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ORIGINAL RESEARCH ARTICLE

Community governance and access to drinking water in semi-urban Togo: Dynamics and impacts in Kovié and Noèpé

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Abstract: Semi-urban water governance in Togo remains challenged by the limitations of community-based approaches, persistent gender-based exclusion, and informal dependency. This study examines the challenges associated with water governance in the semi-urban regions of Togo, with a focus on Kovié and Noèpé. Local organizations, such as the Association of Drinking Water and Sanitation Service Users, are struggling to ensure equitable, transparent, and sustainable management of these services. This research highlights the shortcomings of the current community model and proposes reform based on inclusive governance. Using a mixed-methods approach, the study combines household surveys ($n = 712$) on water sources with interviews, user and manager testimonies, focus groups, and participatory mapping. Drawing on Ostrom's theory of the commons and Fraser and Schlosberg's framework of environmental justice, the analysis reveals that community participation is often merely symbolic and that women, despite being central to domestic water use, remain marginalized in decision-making processes. The results also reveal ineffective operational delegation, prohibitively high connection costs of up to 100,000 FCFA (approximately 152 Euros), unfavorable pricing compared to urban areas, and a significant reliance on informal sources. Access to water is further undermined by recurring outages, opaque governance, spatial and social inequalities, and extremely high user dissatisfaction (over 97%). Recommendations include establishing performance contracts to enhance accountability, strengthening the technical capacities of committees, actively including women in governance, and creating sustainable financing mechanisms to reduce dependence on donors. Thus, the article calls for an overhaul of the system to ensure that water rights become a lever for social justice and local development.

Keywords: Community water governance; Drinking water access; Semi-urban water supply; Commons governance; Kovié; Noèpé; Togo

1. Introduction

The governance of community-managed drinking water supplies poses significant challenges to the sustainability of services, equitable access, and public health in Africa, particularly in rural and semi-urban areas. Population growth and rapid urbanization are placing considerable strain on existing infrastructure in these areas.[1,2] Despite the adoption of the Sustainable Development Goals (SDGs), specifically SDG 6, which aims to provide universal and sustainable access to clean water and sanitation, over 2.2 billion people still lack access to safe water.[3] This situation is exacerbated by rapid urbanization[4] and increasing water scarcity across the continent.[5,6] In the face of weak public water services in many peri-urban areas, community governance models have emerged as a response to this challenge. These models are driven by local dynamics and supported by non-governmental organizations (NGOs) and, in some cases, public decentralization policies.

According to Machado *et al*.,[7] community governance refers to arrangements in which local communities manage and operate water supply infrastructure, particularly in rural areas that lack public or private services. This model emphasizes local involvement in decision-making, operation, and maintenance. However, they emphasize that sustainability depends on community capacity and external support.[7] Whaley *et al*.[8] refer to "community-based management" as a set of management arrangements grounded in local social realities. In this model, community committees or groups of key individuals are responsible for day-to-day water management and interact with other local institutions. They emphasize the need to adapt management to specific social contexts for it to be effective. Harvey and Reed[9] distinguish community management from simple community participation. Community management implies that the community assumes responsibility for planning, operating, and maintaining the water service. However, it requires ongoing institutional support, including supervision, training, and technical assistance, to remain sustainable. Helgegren *et al*.[10] identify four major prerequisites for community management: leadership, a shared vision, collective action, and management capacity. They argue that community management is based on self-organized local organizations that take charge of water management.

Community governance of water services refers to a participatory management method in which the local community directly participates in planning, operation, maintenance, and regulation of water supply infrastructure. It implies taking collective responsibility for operating water sources, such as wells, cisterns, dams, boreholes, standpipes (public water fountains), mini-water networks, drinking water networks, and water towers. This model has increased water accessibility in certain contexts.[1,9]

In West Africa, where access to water remains a major challenge, community governance has gradually become the dominant model for water supply in semi-urban and rural areas. Its long-term success, however, depends on the presence of solid local institutions, strong leadership, transparency, and sustained external support (financial, technical, and managerial).[11] Community participation, though frequently invoked in political discourse, is inconsistently applied and often remains largely symbolic, with little influence on actual management decisions.[12,13] Additional challenges include poor water quality,[14] unequal access,[5] and governance failures in rapidly urbanizing areas.[5,15] These issues are compounded by the absence of decentralized management structures and weak coordination among public, private, and community actors.[1,2]

The semi-urban communities of Noèpé and Kovié, located in southern Togo, exemplify these tensions. Despite ongoing urbanization, these communities lack adequate infrastructure and continue to struggle to access safe water. Community-based systems were introduced to fill the gap left by public services, yet these systems suffer from informal management practices, spatial disparities in access, opaque pricing, limited technical expertise, and poor collaboration with local authorities. The disconnect between the theoretical promise of community governance and its operational reality undermines the model's sustainability in evolving socio-spatial contexts.

