

Research Article

# Analyzing Water Resource Potential and Governance Challenges in Babessi, North West Region, Cameroon

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## Abstract

Water is a vital resource for life, development, and the environment, but its availability depends significantly on its management. Global projections indicate that 40% of the world's population will face water stress by 2050, with demand increasing by 55%. In rural Africa including Cameroon, water supply infrastructure is aging, technologies are outdated, and governance systems are ill-equipped to handle rising demand, urbanization, climate variability, and disasters. This study investigates water governance issues in Babessi, North West Region of Cameroon, where access to and management of water resources present significant challenges. The research employed a survey of 22 water management stakeholders through face-to-face interviews, alongside literature review and field observations. Data were analyzed using Microsoft Excel and SPSS version 27.0. The OECD guidelines on efficiency, effectiveness, trust, and engagement were used with the Analytical Hierarchical Process (AHP) to analyze water governance. Findings revealed that despite stakeholders' efforts, challenges persist, including water supply inaccessibility, unaffordability, and poor quality. Unskilled water management personnel was ranked as the primary challenge (1.14 mean weighted value), followed by limited funding and collaboration (0.85 and 0.83 weighted mean values). Ineffectiveness was identified as the most serious issue affecting water governance based on the OECD principles (0.047 weighted mean). In summary, the study highlights critical shortcomings in water governance in Babessi, which are contributing to water access and service delivery issues. Therefore, there is an urgent need for more inclusive participation, effective partnerships, increased investment, capacity building, and accountability to ensure sustainable water resource management, aligning with the OECD framework.

## Keywords

Water Availability, Water Governance, Stakeholder Engagement, Livelihood, Development Impact, Babessi

## 1. Introduction

According to [1], water, one of the world's most valuable and scarcest resources, is vital for life, development, and the environment. Its apparent availability depends on its occurrence and management, with OECD projections indicating that 40% of the global population will live in water-stressed river basins by 2050, and water demand will rise by 55%. As

recognized by [2], water crises worldwide are fundamentally governance problems. The complexities of water management, including scarcity, pollution, and access, are largely caused by inadequate policies, regulations, and administrative practices. Regrettably, many rural water supply infrastructures in developing countries are rapidly aging, technologies are out-

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dated, and governance systems are often ill-equipped to handle rising demand, continued urbanization, climate variability, and water disasters. Therefore, significant investments are required to renew and upgrade water infrastructure to ensure access for all to water and sanitation by 2030, as outlined by the Sustainable Development Goal for water and sanitation (SDG 6) (UN, 2030). [2] estimated that, about USD 6.7 trillion will be required by 2050 for water resource governance, including a wider range of water-related infrastructure, which could triple that bill by 2030. However, according to [3], irrespective of how it occurred, if well managed; water can be an instrument for growth, wellbeing, and poverty alleviation especially in rural and peri-urban settlements.

Since the Dublin conference in 1992, international goals about water governance have been made and [4] states that the importance of water governance has increased due to the 2030 SDG6 goals. [2] defines water governance as “the range of political, social, economic and administrative systems that are in place to develop and managed water resources and to deliver water services at different levels of society”. For instance, [5] highlighting the experiences with IWRM in Oregon (USA) and Ontario (Canada) showed that Integrated Water Resource Management (IWRM) governance has evolved due to changes in funding and priorities, which have benefitted some catchments and communities more than others. Hence, implementation of IWRM any where should, therefore, start with careful analysis of the local context, and existing governance arrangements and governmentalities. Also, at the World Water Forum (WWF) in The Hague, 2000, [6] said that “water crisis is often a crisis of governance and such; effective water governance should be making priorities for action”. The Hague Ministerial Declaration asked countries to have good water governance by building capacity, investing, and making policies to include the public and all groups in managing water resources especially in developing countries facing acute water insecurity.

According to [7, 8], although access to safe and reliable water supplies has received much-needed attention from stakeholders worldwide in recent years, 663 million people, including 319 million in sub-Saharan Africa (SSA) alone, of which 80% reside in rural areas, still lack improved drinking water sources. Furthermore, [9] indicated that the future outlook foreshadows stress factors for the continued development of the African water sector. Reliable and secure water resources for rural communities in Africa continue to be at the forefront of the challenges facing these communities in the last 20 years, particularly for smallholders, agricultural sector productivity, food security and economic development increasingly exacerbated by climate change and rapidly growing urban populations [10]. With a projected population of over 2.4 billion people by 2050, food security, increasing urbanization, and extreme weather events will increase pressure on water security and the water sector. Despite 20 years of the Africa Water Vision 2025 (AWV, 2025), as reported by [11, 12], the African continent continues to be hit by water

scarcity. This is evidenced by the unwanted trend regarding water resources, as the number of persons living in water-scarce areas increased from 300 million in 2001 to 340 million in 2015 [13-15] found that, governments' performance in water supply in many African countries is rated as fairly, good, or even very bad. According to [10], this scenario is worsened in rural areas, where access to safe water is constrained by acute financial and technical incapability to adequately manage the available water resources. Finally, [16, 17] highlighted that although theoretical measures and operationalization plans exist through political goals to overcome these challenges, these decisions are ineffective if their operationalization is not adequately supported or funded. Hence, addressing these challenges requires well-structured policy in the water sector, to implement commitments and investments effectively, and ultimately ensure the quantity and quality of water supply.

Failure to invest in water resources assessment and development, poor institutional arrangements, and inappropriate governance mark the African water sector, and, according to [18], inadequate legal frameworks regarding ownership and cross-boundary use also constitute a significant challenge to water governance on the continent. Despite the challenges plaguing the sector, over the past 20 years, the African water governance sector has continued to evolve with the implementation of several new declarations, initiatives and institutional establishments. According to [14], the AWV 2025 framework formed the basis for these new initiatives, including the African Ministerial Council of Water (AMCOW), established in 2003, which increasingly holds a major role in water governance in Africa. The establishment of AMCOW enabled water to be assigned political significance and reinforces the operationalization of the set goals in AWV 2025, which is the equitable and sustainable use of water for socio-economic development. [19] highlighted that, the presence of water governance weaknesses in SSA countries, pointing to their struggles with water security. Building on this, [20] emphasized that, these governance challenges in SSA are compounded by spatio-temporal variability in water resources, conflicts over transboundary basins, and limited cooperation.

Cameroon is one of the SSA countries where access to potable water is still a burden to rural areas. Despite abundance water resources estimated to be 322 billion cubic meters with an annual available water per inhabitant of 21,000 cubic meters [21], access to suitable water for whatever purposes remains a major challenge as households sometimes trek several kilometres to fetch drinking water in many rural areas in Cameroon. This is aggravated by seasonal changes as water management body is geared more efforts towards managing solely the surface water sources which dry up during dry season. This renders the population vulnerable to water insecurity. [22] indicated that, Cameroon's efforts to achieve its Sustainable Development Goals (MDGs) (SDGs) for rural water and sanitation were unsuccessful. Even with government partnerships with NGOs and

the ADB, only 44.6% and 28.8% of the rural population had access to improved water and sanitation facilities in 2015, when the targets were 80% and 60%. [23, 24] Roe et al. (2009) highlighted that the natural resources management approach in Cameroon is predominantly centralized, with limited focus on rural communities and private agents. According to [21], water is a public good in Cameroon, and the institutional framework is characterized by a top-down management system, with the Ministry of Energy and Water Resources (MINEE) as the organizing body, and conventional sectoral approaches in the hands of many other ministries and public agencies. As indicated by [25, 21], water scarcity in most rural areas of Cameroon stems from poor water governance and limited exploitation of existing water resources, not from a lack of water itself.

