council of ministers of water of the Economic Community of Central African States (ECCAS) and signatory of ECCAS March 30, 2009, regional institutional framework for implementa-

Table 1: SWOT analysis of IWRM enabling environment in Cameroon.

Strengths	Weaknesses
- Political will displayed by the Cameroon government to promote IWRM through the development of the National Water Policy (2019), the revision in 2021 of the water law to align it with IWRM principles and the process of revising the 2009 national IWRM plan. - Existence of national IWRM plans which provide a knowledge base on water resources, institutional framework, and finance mechanism in Cameroon. - The existence of the No. 2019/019 law on decentralization which allows for better involvement of local authorities (local councils and regional councils) in water resource management and protection. - Adoption of international and regional policies and conventions that promote cooperation between through initiatives such as the regional IWRM plan or water charters. - Cameroon is a member of several basin organizations (ICCOS, LCBC, NBA) and signatory of international and Cross-border agreements - Production and update of the National Determined Contribution (NDC) mentioning water resource as a key sector for climate resilience - Planed process of reviewing the outdated IWRM national plan with support from GWP	- The new water law is still awaiting presidential endorsement, which is hampering the implementation of IWRM projects as well as decrees and orders at the government and subnational levels. - The current National IWRM Action Plan is out of date and has not been endorsed by government, this limits its impact, although it has given rise to other initiatives. - Limited awareness of the national water policy by most stakeholders - Although laws exist, their effective implementation remains weak, limiting the impact of IWRM efforts. - Weak implementation of ratified international conventions. - Difficulties in translating policies and plans into concrete actions.
Opportunities	**Threats**
- The 2030 National Development Plan (NDP) considers water resources as a key lever for Cameroon future development. - The new water law, once adopted, will provide a clear legal and favorable overarching framework for the implementation of IWRM. - Implementation of a decree regulating the volume of water authorized per use may allow better management of water demand. - With the regular monitoring of SDG 6.5.1 and 6.5.2 more institutions and stakeholders are aware and sensitive to IWRM challenges and possible entry points for its implementation. - The AIP score Card assessed for Cameroon in 2024 raised some case of IRWM pillars which could support more finance income for Cameroon. - Growing interest in environmental issues, which may attract more support for IWRM. - Commitment of international donors to support water sector in Cameroon - Decentralize structure and transfer of responsibilities and resources to local council could accelerate IWRM implementation at subnational level	- Slow decision-making processes in the adoption of the water law and other regulatory texts that can compromise the implementation of IWRM. - Misalignment of budget, priorities and vision may end up pushing IWRM far from key national or subnational decision makers priorities. - Transboundary instability and internal crisis may influence water management priorities.

tion of a regional water policy. As a signatory Cameroon set his national water committee in 2001 by the decree nº2001/161/PM setting the attributions, organization and functioning of the committee. Cameroon is also a member of the African Ministers' Council on Water (AMCOW) and collaborates with this organization to monitor investments in the water sector and build public authority's capacity. Established in 2002 in Abuja, Nigeria, AMCOW's primary objectives are to promote cooperation, security, social and economic development, and poverty eradication among member states through the effective management of the continent's water resources and the provision of water supply services. As a member of this organ Cameroon is signatory of the 2008 Sharm el-Sheikh declaration engaging countries to accelerate the achievement of water and sanitation goals in Africa.

Cameroon is member of the Lake Chad Basin Commission (LCBC) and a signatory of the LCBC Water Charter of April 2012 setting rules of water resources use, monitoring, protection, cooperation and governance. In that line, LCBC has developed a management plan for the Logone River Basin in Cameroon.

As part of the Niger basin Authority, Cameroon is signatory of the Niger basin water charter of April 2008 setting agreement on governance, protection, use and preservation of water resources measures around the Niger basin area.

Cameroon also collaborates with the International Basin Water Office to develop a water management plan for hydro-electric water security in the Sanaga River Basin (MINEE, 2023).

As a member of the Congo-Oubangui Sangha international commission (CICCOS) which mandate has been extended to IWRM in February 2007 Cameroon acknowledged the new orientation of the commission toward a basin management organ and validated the concerted master plan for water resource and development as well as the basin information system and water allocation mechanism.

Table 2: SWOT analysis of IWRM institution and participation in Cameroon.

Strengths	**Weaknesses**
- Involvement of civil society organizations and non-governmental organizations in consultation processes and program implementation (Water For Life Cameroon, RECOJAC, ERA Cameroon, …etc.) - Existence and contribution from technical and scientific institutions such as Center for water resource and climate change, who provide crucial data for water resource monitoring and management. - Existence of the Global Water Partnership (GWP) whose main mandate is to promote IWRM in Cameroon in support of state efforts. - Existence of a National Water Committee (NWC) stated by a decree since 2001. - Inter-institutional collaboration between MINEE, other ministries, local councils, private companies, development agencies and other local actors to improve water supply, development, and management. - The presence of organizations such as national observatory for climate change, Division of National Meteorology, which plays a key role in monitoring and communicating on meteorology and climate changes. - Regional water and sanitation coordination committees supervised by national cluster with support from UNICEF. These committee monitor emergency situation and response in coordination with local NGOs, CSO and development agencies	- Low overall participation (low involvement) of women in decision-making processes. - Weak development of cross-country council's partnership network in support of water development, protection, and management. - Weak coordination between institutions (ministries and agencies) having different and sometimes cross cutting responsibilities on water which can lead to duplication and inefficiencies. - Weak awareness and training of local stakeholders on the IWRM approach. - Insufficient information and knowledge sharing between decentralized services and ministerial stakeholders. - Low involvement of communities in the decision-making process, making initiatives less adapted to local needs. - Non-operationality of National Water Committee since its creation, this limits coordination. - Insufficient popularization of the IWRM strategy (some actors, do not feel sufficiently informed nor involved). - National intergovernmental hydrological program committee not yet created
Opportunities	**Threats**
- Existence of multiple expertise and commitment of diverse stakeholders to contribute to IWRM at national and subnational levels. - Current discussion with world bank to develop two structural programs SEWASH (for inclusion of IWRM in drinking water development) and Rural water supply program (which will rehabilitate 350 water schemes in rural areas of Cameroon). - World bank has inspired and is leading an informal donor hub for the water sector in Cameroon - The new national water policy gives an opportunity to improve coordination between actors through dialogue platforms and partnerships.	- inadequate coordination can lead to difficulties and conflicts due to the diversity of institutions, mandates, agenda and programs of the actors involved in water management. - Difficulty in aligning with international standards if local capacities are not strengthened. - The transfer of responsibilities to regional council since 2019 with very little transfer of budget and clear set of boundaries and roles may lead to status quo for long before the effect of local IWRM measures can be felt.