In the face of recurring failures in water service management, including frequent breakdowns, non-compliance with schedules, inadequate communication, high water prices, and opaque governance, the Togolese government has recognized the need to strengthen the involvement of local communities. A legal framework has been established to formalize community water management associations. Anchored at the local level, these associations are responsible for supervising infrastructure operations, ensuring maintenance, promoting financial transparency, and representing users in dialog with authorities and technical service providers. This approach aims to promote participatory and responsible management, based on proximity, accountability, and consultation. By establishing a legal

framework for these committees, the government aims to address systemic issues while highlighting the vital role of communities in ensuring the sustainability of services.

Therefore, the following questions arise: to what extent do community management systems in Noèpé and Kovié guarantee sustainable and equitable access to drinking water? This research study examines these two cases to identify the limitations of the community management model in semi-urban African environments and to explore the conditions necessary for the emergence of better-adapted hybrid models that associate public, private, and community actors with reinforced financing, training, and regulation mechanisms.[16,17] An in-depth examination of the dynamics surrounding community water management is therefore essential, considering social, institutional, and territorial specificities. With this in mind, this study aims to analyze the practices, issues, and factors contributing to the success or failure of community management of water services in Kovié and Noèpé. To achieve this goal, the study employed a rigorous methodological approach that combined qualitative and quantitative methods.

2. Methodology

This study employed a mixed-methods approach, combining quantitative and qualitative tools to provide a thorough statistical and contextual understanding of the dynamics of community governance and access to drinking water in the towns of Noèpé and Kovié. This approach enabled the measurement of governance and access indicators, as well as the exploration of perceptions, practices, and territorial inequalities through the perspectives of local stakeholders.

2.1. Study area

Noèpé is the capital of the commune Avé 2 and is located about 23 km from the capital, Lomé. With a population of 9,796,[18] it is bordered by the commune Avé 1 to the north, by the autonomous district of Greater Lomé to the south, by Ghana to the west, and by the commune Zio 2 to the east (Figure 1A). Noèpé's strategic accessibility is bolstered by the national road N°5 (Lomé–Kpalimé Road), which facilitates economic and logistical exchanges. The tropical climate ensures relatively stable climatic conditions that are favorable to housing.

Kovié is located about 20 km northwest of Lomé and has a population of 20,834.[18] It is the capital of the Zio 2 commune, which borders the Zio 1 and Avé 1 communes to the north, Agoè-Nyivé 2 and Agoè-Nyivé 5 communes to the south, the Zio 1 communes to the east, and the Avé 2 communes to the west (Figure 1B). Kovié is characterized by a notable landscape and ecological diversity. It has a slightly undulating plain crossed by the Zio River, which supports extensive rice cultivation in the foodplain. The tropical Guinean climate is characterized by two rainy and two dry seasons, though it is increasingly disrupted by climate change. The territory's ecological richness is evident in its gallery forests, sacred forests, alluvial meadows, orchards, and private plantations.

2.2. Qualitative approach

The qualitative component consisted of 32 semi-structured interviews, distributed equally between the two localities. These interviews were conducted with key stakeholders: community leaders, users, heads of households, and municipal officials. In addition, six focus groups, comprising four in Kovié and two in Noèpé, facilitated the emergence of collective discourses on issues related to water service governance, adaptation strategies, and the expectations of the population. This qualitative approach enabled the enrichment of the analysis of the quantitative results with contextual elements, revealing local perceptions that were sometimes invisible in the numerical data, and informing the social and political reading of issues related to the governance of urban services, such as water.

2.3. Quantitative approach

The quantitative dimension of this study was based on administering a structured questionnaire to households in the localities of Noèpé and Kovié. The objective was to collect precise data on access to drinking water, sources used, frequency of supply, cost, water-related practices, as well as users' perceptions of the management, quality, and availability of the service.