Babessi as a rural community faces diverse challenges in accessing and sustaining water to meet the growing needs of its growing population. Unreliability, scarcity, limited accessibility and quality all have far reaching and detrimental impacts on health and socioeconomic development. Water resources in Babessi are governed by the Community Water Management Committee –Babessi Water Management Committee (BWMC) who works in collaboration with the Babessi council. The population relies mainly on surface and groundwater sources (wells, springs and manual pump boreholes) with little available information on their physio-chemical and bacteriological properties or characteristics including management. These water points are either own by individuals or NGOs through partnership. Despite the presence of water governing committee, water governance in this village remains a concern [26]. Many taps are dotted literally everywhere in the village but hardly do they flow. This exposes the population to water insecurity especially during dry season when the water availability and recharge is acute. While the 2015 OECD framework on water governance may offers valuable principles for the study area, its effectiveness in addressing critical issues of water supply management in Babessi requires further investigations due to limited water supply in infrastructure, institutional fragmentation, limited community participation and financial limitations.

Hence, there is a lack of in-depth, localized analysis of water resource potential and governance challenges in Babessi, North West Region, Cameroon, and how these factors contribute to water insecurity in the face of broader national and continental trends. Specifically there is a need to bridge the gap between continental and national water policies, and the local implementation of those policies using this framework. This framework could provide valuable starting points with more emphases on clearly define roles and responsibilities, stakeholders' engagement, trust and engagement, however, the effectiveness of the framework in Babessi hinges on the level of adaptation, capacity building and measurement and infrastructure. While this framework offers a promising approach to sustainable water resource management, its success in Babessi relies on addressing local

challenges, ensuring adaptation and building capacity for implementation. Hence, this study assesses the water resource potentials including groundwater and surface water availability and quality; analyze the existing water governance structures and processes in Babessi, identifying strengths and weaknesses and finally identify the key challenges to effective water resource management in Babessi, including financial, technical, and institutional factors. These are very critical to ensure equitable and sustainable access to clean water for local population thereby improving health outcomes of the population while ensuring economic development, poverty reduction and empowering women.

## 2. Conceptual Framework

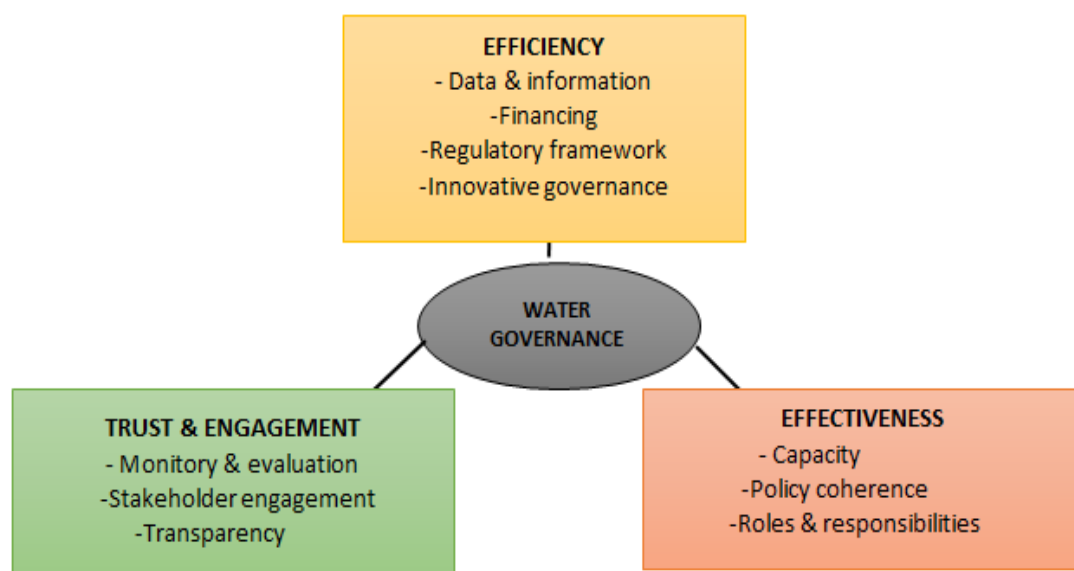
*The OECD Principles and Indicators Framework for Water Governance* [2].

The key framework used in this study is the OECD principles on water governance. This framework adopted for this study provides certain must-haves dimensions for efficient, effective and inclusive water governance by any community. Adopted in May 2015 by the OECD Regional Development Policy Committee and backed by ministers at the OECD Council Meeting at Ministerial Level in June 2015, the principles provide a framework to guide better water policies and reforms. The principles apply to all water management functions (production, distribution, supply, sanitation, flood protection, water quality and water quantity) water uses (domestic, industry, agriculture, energy and environment); and type of ownership of water management, resources and assets (public, private, mixed). The OECD principles on water governance is designed based on five key main objectives which are to; foster dialogue at local, basin, regional and national levels, promote inclusiveness across stakeholders, stimulate transparency in the performance of water-related institutions, increase awareness on water governance related issues and trigger actions to bridge water governance gaps. The principles are centered on three dimensions of which included effectiveness, efficiency, trust and engagement (Figure 1).

Figure 1 shows the three dimensions of OECD framework on water governance. These dimensions are backed by some indicators which promote effective, efficient and inclusive water governance at all levels. The effectiveness of water governance relates to the contribution of governance to defining clear sustainable water policy goals and targets at different levels of government, to implement those policy goals, and to meet expected objectives or targets. Meeting the expected goals or target in effective water governance implies there is need for capacity building, policy coherence and clear roles and responsibilities for the different stakeholders. The efficiency of water governance relates to the contribution of governance to provide the benefits of sustainable water management and welfare at the least cost to members of the community including households. To achieve sustainable

water management at least cost, providing data and information on water governance, financing water projects, designing regulatory framework backed by innovative governance are all necessary to ensure water efficiency. Trust and engagement in water governance as revealed by the framework could contribute to building public confidence and ensuring inclusiveness and public participation through democratic legitimacy and fairness for society at large. The crisis of water is a crisis of governance. To combat water govern-

ance crisis, stakeholder inclusiveness is a must do. All stakeholders including local population must be part of the governing process at all stages. Stakeholders take responsibility of their roles and must also be accountable in order to ensure trust. Many countries around the globe have adopted bottom-up approach in water resources management. However, in most cases the reality is that in top-bottom approach, decisions are taken by the central government and the local people are only ask to implement these decisions.



Source: [2]

**Figure 1.** Principles on Water Governance.

In the context of this study, the three dimensions of the OECD (2015) framework on water governance were used to assess the success or failure of water governance in Babessi in terms of effectiveness, efficiency and trust to ensure water catchment management, water supply, distribution and use meets the need of the population in terms of livelihood opportunities. In addition, the efficiency of water governance was evaluated in terms of citizen participation and stakeholders' collaboration structures to ensure sustainability of water supply infrastructure optimization and accessibility while funding, trust, and equity were explored in terms of promoting transparency and accountability of water governance in the study area. This framework is relevant to this study as it cut across all aspect of water governance; that is water management, water uses and water ownership. The framework is a vital tool in testing the effectiveness of each dimension and its corresponding indicators. Unfortunately, the fragmentation and uncoordinated water resources management, uncler investment stucutre, inaccountability, transparency or access to information continue to limit water governace. This concept however provides options for improvement based on the framework in terms of advocacy, transparency among others in Babessi.