1.2. National institutions

At national level institutions concerned by IWRM are:

- National committees: i) National water committee set in 2001, ii) national intergovernmental hydrological committee (supported by UNESCO), iii) National marine conference, iv) General delegation for sea
- National partnerships or technical groups: i) National water partnership (national chapter of Global water partnership), ii) National water, sanitation and hygiene cluster
- Ministry of water resources and energy: main ministry in charge of the water sector
- Technical support ministries: i) Ministry of agriculture and rural development, ii) Ministry of housing

Table 3: SWOT analysis of IWRM management instrument in Cameroon.

Strengths	**Weaknesses**
- Existence of project monitoring and evaluation mechanisms, ensuring a certain degree of accountability. - Existence of transboundary basin commissions having cross-border data sharing agreements and protocols (ICCOS, LCBC, NBA). - Existence of initiatives for monitoring water quality and quantity. - Cameroon's participation in monitoring water-related SDG 6.5.1, 6.5.2 and 6.5.3 - Emergency response standards established by ministry of water and energy. - Management and capacity building tools such as the GWP IWRM toolbox - Existence of national surface water monitoring institution (CRECC). - National observatory for climate change (NOCC) - Division of meteorology at ministry of transport with extended network of self-recording and man recorded meteorological station - National statistics institute (INS) produce statistic on access to water and sanitation (last report 2014) among the UNICEF joint monitoring program - Recent water actors website set with support from UNESCO and Water For Life Cameroon	- Insufficient exploitation of existing instruments for decision making (plans and strategies are often poorly implemented). - Lack of operational agencies for the management of watersheds. - Lack of operational tools for integrated management at the local level - insufficient monitoring of hydrometric systems - Performance indicators don't recommend for specific sectors which make recommendation less actionable - Lack of specific and systematic monitoring and evaluation mechanisms to measure the effectiveness of IWRM projects. - Reliance on unofficial documents for the assessment of progress made on IWRM. - Incomplete water information system limited to some regions and to drinking water and sanitation. - No internal or local water resource management institution apart form the division in charge at the ministry
Opportunities	**Threats**
- Existing global water information system platforms for better management of all water resources and decision-making. - The revised national water law, under validation will enforce the management tools already in force - A process to build up an intergovernmental national water committee with support of the UNECSO. - Update of the roadmap to identify priority actions and implement them. - Extension of the water resource monitoring system with satellite and remote weather recording devices.	- Insufficient adequate and reliable data and information for decision-making. - Low autonomy of local authorities - Climate change makes water resource management more difficult. - Conflicts and competition among various uses and sectors (agriculture, urban planning, etc.) which could compromise integrated management. - Water challenges are increasingly complex. - Poor valuation of resources (the abundance of certain resources is not always valued). - Disruption of water resources.

and urban development, iii) Ministry of transport, iv) Ministry of livestock, fisheries and animal industries, v) Ministry of health, vi) Ministry of environment, nature protection and sustainable development and vii) Ministry of forestry and wildlife

- Ministries supporting water investments: Ministry of finance, ministry of economy, planning and land development

Such national institutions are key partners to include in reflections on IWRM strategy, planning and implementation for agreed priorities. These can also be good intermediaries with possible funding opportunities and subnational actors to implement sustainable IWRM measures.

1.3. Subnational institutions

At the subnational level, there are institutions whose mandate is to defend the interests of municipalities for better access to water and sanitation. The United Councils

Table 4: Indicators of successful implementation of IWRM.

Aspects	Indicators
Policy laws and regulation	Development of appropriate and policy framework for IWRM at national and subnational (regions) level
Participation	Stakeholder consultation and participation in IWRM planning and implementation
	Establishment of multi-sectoral water basin management body
	Establishing a multilevel management framework
	Decision making decentralized to the lowest appropriate level (community level)
	Enabling information flow and transparency
	Education and public awareness on IWRM
	Training and capacity building on IWRM processes and practices
Efficient water use	Clear legal status of water entitlements and/or water rights
	Establishment of water demand management tools for water pricing and cost recovery to support sustainable water allocation
	Funding, development and maintenance of water resource infrastructure
Environmental (ecosystem) sustainability	Recognition of ecosystems as drivers of the water cycle and their protection through relevant policy and legislation
	Protection of aquatic and terrestrial (watershed/riverine) biodiversity
	Allocation of adequate water resources to water basin ecosystems to sustain their natural functioning and the services (ecological, social, cultural and economic) they provide
	Rehabilitation and restoration of natural ecosystems
	Water pollution monitoring, control and reduction

Source: SIWI (2020).

and Towns of Cameroon (UCTC) build a strong federation of local councils and urban councils over 7 urban councils and 356 local councils. It supports cooperation among these local institutions to address pressing development issues. It also exists some specific council level institutions addressing water infrastructure development and management, as well as advocacy for improved public investment in the water sector. These include:

- Syndicate of municipalities of the Lékié division (SYNCOLEK);
- Syndicate of municipalities of the Mbam and Inoubou division (SYCOMI);
- Syndicate of municipalities of the Nyong-Ekelle division (SYCNYO-EK).

In some municipalities, such as Bangangte, Dschang and Ebebda, specific technical committee or agencies responsible for the coordination, monitoring and development of water infrastructure and associated local water committees. Their main focus is access to drinking water. Besides the council technical offices oversee drainage, wetland management and existing water resource protection.