## 3. Materials and Methods

### 3.1. Study Area

Geographically, Babessi is located between Latitudes 6°50' and 6°39' North of the Equator and Longitudes 10°23' and 10°28' East of the Greenwich Meridian. As the Headquarter of Babessi Council, Babessi town is situated in Ndop plain in Ngoketunjia Division, North West Region of Cameroon. The locality is made up of fifteen (15) neighbourhoods including 196nfrasthoods like Chui, Mboh, Mbezoh and others which shared boundary with Jakiri and Oku in Bui Division, Bambalang in the Ndop Central Subdivision, Bangolan and Baba I (Figure 2). It encompasses a surface area of 40 km<sup>2</sup>, with a total elevation of 77.2 masl. Babessi metropolitan area had a population of 21,628 inhanbitants in 2016, with a growth rate of 3.1% as of the year 2022. The population of Babessi is generally cosmopolitan with individuals from different ethnicity and tribes.

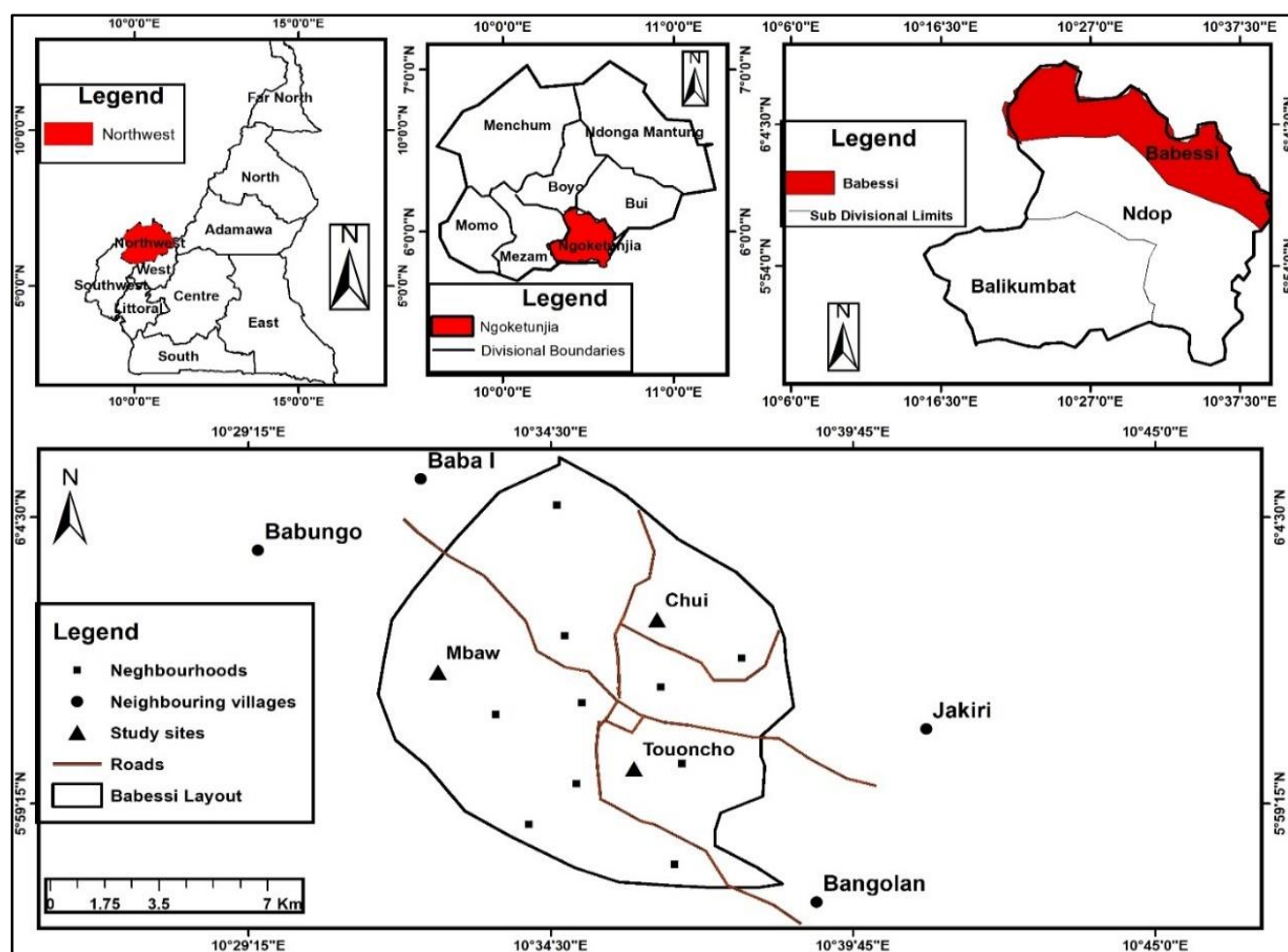
The settlement is drained by three major rivers which are River Mandah, Makkoh and Mittih and their tributaries such as Maah Dohh, Maah Nttohh and Maah Yih. These rivers

provide water for households. Babessi also have vast and extensive marshlands which are used for paddy rice cultivates and cattle grazing during the dry season. It has two seasons, namely the rainy and the dry seasons with an average rainfall ranging from between 1270 – 1778 mm and the dry season with an annual maximum temperature ranging between 27.2 – 33.6 °C and minimum temperature range of 8-16 °C. This alternation in the seasons, favors the cultivation of different varieties of crops e.g. maize, beans, rice, palms among others. Also, high temperatures provide a good environment for the breeding of certain microbes. The study area was chosen due aquitance with the town characterised by population diffcuties to have access to water supply services.

### 3.2. Data Sources, Procedures and Analysis

The study employed quantitative approach to collect data

from key stakeholders in water resources governance and management. The main reason for this decision was to capture information from the orginanl sources. This procedure enables the researcher to capture information from a given population and analyze them without taking into account the respondents attitudes through the use of various statistical instruments [27]. This was the most vital approach which enables this study to achieve its goals and objectives and also to ensure the results obtained are more objective and conclusive. Primary data was collected for this study because of its level of reliability since it was collected from the respondent dirctly. Also, the use of quantitative approach enables the researchers to collect data in a numerical manner which can be put in ranks and catgorised for analysis. Structured sampling technique was used in collecting the data. This offered the respondents equal opportunities of answering included questions.



Source: Administrative Map of Cameroon, 1975

**Figure 2.** Sampled Sites Location in Bassessi Sub Division, Ngoketonjia Division of the North West Region of Cameroon.

Data collection methods also included the evaluation of empirical data which help developing the background to the study and the discussion of results. Direct field observations

and document reviews from research articles and reports on water governance were some of the means employed to collected data for this study. The purpose was to observed and

document water sources locations, conditions, quality, landuse water interactions observations and management practices. Four key water catchments areas including 02 in Upper Mission, Touncho, 01 in Chui and Nzonzene respectively were purposively sampled for this study. The target population considered in this study was a total of full time workers engaged in the day to day operations, control and management of water governance issues in their institutions. Their views were ranked on a five (05) likert scale (5-extremely important,

4-important, 3-very important, 2-slightly important, 1-not important). The target population of the study was drawn from a total of 50 employed workers of water governance related institutions in Babessi (Table 1). From this, a total of 22 individuals were randomly selected for questionnaire administration and 5 interviews were done in a proportionate manner as the sampled population for this study, so as to avoid representation biased. Thus, a total of 24 respondents' constituted this study gotten from the Fishers formula.