At a lower level, water management committees, neighborhood committees or local development committees are existing with the mandate to decide on water access rules, mobilize local investment, manage existing structures, plaid for more investments, regulate water uses and prevent/solve water conflicts. Such structured and decentralized setting is favorable for the development of multiscale IWRM programs addressing both national and local levels priorities in collaboration with appropriate institutions at each level. Recently was launched a process to establish the Sanaga basin authority, the only trans-territorial organ in charge of a basin management in Cameroon. The process is on and full operability of the organ is envisioned by 2028.

1.4. Finance institutions

Regarding finance institutions, major donors in the water sector comes from four sources: grants from cooperation partners, loans or subsidized loans from development and investment banks, public national budget, individual and private investment. Most of those funds going to water development, water management and water protection. Despite this reliance on cooperation interventions, there is no real national or subnational strategy capable of better exploiting the opportunities offered by decentralization.

Table 5: SWOT analysis of IWRM finance in Cameroon.

Strengths	**Weaknesses**
- Commitment of development banks (World Bank, African Development bank) to invest massively in the water sector in Cameroon, using multi-phase programmatic approaches for financing projects. - Support of the ministries which finances the activities on water development, protection and management. - Existence of taxes and royalties on water constitute a source of financing of the activities in the water sector. - Existence of non-tax revenue from fees, sanitation taxes and water rights. - Existence of a special fund for water development (mainly used for water and sanitation so far). - Available and potential funding by international donors such as the IMF for flood response projects. - The possibility of grants and technical support to strengthen the capacities of the actors	- Low budget allocated to IWRM (it is not sufficiently integrated into public budgets) mainly external financing - Insufficient data on water investment and investment frameworks - Insufficient funding (the needs are significant and current funding is insufficient). - Lacks an integrated climate resilient national water investment plan and financing strategy - few considerations of gender sensitivity and promotion of gender equality in budgetary processes and budget allocation - Funds not allocated to basin authorities (because they do not exist). - Absence finance dynamic and fluxes at local and national levels for water development, protection and management - Few information at local level on possible funding opportunities for water management - Water rights used for several other uses - Very few economic instruments to incentivize water finance and investment
Opportunities	**Threats**
- An informal donor platform to explore innovative financing mechanisms and mobilize additional financing to support the government in its development vision, led by World Bank. - The new strategic framework of World Bank plans significant investments in the water sector in Cameroon - Expanding partnerships with private actors and NGOs to diversify sources of financing. - Increased royalty base (mining companies could contribute more to IWRM financing). - Establishment of basin agencies for better management of funds and more efficient allocation with the region development master plans. - Conducting studies on revenue allocation to optimize the use of funds. - Broadening the tax base to increase revenue dedicated to IWRM. - Increased involvement of the private sector to finance water-related projects. - Access to climate funds to finance IWRM projects is possible with support of GWP and UNEP (accredited entity in Cameroon)	- International finance situation with reduction of international funds and reorientation of certain funds to reconstruction of crisis affected countries - Difficulty to ensure transparency and accountability in the management of funds allocated to water sector projects - Risk of misappropriation of funds and corruption - Fluctuation of external funding depending on donor priorities. - Lack of financial resources (MINEE does not have the means to regularly monitor the projects it implements). - Economic instability (may reduce resources allocated to IWRM). - Pressure on public budgets could lead to reductions in investments in the water sector.

Indeed, according to Ako *et al*. (2010) the elaboration of a council water resource management policy and strategy provides the council with a strong legal instrument to negotiate with the supervisory authority and external

Table 6: Contribution of Major programs to IWRM in Yaoundé.

	Period	enabling environment	institution & participation	management instrument	financing	Major water dimension	Principal field
PADY1	2006-2011	Low	Significant	Low	Significant	Development	Drainage Flood
PADY2	2013-2021	Moderate	Significant	Low	Significant	Development	Drainage flood
PCADY	2023-2026	Moderate	Low	Moderate	Moderate	Development	Drainage flood
WACDEP	2011-2016	Low	Significant	Low	Low	Management	Water security
AIP WACDEP G	2020 - 2023	Low	Significant	Low	Significant	Governance (Investment + Gender)	Water security
PAEPYS	2016-2025	Moderate	Significant	Low	Significant	Management	Drinking water
PDVIR	Running	Low	Low	Moderate		Development	Flood
SEWASH	Not yet commissioned	Moderate	Significant	Moderate	Significant	Protection & management	Water security sanitation

support agencies. This is therefore a step towards self-reliance and empowerment of councils.

Analysis reveals that major donors of the water sectors are: United Nations agencies (UNEP, UNESCO, UNICEF, UNHCR, UN-Habitat, UNDP, FAO), development banks (World Bank, African development bank, Islamic development bank), development agencies (African Union, IFAD, EU, GWP, USAID, KOICA, JICA, AFD, GIZ), development funds (Green Climate Fund, GEF small grants), private banks (European Investment Bank, Exim bank China, Exim Bank India), international NGOs, Corporates and private individuals.

Besides, many water infrastructures, mainly those in line with socio-economic development are sponsored by the Cameroon public investment budget. Local NGOs and local communities also finance water sector, though their contribution is not sufficiently documented or considered.

2. Regulatory framework

2.1. International agreements

Cameroon also adhered to important international initiatives, conventions, and agreements related to environmental management in general and water resources in particular. These include:

- RAMSAR Convention No. 28-96 of 25 June 1996 on Wetlands;
- Convention No. 27-96 of June 25, 1996, on Climate Change and its Kyoto Protocol;

- The African Convention of April 21, 1980, on the Conservation of Nature and Natural Resources;
- The Cooperation Convention of July 19, 1985, related to the Protection and Development of Coastal Zones in West and Central Africa;
- Helsinki Convention on Transboundary Waters convention;
- Convention on biological diversity (CBD)of June 5, 1992;
- United nations framework convention on climate change (UNFCCC) of on 21 March 1994;
- United nations convention to combat desertification (UNCCD) of 17 June 1994;
- Stockholm convention on persistent organic pollutants of 17 may 2004;
- Paris agreement of 12 December 2015;
- 2025 Africa Water Vision and Policy;
- 2063 Africa Water Vision and Policy;
- Africa development agenda 2063;

Apart from these international agreements Cameroon subscribed to the Global water partnership with a national chapter. He is also signatory of the Paris Agreement on climate change and 2030 agenda for sustainable development.