**Table 1.** Sample Stakeholders for Questionnaire and interviews in the study area.

| Key Stakeholders                                      | Target Population | Sampled | Interviews |
|-------------------------------------------------------|-------------------|---------|------------|
| 1. Babessi Municipal Council                          | 13                | 7       |            |
| 2. BWMC                                               | 10                | 5       |            |
| 3. Delegation of MINEE                                | 7                 | 3       | 3          |
| 4. PI                                                 | 6                 | 2       |            |
| 5. IDB                                                | 5                 | 3       |            |
| 6. Coca cola Foundation                               | 4                 | 2       |            |
| 7. Hevecam and Village Development Associations (VDA) | 3                 | 2       | 2          |
| Total                                                 | 50                | 22      | 5          |

Source: Extracted from Population Statistic (2015)

Seven (07) sets of questionnaire data were gathered from the council through the chairperson of the aforementioned committee. 05 sets of data was collected from the infrastructural development departments of the BWMC, 03 sets from the delegation of MINNEE, 2 sets from Plan International (PI), 03 from Islamic Development Bank (IDB), 02 from Coca Cola Foundation, HEVECAM (Société des Hévés du Cameroun) and the Village Development Associations (VDA) respectively through their head of services. Thematic data analysis was used to analyze the data gotten from the interviews. It analyses the topics, ideas, and patterns of meaning that come up repeatedly.

The data gathered contained information on governing approach of water resources management, evolution of the water management sector and problems affecting the management of Babessi water resources. Interview guides were handed to the respondents 48 hours before the day of the scheduled interview for preparedness. Data analysis was carried out using thematic and 198 infrastructure statistics. Microsoft excel was used to process the raw data and Statistical Package for Social Sciences (SPSS version 23.0) was used to analyse the data. The OECD three dimensions on water governance; efficiency, effectiveness and trust and engagement were tested using the Analytical Hierarchical Process (AHP) and the results were presented in tables and figures. Ethical clearance was obtained from the ethics committee of the Department of

Geography at the University of Buea. For every stakeholder agency that was selected, individual informed written consent was obtained from them. The respondents were made aware of the objectives of the study, potential harms and benefits of their rights not to participate if they prefer not to do so. The identity of the respondents was estimated using subject identifier code instead of names.

## 4. Results and Discussions

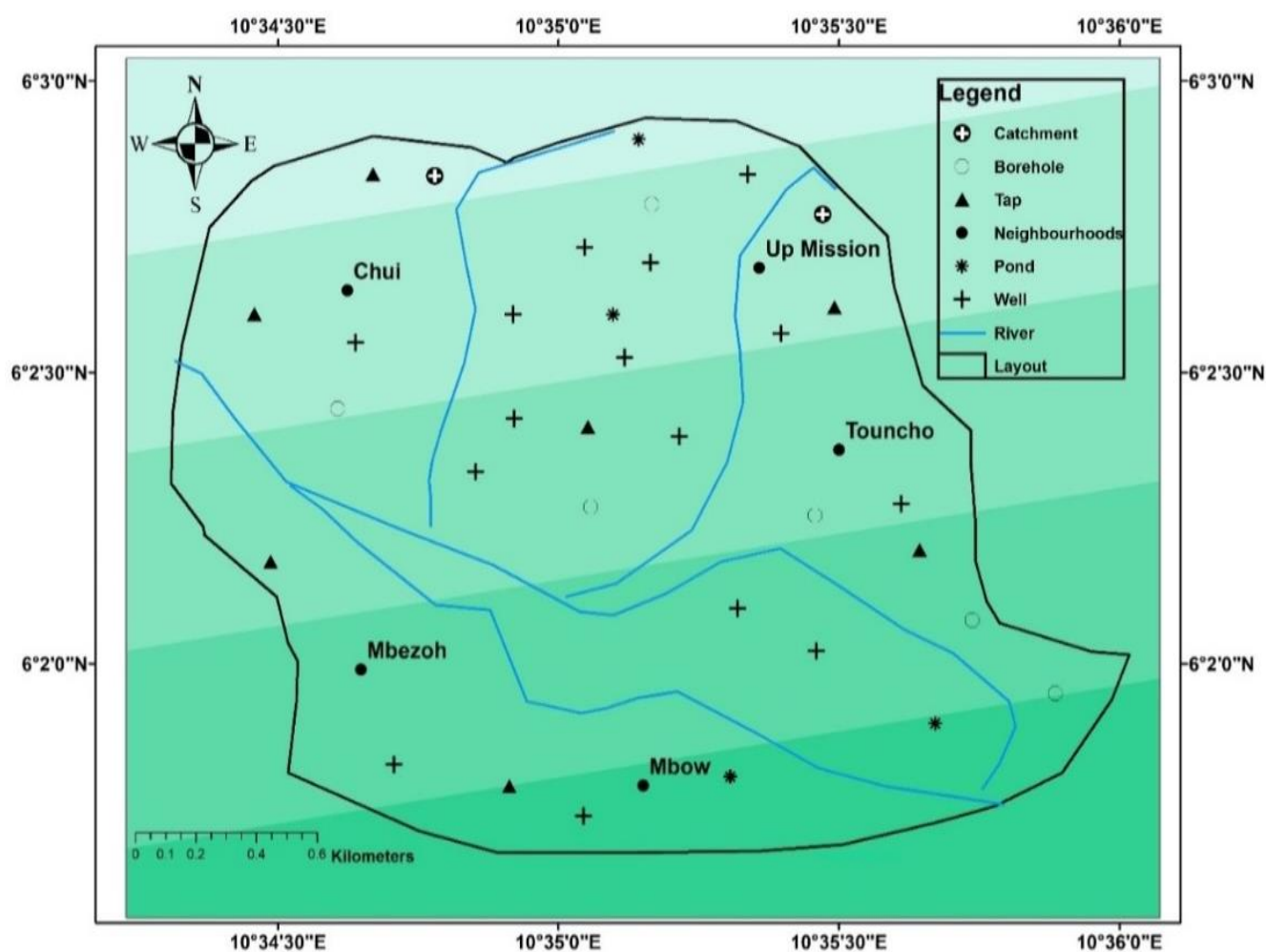
This section presents the results of the field data analysis regarding water resource potentials and functionalities in Babessi, as well as the key stakeholders' roles in water governance dynamics, their challenges in water resource governance, and an evaluation of the stakes of water governance in alignment with the OECD Framework.

### 4.1. Water Resources Potentials, Uses and Functionality

Babessi is endowed with both surface and groundwater resources whose exploitation varies depending on seasons. Field observations showed that, surface water resources are better governed and managed than groundwater resources (Table 1). Surface water resources include the Mandah, Makkoh and

Mittih rivers use for fising, irrigation and drinking contributing to local development, poverty allivaition, ensuring food security and wellbeing. Water resources especially rivers are exploited through catchments although their quality and availability vary depending on factors such as rainfall patterns, pollution, and land use practices. In addition to the rivers, Babessi also has numerous ponds, primarily located around raffia bushes and in the extensive swampy and marshy lands. These water bodies serve as valuable sources of water for household needs such as drinking, cooking, and cleaning. It also save as a source of irrigation, supporting agricultural activities like paddy rice cultivation and livestock activities, such as cattle rearing. In addition to surface water resources,

groundwater is also a significant source of water in Babessi. Groundwater are extracted through wells and boreholes and used for the provision of reliable and safe supply of water for domestic use, lundry and irrigation purposes. Rainwater harvesting is a significant source of water for household purposes in Babessi. This practice involves collecting rainwater from rooftops and storing it for later use. Rainwater harvesting reduce the over dependence on municipal water systems, which are often unreliable or subject to water shortages, ensures a consistent supply of water to households at good quality, reduce cost and delays on fetching water from public sources and ensures water conservation. Figure 3 present the spatial distribution of water sources and catchment areas in Babessi.