2.2. Laws

In Cameroon there are five (5) main laws supporting sustainable water resource use and management

- Law No. 96/12 of August 5, 1996 on environmental protection;
- Law N° 98/005 of April 14, 1998, related to the water regime;
- Law N° 98/015 of July 14, 1998 defining classified, unhealthy and polluted classified establishments;
- Law N° 2011/022 of December 14, 2011 regulating electricity sector in Cameroon;
- Law 2019/024 of December 24, 2019 which establishes the General Code of Decentralization setting the role of local authorities and the financial regime of local decentralized councils.

-

2.3. Decrees

The laws above mentioned are enforced by sixteen (16) decrees as follows:

- **Decree No. 2001/161/PM of May 8, 2001** defining the attributions, organization and functioning of the National Water Committee;
- **Decree No. 2001/162/PM of May 8, 2001** setting out the terms and conditions for the appointment of sworn agents for the monitoring and control of water quality;
- **Decree No. 2001/163/PM of May 8, 2001** regulating the protection area around the points of collection, treatment and storage of drinking water;
- **Decree No. 2001/164/PM of May 8, 2001** regulating the extraction of surface water or groundwater for industrial or commercial purpose.
- **Decree No. 2001/165/PM of May 8, 2001** specifying the terms of protection of surface water and groundwater against pollution;
- **Decree No. 2001/166/PM of May 8, 2001** establishing a special allocation fund for financing sustainable development projects in water and sanitation;
- **Decree No. 2005/493 of December 31, 2005** Establishing the terms of delegation of public drinking water and liquid sanitation services in urban and peri urban areas;
- **Decree No. 2007/290 of November 1, 2007** on the organization and conduct of official action at sea and on waterways;
- **Decree** N° 2005/3089/PM of august 29, 2005 specifying rules to assess, recover and control the sanitation tax and water extraction fees;
- **Decree No. 2009/148 of June 2, 2009**, conferring public works concession contract and management of urban and peri urban water assets to the CAMWATER company;
- **Decree N° 2010/0239/PM of February 26, 2010** stating modalities to exercise specified competences transferred to local council in drinking water supply in areas not covered by public conceded area;
- **Decree N° 2012/501 of November 07, 2012** organizing the ministry of water and energy and setting a specific department for water resource management;
- **Decree N° 2012/2806/PM of September 24, 2012** setting certain guidelines of the electricity regulation law in Cameroon to access and renew concession on water reservoirs;
- **Decree N° 2013/0171/PM of February 4, 2013** setting modalities to conduct environmental and social impact assessment;
- **Decree N° 2013/0172/PM of February 14, 2013** setting modalities to conduct environmental and social impact audits;
- **Decree n° 2024/00176/pm of February 26, 2024** setting out the terms and conditions for managing water used for agricultural purposes and for maintaining hydraulic infrastructure in Cameroon's irrigated farms.

It is observed that only one decree address management of water resources for agricultural use. This might be a first outcomes of the IWRM oriented water policy finalized in 2019 and launched in 2025. Subsequent decrees are still awaited as the enforcement of the regulatory framework of the water sector is a priority in the policy (recommendation 15 p. xi, objective 9 p.84).

2.4. Orders

Order No. 067/PM of November 13, 2001 establishes the Technical Committee for Coordination and Monitoring of the Inter-Basin Water Transfer Project including the Logone/Lake Chad basins, the Benue/Niger basin; the Boumba/Kadey/Ngoko/Sangha/Oubangui/Congo basin;

Order No. 2010/00000298/a/MINEE of September 1, 2010 setting out the specifications specifying the technical conditions and methods for exercising the powers transferred by the State to the municipalities in terms of drinking water supply in areas not covered by the public water distribution network.
This list of orders (2) indicates a weak operation rules of existing laws and decrees regulating the water sector in Cameroon.

2.5. Strategic planning documents

Key strategic documents shaping the programs and intervention about water resource development protection and management are grouped into three categories: strategies, plans and policies. These are:
- **Policy**: National policy for agricultural hydraulics, National Water policy, National gender policy.
- **Plans**: National Agriculture investment plan, national climate change adaptation plan, national integrated water resources management plan.
- **Strategies**: i) Rural water supply development strategy, ii) Wastewater development strategy, iii) Structural hydraulic infrastructure development strategy, iv) National strategy for water sector finance and governance, v) rural sector development strategy, vi) national strategy for water and soil sustainable management and vii) national strategy for growth and employment, updated national determined contribution to climate change effect reduction.

Analysis of the regulatory framework indicate very dense regulation of the water sector as whole, but very few specific texts on IWRM. The National plan for IWRM exist but lack enforcement since it is still not endorsed by government. Nevertheless, the national water policy includes IWRM as a key priority area. Cameroon plan to review and update the Cameroon IWRM plan through a participatory process in 2025 with global water partnership technical assistance and financial support from IWRM Globe support program.

3. SWOT analysis of IWRM framework four pillars

3.1. Enabling environment

The enabling environment for IWRM focuses on existing regulatory, policy, and strategic plans that can stimulate IWRM implementation in a given system or institution. This corresponds to the enabling environment at the national level, due to the absence of a specific framework at the local level. The enabling environment of IWRM in Yaoundé is marked by the existence of decentralized units responsible for water resources planning, development, and protection.
Table 1 reveals favorable strengths and opportunities for the advancement of IWRM implementation in Cameroon with an updated policy, general law under revision to include IWRM, diversity of donors opened to finance water sector in an environment where decentralization is translated into transfer of responsibilities on water resources management and progressive transfer of financial resources. This is considered by Njikam (2021) as a major strength shared with several other countries in central Africa. Another interesting points are the existing and proven monitoring system of SDG 6.51 and 6.5.2, and the upcoming revision of the national IWRM plan for Cameroon with support from UNEP and GWP. The endorsement of international agreements and being part of multiple international and transboundary institutions is also an asset through which more finance for IWRM implementation could be drawn. Indeed, Belay *et al*. (2013) identified the environmental management plan, favorable institutional governance structure and processes, as well as the legal framework for transboundary management as strengths for IWRM effective implementation at country level.
In the other hand, there is limited awareness of the national water policy among stakeholders and limitations in implementation of existing laws and international agreements due to lack of dedicated funds and operational mechanisms. As a result, existing policies and plans are difficult to translate into concrete actions. Which according to Belay *et al*. (2013) is a significant threat to IWRM that limits the efficient use of transboundary water resources. Another constrains are the misalignment of the state development priorities with IWRM plans at national and local levels as well as the internal socio-economic and political crisis at borders of Cameroon which hinders long term investments in those areas.
Despite these strengths, the local implementation or consideration of IWRM in Yaoundé is still weak due to several factors including low awareness of authorities on the importance of IWRM, misperception of IWRM, insufficient consideration of efficient water resources management, lack of water resources management tools. These weaknesses are similar to those identified by Collado *et al*. (2023) for four localities in Philippines (Puerto Princesa, Roxas, Taytay, El Nido) where there is also absence of IWRM master plan. Yaoundé city too does not have such a plan and the current Yaoundé 2020 master plan is upset and does not consider water resource management.
For effective IWRM at all levels, it is agreed and stated in the Cameroon national water policy (MINEE, 2019) that, efforts are still needed to address seven (07) pressing issues: i) coordination and monitoring of the water sector, ii) improving the legal and institutional framework, iii) development of human resources, iv) capacity building and knowledge transfer of local administrations, v) implementation of IWRM set up, mechanisms and principles, vi) financing the water sector and vii) develop inclusion considering human rights.

3.2. Institutions and participation

The institutional and participatory dimension of IWRM in Yaoundé is characterized by a multitude of actors and organizations at different levels interacting on water

issues. This dimension refers to the institutions that influence water resources and the participation of stakeholders who contribute to the implementation of IWRM at different levels, as well as their role within this framework.

Table 2 shows a balance between strengths and weaknesses as well as between opportunities and threats, indicating a great potential of developing institutions and participation but also a huge sensitivity of this pillar to threats as well as several entry points for improvement.

Though civil society, research institutions, technical institutes and private sector is involved at national level with Global Water Partnership (GWP) supporting and promoting IWRM, coordination and collaboration at national level and subnational level remain major concerns in Cameroon. This situation is the same in many African countries (AMCOM, 2025). Indeed, inter-institutional collaboration among various ministries and agencies, with weak coordination lead generally to duplication and inefficiencies. Existing example like the WASH sub-sector regional coordination unit with national cluster can inspire decision makers in the water sector so as to address other water dimensions (health, education, culture, transport, energy, environment, habitat, …).

In fact, it is needed to have coordination mechanisms at all levels of implementation of water resources development, protection or management. The existing national water partnership (national chapter of GWP) as an informal inclusive mechanism shall be strengthened, national water committee reactivated and the national intergovernmental hydrological committee created and operationalized. To address the finance of water sector, the informal donor hub led by world bank has to be supported to leverage finance mechanisms/corridors and align investment priorities on the national water policy and IWRM dimensions.

The SEWASH program (*Improve access to WASH services and contribute to water security by promoting integrated water resources management in targeted rural and peri-urban areas*) is a good start for integrating water development, water governance and water resources management in the same program for multiple level intervention. This may also help strengthening horizontal and cross-cutting level coordination if institutional and participation barriers are addressed prior to its launch. That program may also address the low transfer of financial resources to subnational levels for effective water resource management investments. Such a program aligns with the recommendation of Belay *et al*. (2013), indicating that such measures can enhance institution and participation at local or transboundary levels with the development of multinational and multi-sectoral programs for collaborative actions, exchange of experiences, trust and capacity building for cooperation and sustainable management.

Moreover, low community involvement observed by stakeholders generally ends up in misalignment of investments with local priorities low consideration of social aspects or cultural realities and unsustainable investments or programs. This is in line with Okala (2023) observation about ineffective citizen participation to institutional processes. According to GWP (2009) water resources in Cameroon are still undervalued in all their dimensions (social, economic, environmental and cultural). Vulnerable groups (women, youth…etc) are considered in various programs and gender sensitive approach progressively included in the budgeting process (MINEE, 2023). A specific interest for stakeholder balance at various consultation or planning processes is already a good step ahead in many public and private institutions.

3.3. Management instruments

The management of water resources is characterized by a set of mechanisms and actions enabling the monitoring and management of resources. This component concerns the tools and activities that enable decision-makers and users to make rational and informed choices between different actions. Globally there are 15 instruments commonly referred to in Cameroon:

- International agreements and treaties of the three transboundary agencies over lake Chad, Congo river and Niger river basins;
- International conventions (biodiversity, desertification, pollutants, climate change, …);
- National constitution;
- National laws related to water resource, environment, mining, marine and oceanic areas, forest and agriculture;
- Decrees and orders: defining rights, responsibilities, and regulations;
- Sustainable Development Goal indicators monitoring framework addressing IWRM and other water related indicators;
- Monitoring reports on SDG 6.5.1, SDG 6.5.2, WASSMO and AIP scorecard;
- Policies, Strategies and plans;
- Emergency response standards established by ministry of water and energy;
- GWP IWRM toolbox and IWRM portal;
- Emergency situation and response report and other specialized reports;
- Council's local development plans, city master plans and Regional development plans;
- Water information system and stakeholder's information system;
- Finance laws;
- Climate monitoring and forecast report + Meteorological journals and forecasts.

Table 3 shows a balance among the four aspects. It highlights monitoring and evaluation mechanisms, both for project implementation, budget use and IWRM implementation. Thus, ensuring a degree of accountability and providing a guide for future planning. Regular capacity building, information and data sharing at transboundary

levels, existence of some standards, having institutions monitoring water resources (CRECC, ONACC, division of meteorology) and water statistics (INS and UNICEF), country factsheets from UN agencies (UNEP, UNICEF, UN-HABITAT, …), national water and actors information systems as well as 15 management instruments are huge advantages for Cameroon.
Unfortunately, these strengths and opportunities are insufficiently exploited both at national and subnational levels for decision making and to address water development, protection and management. The lack of operational agencies for watershed management at national and subnational levels, as well as inadequate tools for integrated management and monitoring at local level combine with incomplete water information system.