Source: Fieldwork, 2024

**Figure 3.** Spatial Distribution of water resources potentials in the Study Area.

There exist two water catchments in Babessi which are filled with water channeled from the main River Mandah and its tributaries (Figure 3). Water channeled into these catchments are transferred to treatment tanks for treatment before distribution as pipe borne water located at Up Mission Neighbourhood. It is worthy to note that the functioning of

these catchments depends on seasonality. For instance, during the rainy season, there is high volume of water within these catchments due to high rainfall. The Chairperson of the BWMC noted a maximum of about 50,000 cm<sup>3</sup> of rainfall is recorded during the pick period of the rainy season especially during the months of August and September. Some streams

over floor their banks in during these periods causing floods with severe implications on underground water quality and availability due to constant sedimentation and pollution. This finding corroborates [28, 29] who noted that the Easter flank of Mount Cameroon is endowed with litany of water catchments most of which takes their rise from Mount Cameroon. While these sources serve as common pool resources, they are usually open to contamination caused by urbanization and increasing water abstraction by vendors. Thus, there is the need for proper management and protection of surface water sources in developing rural areas to ensure their continued use for various purposes. Conversely, during the dry season, the volume of water within these catchments declined (from about 33,000 cm<sup>3</sup> to less than 5, 000 cm<sup>3</sup>). The episode during the dry season espacially during the months of February and March at the various catchments almost result to complete emptying of the reseviour tanks resulting to severe water crisis as observed during the field observations. Similarly, this is noted in the Eastern flank of Mount Cameroon [28, 29]

where the use of the different water sources by the households is attributed to the unequal and seasonal distribution of most of the water sources in the sub-catchment. This unwillingly forces the households to resort to other social practices (that include the use of various storage methods, water rationing and recycling and alternative water sources). This also explains why many households turn their attention to the use of rain water harvesting, wells or boreholes as well as harnessed springs and streams in Babessi. This further corroborate [30] who noted that depite population pipe borne water usage (65%) dominance, supplied by CAMWATER, the population of Bamenda Metropolitan used Community Water Systems obtain through water catchments. Therefore, sustainable management of surface and groundwater resources is crucial for ensuring their long-term availability and quality. Based on water supply functionalities, underground water sources were the most functional as good but there were the most damaged and therefore the most highly prioritized for rehabilitation by authorities (Table 2).

**Table 2.** State of water supply infrastructure functionality and management.

| Water sources   | Percieved Functionaity |         |                     | Total |
|-----------------|------------------------|---------|---------------------|-------|
|                 | Good                   | Damaged | To be Rahabilitated |       |
| Boreholes       | 38                     | 02      | 03                  | 41    |
| Wells           | 26                     | 04      | 01                  | 28    |
| Hanessed Spings | 16                     | 01      | 02                  | 18    |
| Streams         | 01                     | 0       | 01                  | 2     |
| Total           | 81                     | 01      | 07                  | 89    |

Source: Fieldwork, 2024

The study also revealed that there are evidence of poor drainage systems and land use practices at Chui, Haoussa, Mbow, Tsentuoh, Nzolo'oh, Nzozene Neighbourhoods which often results to significant damaged on water supply infrastructure due to deposition of sediments and erosion during intense rainfall caused by flooding. As noted by [28], human invasion of water sources have resulted to severe degradation and contamination of water sources which poses significant risk to public health and increases cost of drinking water treatment. Irregular functioning of water supply facilities also affects the hygiene and sanitation conditions of the people and none waste collection and disposal system (waste collection bins, public urinary and toilets) and poor farming methods throught the use of chemicals results to limited quality water supply from steams to various households with severe health outcomes as the population prioritise dumping waste in water sources. This also corroborate the findigs of [30] who noted that despite Community Water Systems attempts to provide

water to many households that is treated at the source (treatment plants), service providers still faces difficulties in carrying the repairs of burst pipes due to inaccessibility of some catchment 200nfrastructure by rucky relief. The authors also noted constant power cuts and fuel scarcity for generators inhibite efficient water treatment and distribution in Bamenda Metropolitan. The situation continue to be challenging as most customers are not willing to pay their bills regularly in order for the water management body to be able to ensure proper maitainance and upgrading of the outdated infrastructure. Therefore, it's crucial to manage and protect the water resources effectively in order to ensure their continued use for various purposes.

#### 4.2. Key Stakeholders' Roles in Water Governance and Dynamics

Though water supply management, treatment, distribution

and allocations are the responsibilities of every stakeholder, the governance of this precious resource is hugely the responsibility of the Babessi Council. The BWMC however acts as affiliate in managing water resources through the council. That is, the committee can be in charge of executing water projects, but the financing, monitoring and evaluation is done by the council. Couple with the low budget of the council, the realization of water projects is proving impossible. Engaging the broad range of stakeholders in water-related decision-making holds the promise of raising awareness about risks and related costs, building the social and political acceptability of related decisions, and reducing the potential for conflicts over water [31]. Failure to integrate this initiative by stakeholders in Babessi explains why abandoned water projects prevailed in the study

area as observed during the field studies. Field observations also showed that nearly 95% the abandoned water projects in the village were financed by the Council either through the water management committee or through private individuals whom the contracts were subcontracted. Alongside the Babessi Council and BWMC, the signatures of NGOs like PI, IDB, The Coca Cola Foundation and HEVECAM are glaring in Babessi (Figure 4). Many homes in Babessi can today boast of assessing harbessed manually drilled boreholes stand taps and especially where groundwater is extracted especially for diverse socioeconomic households, agricultural, industrial and recreational activities). These NGOs have provided public standpoints in public places like hospitals, schools, mosques and markets.



Source: Fieldwork, 2024

**Figure 4.** Evidence of Stakeholders' participation in Water Governance. NB: Boreholes Donated by PI at Chui Neighbourhood (6.027981N & 10.58623E) and by IDB at Tuoncho Neighbourhood (6.035774N & 10.587315E).

This is evidence in easily accessed Neighbourhoods like Three Corners Abakwa in Babessi. Table 3 also shows the multi-varied functions of diverse organisations in water resource governance in the study area. Figure 4 shows the contributions of PI and IDB in promoting water security in Babessi. Despite their loudable efforts, the maintenance of

these water infrastructure and facilities remained a concern for the BWMC. Field observations further revealed that the BWMC is solely focus on exploiting surface water resources through harnessing major rivers into the catchments, which implies that as the rivers dry up in dry season, the catchments become empty.

**Table 3.** Stakeholders and their functions in water governance.

| Stakeholders                              | Functions                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Babessi Water Management Committee (BWMC) | Field inspection, finance of projects, monitoring and evaluation, maintenance of water points and distribution of to households.                                                                                                                                                                                                                                                                                                           |
| Babessi Council                           | Field inspection, design projects, raise fund to finance projects, subcontract projects to individuals, manage water resources, maintenance of water points and data sharing, The Council maintains relationship with a wide range of partners includeing: Supervisory Authorities, Sector Ministries, Religious and Traditional Authorities, CSOs and the Business community. The Council in general maintains good relationship with its |

| Stakeholders                            | Functions                                                                                                                          |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
|                                         | partners which help reduce conflict, enhance efficiency and efficacy and communication for more resilience and adaptation.         |
| NGOs (PI, NRC, COMIN-SUD, and others)   | Sponsor projects through the council or BWMC, digging of wells and boreholes, monitor and evaluate projects.                       |
| Village Development Associations (VDA), | Create public standpoints; maintain water infrastructures, fund water projects via partnership with council or other associations. |
| Local community                         | Raised fund for water projects, organized community works for water projects, protect water infrastructures like catchments.       |

Source: Fieldwork, 2024

This is evidence as there is no single borehole or hand dug well in the village constructed by the said water committee. Though each stakeholder has a vital role to play in the management of water resources, the role of some stakeholders like the local community to a greater extent ends at the level of implementation. NGOs role in water resource governance also contribute enormously in the socio-economic development of Babessi, especially in water management and use activities. Unfortunately, the local communities are rarely part of the monitoring and evaluation team. Though NGOs are sponsors of water projects, the maintenance of the water infrastructure and facilities are done mostly by the council and the water management committee through the local population. For instance, during the year 2023, NRC a Norwegian Refugee Council greatly improved in water supply programme in terms of quality and quantity of interventions, introducing more contexts based locally acceptable and environmentally friendly solutions to respond to immediate water needs of the local community. The agency helps facilitated access to clean water integrating to other livelihood needs like food security, education and shelter through the development of 02 boreholes with hand pumped. However, to ensure the sustainability and efficacy of water supply for households in the study area, stakeholders in the study area must ensure active sensitization of the local communities on basic water management, community leadership and capacity building.