Sometimes some of the listed management instruments are unknown or inaccessible to decision makers at all levels. Other drawbacks like insufficient or unreliable data and information for decision-making are some bottlenecks of the IWRM implementation in Cameroon globally and particularly in Yaoundé city.
At the city level, improving on these weaknesses and threats may help counteract current challenges of managing urban water sustainably. These challenges are: poorly maintained surface water, destroyed wetlands, increasing eutrophication and land occupation for infrastructure, factories, commercial areas, public spaces or agricultural production. With the fast-growing population and spatial expansion pace of the city of Yaoundé (3.68% annual population growth according to world population review and already 60% area urbanized), water resource crisis in that merely megacity is not far in the next decade. To avoid this, SIWI (2020) indicates 04 aspects to consider for successful IWRM implementation: i) policy laws and regulation, participation, efficient water use, environmental (ecosystem) sustainability. These and their respective indicators can be useful checklist to complement existing SDG 6.5.1. monitoring questionnaires (Table 4).

3.4. Financing

In Cameroon, IWRM financing is complex. From the SWOT analysis (Table 5), it is dominated by international donors with complementary contribution from the public investment budget and private initiatives (national banks, development agencies, non-governmental organizations, corporates, communities, individuals). The legal framework governing local councils finance in Cameroon is primarily established by Law No. 2004/17 on the Orientation of Decentralization and Law No. 2004/18 on the Municipality Regime, which constitute the legal framework of financial management.
Besides, each year a law of finance approved by the two legislative chambers of Cameroon (parliament and senate) states the budget allocation for various expenses at government, regional and local levels. These laws authorize local governments to levy taxes that can be used as loan or guarantees for investment on critical sectors.
According to Law No. 2019/019, water development and protection is therefore in line with the sector to be financed locally. Local councils may levy taxes, international cooperation or local revenue activities to finance investment in general. The challenge is about how much of the collected taxes could be allocated to investment in the water sector locally. As this is sometimes difficult to address, councils rely on decentralized cooperation and the Inter-council investment and equipment fund (FEICOM) for loans, subsidies and grants. Development banks mainly finance water development and management through bilateral and multilateral agreement with the government. These are done through targeted areas and programs with limited duration according to national strategic frameworks and priorities. Development agencies also support water management through short term programs and targeted actions. Unfortunately, there are few mechanisms to continuously monitor finance mobilization, their use and efficiency for water development, protection and management in Cameroon. This is the same for the city of Yaoundé.
Though taxes from water use rights targeting gross water consumers (domestic drinking not included) are collected, it generally servs other sectors due to the structure of national treasury management in general. Nevertheless, a special fund was created with the national water committee in 2001 and anchored to the ministry of water and energy to finance water development. Budget allocation for that fund is regular; but their amount is still very limited compared to needs and allocation still random. As a consequence, despite the decentralization orientation, law and process, no specific funds are transferred yet to regional and local councils for water protection and management. The main focus remains water development for drinking water points. This situation is looked by Njikam (2021), as a major weakness. In certain cases, where there is sufficient financial capacity, budget allocation may be an issue for the sponsoring of water resource management (Collado *et al*., 2023). Another drawback in that situation may be corruption, if distraction of funds towards other uses and other beneficiaries than the prime target happens (Belay *et al*, 2013)
According to the 2024 Africa Investment Program scorecard analysis for Cameroon through the three main pillars (enabling environment for water investments, investment and financing in the water sector, efficiency and sustainability of investments), it appears that Cameroon still face some weaknesses like the limited inclusion of gender, the absence of climate risk assessments in the planning of investments in the water sector and inadequate monitoring of water sector investments (GWP, 2023). Some possible root causes may be: insufficient or lack of data on water investment and investment frameworks, lack of an integrated climate

resilient national water investment plan, few long term public private partnerships for water investment, insufficient data on climate resilient water investments and no specific training program or research team on water financing.
To address these challenges, the government should increase its budget allocations for IWRM at both national and subnational levels; develop strategies to attract more donors and match their interest with the needs and better exploit the opportunities from existing cooperation partners.

4. Analysis of major programs for water development protection and management in Yaoundé

There is a growing attention to the challenges of sustainable water resource management in the city of Yaoundé, namely rapid urbanization, vulnerability to floods, degradation of wetlands and the need to improve access to drinking water. To address these, several programs and initiatives have been developed through years:

- Yaoundé City Drainage Program (PADY1) in 2012, which involved the construction of a network of drainage canals (20% of the Mfoundi's main canal and its four tributaries), with domestic funding and support from the African Development Bank, the Global Environment Facility, and the French Development Agency.
- The second phase (PADY 2) completed in 2020, following PADY 1, in which approximately 6 km canal along the main bed of the Mfoundi with towpaths, and 8 km canals along its four tributaries, with the establishment of a pilot sludge treatment plant and support for the pre-collection of household waste (www.undrr.org).
- The Complementary Sustainable drainage Project for the City of Yaoundé (PCADY) continued the objectives of phases 1 and 2 of PADY Project. Signed in 2022, PCADY aimed at the construction of 17 km of canals on the waterways that drain the city of Yaoundé (www.afdb.org).
- The Drinking Water Supply Project for the City of Yaoundé and its Surrounding Areas from the Sanaga River (PAEPYS), launched in 2018 and commissioned in 2024, aimed to improve the drinking water supply of Yaoundé and its surrounding areas by exploiting the resources of the Sanaga River. Objective is to increase the drinking water production capacity to 300,000 m³/day, expandable to 400,000 m³/day.
- Yaoundé drinking water network rehabilitation: it aimed to address the challenges in water distribution. This project, financed partially by a loan from Eximbank-India, involves the construction of new pumping stations, storage reservoirs, the extension of secondary and tertiary networks for approximately 200,000 new connections (including 20,000 with smart meters), and 100 standpipes in the cities of Yaoundé, Obala, and Batchenga by the end of 2025 (www.camwater.cm).
- The Inclusive and Resilient Cities Development Project (PDVIR) aimed to strengthen capacities for inclusive and resilient urban management, improve connectivity and living conditions in beneficiary cities (Ngaoundéré, Maroua, Kousséri, Kumba, Batouri, Douala, and Yaoundé), and provide a contingency response in emergency situations. Actions taken include the construction/rehabilitation of urban roads, the construction of drains, and the supply of drinking water.
- Water, Climate, Development program (WACDEP) focused on supporting the national adaptation plan to climate change process in Cameroon and build the capacities of several ministries on integrated water resource management. Implemented by Global Water Partnership (GWP) on behalf of the African Ministerial Council on Water (AMCOW).
- Africa Water Investment, Water, Climate, Development-Gender (AIP-WACDEP G) program which is being implemented in Cameroon by Global Water Partnership Cameroon (GWP-Cmr) with the financial support of the Austrian Development Agency (ADA), Swedish International Development Agency (SIDA) aimed to mobilize 30 billion dollars in climate resilient water investments by 2030 across Africa, create 5 billion jobs and facilitate the implementation of the gender transformative approaches (GTA) in order to improve gender inclusion/equality in the water sector
- The Cameroon Water Resources Security and Access Improvement Project (SEWASH), approved by the World Bank under the Multi-Phase Program Approach (MPPA), aims to strengthen institutions, improve water resources management, and increase access to water and sanitation services in urban and semi-urban areas of Cameroon (www.worldbank.org).

According to table 6 most of the programs implemented in Yaoundé for the last 20 years focused on water development and protection, few programs focused on management. Programs run by public institutions mainly targeted drinking water, flood management and drainage. Programs run by development agencies with support and participation of public actors were geared towards water management. There has been a shift in the orientation since the national water policy decided to embed the IWRM principle as the core of the Cameroon strategy for the water sector. A clear indication of it being the focus on water security with the SEWASH program planned to run for 10 years with a multiphase approach.
According to Figure 2, Cameroon in 2023 had a medium to low level of implementation score of IWRM with a low level of investment on water resource infrastructure. This is in line with the program analysis. Which means that the low investment rate in city of Yaoundé on IWRM is underpinned by the national trend. Nevertheless, considering the relative autonomy of regional councils and city councils there is an opportunity to leverage decentralized cooperation with foreign institutions to raise funds and leverage investments for local IWRM finance.

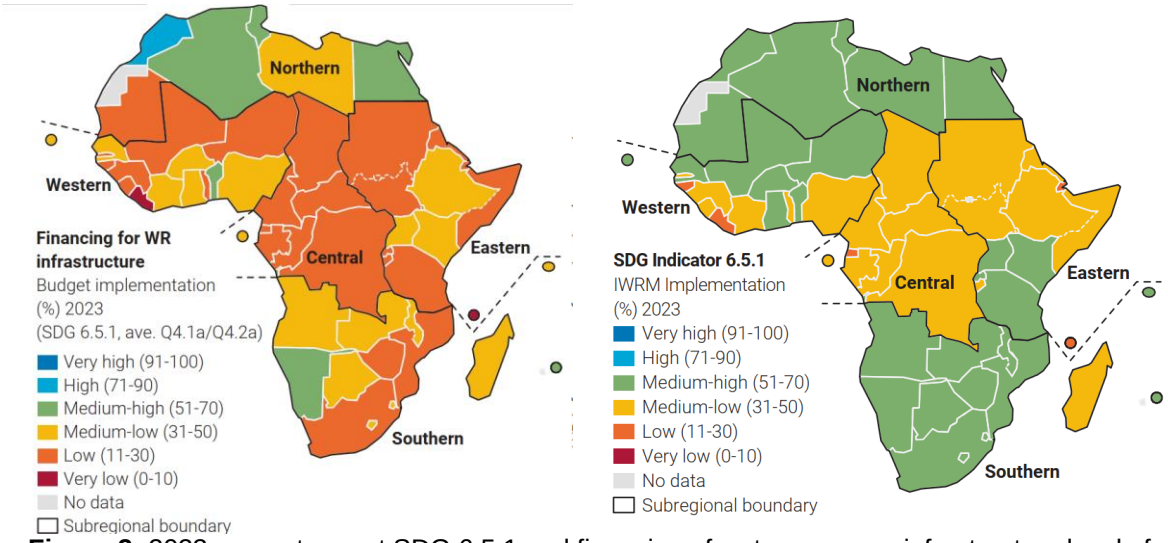

Figure 2: 2023 or most recent SDG 6.5.1 and financing of water resource infrastructure level of implementation in Africa.
Source: AMCOW (2025).

5. Benefits of assessing IWRM implementation using framework analysis

A SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis is a valuable tool for improving SDG reporting, monitoring, and planning. It provides a structured framework to assess progress toward SDG 6.5.1 and a comprehensive understanding of the situation, beyond data reporting. This helps in identifying persistent challenges, adequate action points for strategic planning, development, protection or management of existing water resources.

Analysis of opportunities and threats highlight potential risks and impacts (positive or negative) which are critical in decision making processes. As such, a SWOT analysis, when conducted with the participation of multiple stakeholders, can improve engagement and collaboration between different government agencies, the private sector, and civil society. Exploration of past, ongoing and planned programs through program analysis matrix highlights the orientations of of existing policies and guides on future strategic planning. From Koop *et al.* (2022) "*Inadequate governance capacity impedes cities to improve IWRM in an effective manner and delays necessary investments in drinking water infrastructure, sewerage and wastewater treatment. This shifts the legacy to next generations*". He proposed seven guiding principles towards water wise cities which can inspire decision and policy makers at city levels.

Beyond, checking the level of implementation of IWRM with the SIWI (2020) IWRM success indicators framework is a complementary and comprehensive tool which could help identify additional areas of improvement and mobilize common understanding of ways to go, for improved IWRM practices at city level. Applied to the 107 countries still on track and less advanced to reach the SGD 6.5.1 target (UNEP 2024), clear pathways can be identified to accelerate city and countries improved IWRM implementation worldwide.

CONCLUSION

This paper aimed to analyze SDG 6.5.1 implementation in Cameroon and city of Yaoundé using the framework analysis approach based on SWOT analysis and program analysis, considering the four dimensions of IWRM: favorable environment, institutions and participation, management instrument and financing. A possible complementary tool recommendable to policy makers and practitioners could be the IWRM success indicators checklist, water wise city indicators or the city blue print framework.

From the analysis, it was observed that Cameroon has a very strong institutional and regulatory set up for water sector and very few addresses specifically water management. Main programs implemented focus on drinking water, flood protection and capacity building. Unfortunately, operating mechanisms to translate existing framework and potential to sound, efficient and sustainable water management is globally lacking. Despite the numerous donors and diversified internal finance mechanisms, very few investments are made on management, infrastructure and operational instruments. A common ground of many developing countries.

This is clear and more acute at city level where local authorities have little awareness on IWRM benefit, processes and practices. With the fast growth rate of Yaoundé, as many of such in developing countries, water crisis is fast approaching if no measure with adequate actors and sufficient tailored funds are not mobilized.

Key opportunities offered by external parties, political environment and water regulatory framework in Cameroon shall be leveraged by decision makers and practitioners to expand water development, protection and management. Besides, improved SDG 6.5.1 monitoring framework would help decision makers to understand current and future challenges for informed and efficient IWRM interventions.

REFERENCES

❖ Ako A. A., Eyong G. E. T., G. E. Nkeng (2010) Water resource management and integrated water resources management (IWRM) in Cameroon. Water Resour Manage (2010) 24:871–888 DOI 10.1007/s11269-009-9476-4

❖ AMCOW (2018). 2018 Status Report on the Implementation of Integrated Water Resources Management in Africa: A regional report for SDG indicator 6.5.1 on IWRM implementation.

❖ AMCOW (2025) 2025 IWRM-related Progress in Africa: Integrated Water Resources Management (IWRM), Disaster Risk Reduction, climate resilience, and financing for infrastructure, based on SDG 6.5.1. Technical note.

❖ Belay Alebel Abebe, Semakula Henry Musoke, Wambura George James, Labohy Jan. (2013) SWOT Analysis and Challenges of Nile Basin Initiative: An Integrated Water Resource Management Perspective. Article in Chinese Journal of Population Resources and Environment DOI: 10.1080/10042857.2010.10684960.

❖ Collado Jennifer Cacal, Taboada Evelyn Buque and Mehboob Muhammad Shafqat. (2023) Strategic Implementation of Integrated Water Resource Management in Selected Areas of Palawan: SWOT-AHP Method. https://doi.org/10.3390/su15042922

❖ Douglas North (1991). Institutions. Journal of Economic perspectives, 5 (1), 640-655. "Europa". In: Zedler's Universal-Lexicon, Volume 8, Leipzig 1734, columns 2192–2196.

❖ GWP (2009) State of play of the water sector, knowledge and uses: National Action Plan for Integrated Water Resources Management in Cameroon (PANGIRE).

❖ Hassan Muhamad (2022) ResearchMethod.net consulted on 30th august 25 Framework Analysis - Method, Types and Examples

❖ Koop Stef H.A., Grison Chloé, Eisenreich Steven J., Hofman Jan, Van Leeuwen Kees, (2022) Integrated water resources management in cities in the world: Global solutions. Sustainable Cities and Society Volume 86, November 2022, 104137. https://doi.org/10.1016/j.scs.2022.104137

❖ Njikam Linjouom Abdou Rahamani (2021) Comparative analysis of the institutional and legislative framework for water resource management in Cameroon, in the context of the countries of the Economic Community of Central African States. Master's thesis in IWRM, University of Liege.

❖ Nsangou, D., Mfonka, Z., Kpoumié, A. (2024) Analysis of rainfall variability and impact on the start and end dates of rainy seasons in the urban humid tropical zone: a case of the Yaoundé Town, Cameroon (Central Africa). *Arab J Geosci* **17**, 273. https://doi.org/10.1007/s12517-024-12073-5

❖ Nwankwoala H.O, and Ngah. S.A. (2014) Groundwater resource of the Niger Delta: quality implications and management considerations. *International journal of water resources and environmental engineering.*

❖ Okala Abega Michele Desire (2023) Public participation and integrated management of water resources in Central Africa. International Journal on Water and Sustainable Development (RIEDD).

❖ Petousi I., Fountoulakis M., Papadaki A., Sabathianakis I., Daskalakis G., Nikolaidis, N. Manios T. (2017) Assessment of Water Management measures through SWOT Analysis: The case of Crete Island, Greece. ISSN: 2367-8941. http://www.iaras.org/iaras/journals/ijes

❖ SIWI - Stockholm International Water Institute (2020) Principles and practices of integrated water resources management: workplace based professional training. Manual 1. SIWI Stockholm International Water Institute. Stockholm, Sweden

❖ UNEP (United Nations Environment Programme) (2024) Progress on implementation of Integrated Water Resources Management : Mid-term status of SDG Indicator 6.5.1 and acceleration needs, with a special focus on Climate Change

❖ WWAP (United Nations World Water Assessment Program), UN-Water (2018) The United Nations World Water Development Report 2018: nature-based solutions for water. UNESCO, Paris.

❖ Xueping Gao, Lingling Chen, Bowen Sun and Yinzhu Liu, (2017) Employing SWOT Analysis and Normal Cloud Model for Water Resource Sustainable Utilization Assessment and Strategy Development. www.mdpi.com/journal/sustainability

Acknowledgement

Authors acknowledge the contribution of all the stakeholders who accepted to answer the interview and facilitate data collection.

DATA AVAILABILITY STATEMENT

No dataset.

CONFLICT OF INTEREST

the paper and authors have no conflict of interest.

ETHICS STATEMENT

All information gathered and presented here respect the scientific ethics and integrity of all interviewed actors with free and informed consent.