Hence, exploring the evolution of stakeholders' action in the management of water resources, the study noted that, the management and governance of water resources in Babessi have undergone some evolution since the 1980s. At first, water resources were managed by individuals at household level until 1980 when the BWMC was set up. This committee was designated by the Babessi elites as a tool to solve water insecurity within households between 1980 and 2010. The BWMC was unable to finance projects independently; as a result many uncompleted water projects prevail in Babessi. This is the case of the uncompleted catchment project at Nzonzene Neighbourhood, the abandoned pipeline network at Chui Neighbourhood and the abandoned storage tank at Up Mission Neighbourhood. From 2010 up to 2015, water infrastructures (storage tanks and distribution lines) have increased as the

committee signed partnerships with organizations like PI, the Coca Cola Foundation and the IDB. Though the BWMC was designed to improved water supply, water supply in Babessi remains a call for concern as this committee heavily depends on aids and local population to finance their water projects as noted by BWMC Chairperson, 2023 during the field survey.

Coupled with the outbreak of the ongoing socioeconomic crisis in 2016, water governance was handed to the Babessi Council due the inability for the committee to achieve the goal of proper governance, or ensure adequate and sustainable water supply delivery to the population. The constant kidnapping of workers for ransom prevents the efficient functioning of water management activities. There were inadequate accessibility to some sections of the water catchments and distribution networks. The general insecurity in terms of ghost towns, lockdowns, gunshots and fighting using arms between the state and secessionists fighters often prevent the smooth management of water in Babessi. This is similar to the situations in most of the Anglophone villages/communities in the North and South West Regions of Cameroon where water supply infrastructure and related services are often abandoned due to the crisis. According to [32], this precarious situation has enormously hindered the easy flow of water supply to various neighbourhoods and also made many rural settlements and internally displaced persons (IDPs) not to have adequate access for their various activities due to severe confrontations, vandalism of infrastructure and poor management of water supply infrastructure and catchments and increase vulnerability due to poor and untimely treatment of water before distribution.

Despite the switch to private supplies and the use of rain-water harvesting, households are still hit by water insecurity due to high costs. Since the council took over the management of water supply in Babessi, many water projects have been initiated, unfortunately over 80% end up uncompleted or completely abandoned due to limited funds and insecurity. The council's water project portfolio, characterized by the uncompleted Chui-Nzonzene distribution line and the abandoned Nzonzene catchment project, both initiated seven years ago, underscores the challenges in translating governance changes into tangible improvements. Although Babessi's water resources have experienced shifts in governance

frameworks, the rate of development remains markedly slow. This discrepancy contributes to ongoing water insecurity across numerous households, a condition significantly influenced by inadequate water governance practices.

### 4.3. Challenges of Water Governance

Water governance faced many challenges in Babessi as noted by the respondents during the field survey. As pinpointed by the BWMC Chairperson and the chief project management at Babessi Council at the conference hall on the 19<sup>th</sup> of May 2022, “many challenges plague the water resources management in the study area but amongst the most mentioned were; community collaboration, inadequate fund to 203nfrast water related projects among others”. Hence, with more

than 70% of the population as farmers, the implications poor governance on water catchments are inevitably as sediments eroded from nearby farmlands drains directed uncontrolled to nearby cathments thereby intensifying diseases, long distances covered to fetch water, especially by women and children. Also, poor water management results to limited water supply, drying up of catchment during the dry season, poor management of the and maintenance of existing drinking points and limited knowledge on hygiene and sanitation and non-protection of water catchment areas were observed to be challenged by the failures of water resource governance. Hence, the challenges of water governance in Babessi can not be over emphasized due to the availability of unskilled water management personnels, limitd funding and collaboration among others as presented on Table 4.

**Table 4.** Percieved Challenges of Water Governance.

| Challenges                           | Weight | Rank            | Criteria            | Weight | Mean Weight |
|--------------------------------------|--------|-----------------|---------------------|--------|-------------|
| Limited of Funding                   | 0.85   | 2 <sup>nd</sup> | Not important       | 0.007  | 0.0017      |
|                                      |        |                 | Slightly important  | 0.012  | 0.003       |
|                                      |        |                 | Very important      | 0.090  | 0.0225      |
|                                      |        |                 | Important           | 0.032  | 0.008       |
|                                      |        |                 | Extremely important | 0.008  | 0.002       |
|                                      |        |                 | Total               | 0.149  | 0.00744     |
| Limited Collaboration                | 0.83   | 3 <sup>rd</sup> | Not important       | 0.001  | 0.0002      |
|                                      |        |                 | Slightly important  | 0.003  | 0.0007      |
|                                      |        |                 | Very important      | 0.054  | 0.0135      |
|                                      |        |                 | Important           | 0.082  | 0.0205      |
|                                      |        |                 | Extremely important | 0.006  | 0.0015      |
|                                      |        |                 | Total               | 0.146  | 0.00728     |
| Unskilled Water Management Personnel | 1.14   | 1 <sup>st</sup> | Not important       | 0.016  | 0.004       |
|                                      |        |                 | Slightly important  | 0.069  | 0.0172      |
|                                      |        |                 | Very important      | 0.009  | 0.0022      |
|                                      |        |                 | Important           | 0.087  | 0.0217      |
|                                      |        |                 | Extremely important | 0.019  | 0.0047      |
|                                      |        |                 | Total               | 0.2    | 0.00996     |
| Community Participation              | 0.71   | 4 <sup>th</sup> | Not important       | 0.004  | 0.001       |
|                                      |        |                 | Slightly important  | 0.080  | 0.02        |
|                                      |        |                 | Very important      | 0.021  | 0.0052      |
|                                      |        |                 | Important           | 0.003  | 0.0007      |
|                                      |        |                 | Extremely important | 0.016  | 0.004       |
|                                      |        |                 | Total               | 0.124  | 0.00618     |

Source: Field work, 2024

Table 4 presents the different challenges face by stakeholders in Babessi including limited funding and collaboration between water governance stakeholders, unskilled water management technicians and community perception on water governance. Ranked first amongst other challenges was unskilled water management personnel. According to the Deputy Mayor of Babessi Council in an exclusive interview, *“most of the time water projects are abandoned at the initial stage partly as a result of lack of trained water management personnel”*. He further reiterates that *sometimes to initiate community water projects, field experts have to be hired from delegation of the Ministry of Water and Energy (MINEE) in Ndop which sometimes are not always an easy procedure.”*

Unsurprisingly, inadequate fund was identified as a challenge and this was ranked second most serious threat to water governance. In spite the fact that there is water management committee, the area still lack potable water for household uses. This is couple with the fact that the water management committee solely rely on the local population to raise fund in order to finance community water projects. With over 80% of the population engage in subsistence farming, household income level is very low to raise a reasonable amount of money for community projects financing. Also, most households preferred to go fetch water directly streams and wells, thus, see no need of raising fund for the construction of community water infrastructures like catchments and public standpoints. This contributes to the existence of many abandoned uncompleted water projects found in the area as the committee in charge run out of fund. The Babessi council may have its budget to design and execute water projects, but the BWMC depends on the local population for fundraising in order to carry out meaningful water project which sometimes tend to provide very little finances. Despite investments and reforms, Lagos, Nigeria, as shown by [33], still lacks adequate treatment capacity to deliver enough clean water for drinking and household use, confirming that the population is either unable to raise funds for such projects or are reluctant to, as they depend on unharnessed rivers/streams and ponds.

Results from the study raked limited collaboration as the third constraint limiting effective water governance in the study area. According to the chief of service in charge of infrastructure development at the Babessi Municipal Council, *“workers rarely collaborate through meetings”*. Water governance involves every stakeholder in a bottom-up approach. The different stakeholders involving NGOs, the council, BWMC, and the local population all have to work hand in gloves to achieve sustainable water governance. Unfortunately, the inability to collaborate with stakeholders impact the stake of water governance in terms of mismanagement, inability to complete tasks, and lack of transparency and accountability. This is in line with a study by [34] who noted that although Nigeria is blessed with abundant water resources, governments at all levels (federal, state and local) have not been able to successfully harness these resources to ensure a

sustainable and equitable access to safe, adequate, improved and affordable water supply and sanitation to the population due to limited collaboration among the different stakeholders and actors in water and sanitation services.

Community participation in water projects is indicated as fourth challenges of water governance. Linking to lack of collaboration, this study revealed that the local population are always reluctant to raise fund for their community water supply projects because of none involvement or representation in the decision making process regarding project initiation, planning, implementation and funding. Also, local population resistant to raise fund for community projects is due to lack of transparency and accountability of the water management committee. Most households see it needless to raise fund for such water supply projects because they were not given account of the previous fund raised for the same project. The consequently this has far reaching implications as households prefer fetching water from alternative but doubtful sources rather than from pipe borne to avert these huddles. The study showed ineffectiveness in water governance despite the involvement of different Civil Society Organizations (CSOs) and NGOs in water governance in terms of advocating for the rights of water users and the protection of water resources. This goes contrary to the Bruntland Commission Report [35] which noted that the fulfilment of “basic needs” including water among others requires a political system that can secure it citizens a real influence on decision. This emphasizes the need to support grassroots initiatives, given more power to NGOs and strengthen local democracy. These recommendations are reported in the Agenda 21 document of the Rio de Jaenairo conference in 1992, where local authorities are encouraged to initiate processes where, among others, young people, women and indigenous are involved in local work to promote local infrastructural development [36].

Without this initiative grounded in Babessi, Cameroon, local water management committee has therefore failed to effectively managed water projects, thus, several abandoned have resulted to severe water degradation and pollution with profound implications on human health and socioeconomic wellbeing and livelihoods. [36, 25] also argued that achieving effective water governance cannot be undertaken hastily using blueprints from outside any given county or region. There is no single model of effective water governance; indeed, to be effective; governance systems must fit the socioeconomic and cultural particularities of each country and in this study this include community participation and citizen inclusion in water resource manjagement. Local authorities in the study area are on the frontline of addressing the challenges of water resources manjagement and having to reduce vulnerability and enhance resilience of water supply infrastructure. Yet they frequently suffer from longstanding shortages of personnel, resources and implementational capacity relative to their legal mandates and responsibilities, let alone to address the substantial and substantive transformational changes now re-

quired. According to [37], the most common water resources governance challenges at the local levels are a lack of local revenue raising ability and heavy dependence on central and/or regional governments for disbursements, and additional tasks and roles being assigned to local government without appropriate funding—sometimes referred to as unfunded mandates. This may reflect inadequate central government revenues or political centralism that means that allocated resources are not transferred to lower tiers of government.

#### 4.4. The Stakes of Water Governance

The current stake of water resources governance in Babessi was examined using the three dimensions of effectiveness, efficiency, trust and engagement postulated by [2]. To adequately govern water resources for effective and efficient use in Babessi, the aforementioned dimensions were critical as they determinant the levels of socioeconomic opportunities, reduced poverty, and better living standards, public health, environmental sustainability, growth and wellbeing of the community and people.

Table 5 shows the three principles of OECD of water gov-

ernance and their dimensions. According to the ranking of the various principles, effectiveness was ranked first, this implies that the effectiveness of water governance in terms roles and responsibilities of stakeholders, adequate investment, capacity building and policy coherence is still problematic. This raises the question of limited investment in water management and sanitation services in the study area which are critical for the eradication of rural poverty and enabling rural development. [38] noted that, effective water management brings more certainty and efficiency in productivity across economic sectors and contributes to health of the ecosystem.

Also, taken together, these interventions could lead to immediate and long term socioeconomic and environmental benefits that makes a difference to lives of billion of people. Next on the ranking is trust and engagement with a weight of 0.033. It shows that there is low level of trust and engagement of all stakeholders in the water governance process in the area. This manifest it self through lack of inclusivity, monitoring and evaluation, limited stakeholder engagement and transparency and accountability. The last on the scale is efficiency with a weight of 0.029. There are still efficiency issues in water governance in Babessi as project finance, data on water governance and regulatory frameworks are yet to be a reality.

**Table 5.** Perceived Ranks of OECD Water Governance Principles.

| Principles                       | Weight | Rank            | Criteria            | Weight | Mean weight |
|----------------------------------|--------|-----------------|---------------------|--------|-------------|
| Effectiveness<br>Dimensions      | 0.047  | 1 <sup>st</sup> | Not effective       | 0.521  | 0.052       |
|                                  |        |                 | Very effective      | 0.084  | 0.008       |
|                                  |        |                 | Effective           | 0.068  | 0.006       |
|                                  |        |                 | Slightly effective  | 0.334  | 0.033       |
|                                  |        |                 | Extremely effective | 0.079  | 0.007       |
|                                  |        |                 | Total               | 1.086  | 0.0212      |
| Efficiency<br>Dimensions         | 0.029  | 3 <sup>rd</sup> | Not effective       | 0.235  | 0.023       |
|                                  |        |                 | Very effective      | 0.031  | 0.003       |
|                                  |        |                 | Effective           | 0.006  | 0.0006      |
|                                  |        |                 | Slightly effective  | 0.002  | 0.0002      |
|                                  |        |                 | Extremely effective | 0.403  | 0.040       |
|                                  |        |                 | Total               | 0.677  | 0.01336     |
| Trust & Engagement<br>Dimensions | 0.033  | 2 <sup>nd</sup> | Not effective       | 0.120  | 0.012       |
|                                  |        |                 | Very effective      | 0.000  | 0.004       |
|                                  |        |                 | Effective           | 0.273  | 0.023       |
|                                  |        |                 | Slightly effective  | 0.369  | 0.036       |
|                                  |        |                 | Extremely effective | 0.008  | 0.0008      |
|                                  |        |                 | Total               | 0.77   | 0.01516     |

Source: Field work, 2024

*The effectiveness* of water governance refers to the contribution of governance to defining clear sustainable water policy goals and targets at different levels of government, to implement those policy goals and to meet expected objectives or targets. Effectiveness of water governance assists in determining clear roles and responsibilities of stakeholders, capacity building and policy coherence within basin systems. The BWMC has as a goal to achieve adequate water supply within households in Babessi. Despite this, the target is yet too materialized as households are still hit by severe water crisis, which practically implies lack of capacity building and policy coherence in the area. Though different stakeholders are involved in water resources management and supply, the roles and responsibilities of each stakeholder in the water sector is not clearly defined. The inability to clearly define the role of each stakeholder coupled with limited collaboration is indicators of ineffectiveness of water resource governance. [39], in their study on the stakeholder engagement wheel as a tool for addressing complex water management issues, identified several factors limiting the effectiveness of engagement processes. These include temporal constraints, the inherent complexity of water resources management, difficulties in engaging diverse stakeholders, and the absence of engagement methodologies that prioritize empowerment, equity, trust, and learning. Consequently, there is a need to cultivate a community of practitioners with a nuanced and shared understanding to facilitate cohesive action and robust decision-making in the face of significant challenges, achieved through improved engagement activities and actions.

*The efficiency* of water governance relates to the contribution of governance to maximizing the benefits of sustainable water management and welfare at the least cost to society. This dimension includes data and information on water governance, financing water projects, implementing regulatory frameworks and innovative governance of available water resources. The Babessi council in collaboration with the community water management committee might be in charge of managing water resources, surprisingly, very little data exist on water governance, finances to help track the evolution of water management, governance and distribution. There exist several water infrastructures and projects abandoned half way due to financial setbacks and mismanagement of community fund. There exists no regulatory framework as far as water governance is concern. It was revealed during the interview that there are no set criteria for water supply and distribution within neighbourhoods in the village. The presence of several abandoned water infrastructures like taps, catchments and community water projects installations and equipment partly due to financial setbacks and misused of community funds and resources are adequate indicator of improper governance of water resources across the affected communities in Babessi.

*Trust and engagement* relates to the contribution of governance to maximizing the benefits of sustainable water

management and welfare at the least cost to society especially in the context of Babessi. In this study, trust and engagement refers to the contribution of governance to building public confidence and ensuring inclusiveness of stakeholders through democratic legitimacy, women participation and fairness for society at large.

These dimensions include monitoring and evaluation, stakeholders' engagement and integrity and transparency. The OECD framework and other frameworks on water governance like the Integrated Water Resources Management (IWRM) suggest bottom-up approach in effective water resources governance and supply. This implies involving the local population and other stakeholders in every stage of water projects and welcoming their contributions in whatever form. Field data revealed that though the local population is engaged in water management projects, their contributions end at the level of finance where they participate in fundraising for their community water projects. They are exempted from the monitoring and evaluation phases of the project.

The BWMC heavily depends on community fundraising to realize water projects in Babessi. Coupled with low household income, the local people cannot contribute adequate funding to realize water supply projects to the fullest. Worse of all, the little fund raised by the local population is misused as the committee in charge of water projects cannot provide adequate account on how the funds are used at each stage of the water supply projects. This indicates lack of trust and transparency, which made the population to resist subsequent fundraising initiatives. The concept of water governance is there invariably complex. Even though desirable, the fundamental challenge is to establish systems of water governance that take account of and adapt to societal, economic and environmental conditions that are characterized by uncertainty, variability and change. It is not just possible to develop water management strategies and plans that will solve all water governance issues ; instead, water governance capacity must be developed to enable societal to respond to and adaptation to uncertainty, variability and change local or regional, short or long term.

As one of the OECD principles of proper water governance, the governance of water resources in Babessi still lacks trust, transparency and accountability. Recommended by IWM and OECD, bottom-up approach is much needed if water governance is to operate successfully. The exemption of the local people at some levels of water projects indicates a great lack of trust and accountability. In line with this, [40] reported that corruption remains one of the least addressed challenges in water governance, which is seen as a symptom of governance deficiencies in both private and public sectors. Similarly, the procedures leading to this outcome is due to lack of ethical considerations in the management of water resources [41]. Fund raising activities by the local population is the sole source of income for the water management committee to realized water projects. [42, 9, 43] reported that if

this water-related goals are to be achieved, a large increase in financial support not necessarily in the form of external aids is required for the implementation and realization of projects in water sector. The European Union (EU, 2007) however, indicated that it is difficult to justify such large levels of investment because positive outcomes in terms of improved service delivery cannot be guaranteed in the absence of improved water governance [43].

## 5. Conclusions and Recommendations

The water crisis in Babessi is fundamentally a governance crisis, manifesting in critical health, socioeconomic and social justice issues. Despite the availability of abundant water resources, access to safe and reliable potable water remains a significant challenge. Efforts by the stakeholders including the water management committee, the Babessi Council and others to improve water security have been hindered by limited infrastructure and poor water quality. Factors such as centralised control, limited community participation, funding ; skills and community participation and poverty exacerbate the water governance challenge in Babessi. The study reveals limitations in the adoption of the OECD 2015 framework in Babessi. While the OECD framework has strengths, its top-down approach has not led to meaningful improvement in the community. Persistent limited access to reliable and affordable water is attributed to limited effectiveness in the engagement process through collaboration and participation in decision making process, efficiency in funding and capacity development, advocacy and education and limited trust and accountability in water management practices. Water governance practices in Babessi must therefore meet its sustainable demand and supply, ensure equitable distribution and management if the future challenges of water governance in rural environment must be achieved as prescribed by the national and international frameworks and models.

To address the water crisis, water resource governance practices in Babessi must prioritize meeting sustainable demand and supply. There is a need for a reverse approach that incorporates community participation in water project development and processes, aligning with the OECD principle of participation. This approach can enable better resource management, informed decision-making, and fee collection for sustainable water management. Collaboration among stakeholders through joint efforts and resources allocations and infrastructural development is crucial for long-term water management sustainability and efficiency. Community capacity building through education and resources is essential for efficient water management. This could be enhanced through capacity development in areas such as water quality testing, infrastructure maintenance, and financial management which align with the principle of water governance. Finally, stakeholders should encourage transparency and accountability through improved communication and regular meetings and reports sharing to foster trust in decision making

process thus aligning to the principle of accountability as noted by the OECD 2015 Framework.

## Abbreviations

|          |                                                        |
|----------|--------------------------------------------------------|
| AHP      | Analytical Hierarchical Process                        |
| AMCOW    | African Ministers' Council on Water                    |
| AU       | African Union                                          |
| AWV      | Africa Water Vision 2025                               |
| BCDP     | Babessi Council Development Plan                       |
| BWMC     | Babessi Water Management Committee                     |
| CAMWATER | Cameroon Water Utility Corporation                     |
| CSOs     | Civil Society Organizations                            |
| ECA      | Economic Commission for Africa                         |
| EU       | European Union                                         |
| FAO      | Food and Agricultural Organisation                     |
| GWP      | Global Water Partnership                               |
| HEVECAM  | Sociétés Hévées du Cameroun                            |
| IDB      | Islamic Development Bank                               |
| IDPs     | Internally Displaced Persons                           |
| IDMC     | Internal Displacement Monitoring Center                |
| IWRM     | Integrated Water Resources Management                  |
| MINEE    | Ministry of Water Resources and Energy                 |
| NGO      | None Governmental Organizations                        |
| NIS      | National Institute of Statistics                       |
| NRC      | Norwegian Refugee Council                              |
| OCED     | Organization for Economic Co-operation and Development |
| PI       | Plan International                                     |
| PNDP     | National Community Driven Development Program          |
| SDGs     | Sustainable Development Goals                          |
| SIWI     | Stockholm International Water Institute                |
| SPSS     | Statistical Package for Social Sciences                |
| SSA      | sub-Saharan Africa                                     |
| UNDP     | United Nation Development Program                      |
| UNECA    | United Nations Economic Commission for Africa          |
| UNICEF   | United Nations Children's Fund                         |
| VDA      | Village Development Associations                       |
| WCED     | World Commission on Environment and Development        |
| WHO      | World Health Organisation                              |

## Conflicts of Interest

The authors declare no conflicts of interest.

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