To determine the sample size, we used Cochran's formula, as shown in Equation (1), which is widely accepted for random sample surveys in finite populations:

$$n = \frac{t^2 * P(1-P) * N}{t^2 * P(1-P) + (N-1) * y^2} \quad (1)$$

Where n is the theoretical minimum sample size; N corresponds to the actual or estimated number of households; t is the statistical value for a 95% confidence level ($t = 1.96$); p is the expected proportion

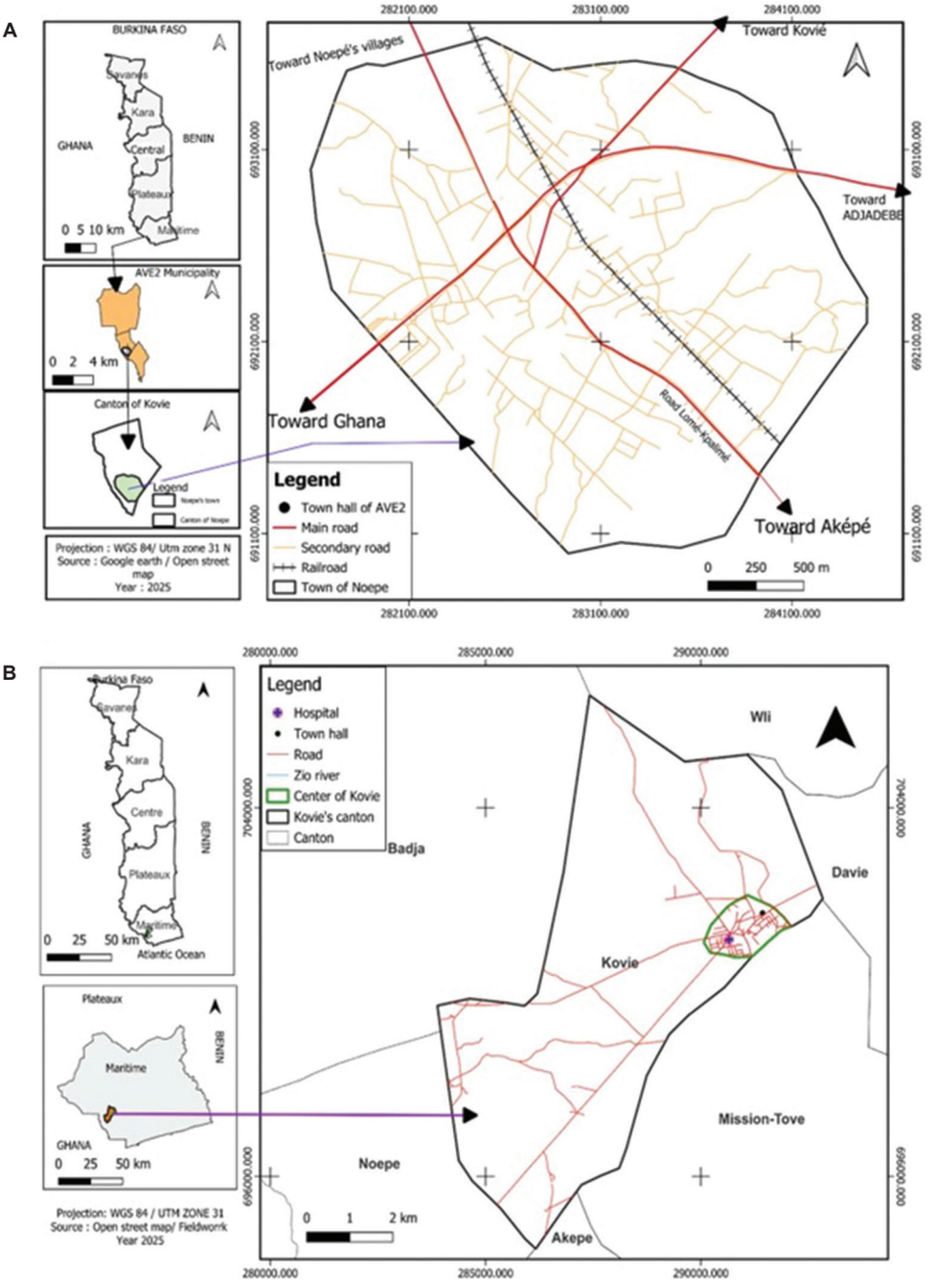

Figure 1. Study areas. (A) Noèpé and (B) Kovié

of a response (p=0.5), and y is the permissible margin of error (y = 0.05).

The theoretical minimum size obtained was 689 households for the entire target population, i.e., 333 households in Noèpé and 356 in Kovié (Table 1). However, at the end of the fieldwork, the number of surveyed households amounted to 712, distributed as follows: 353 households were surveyed in Noèpé, and 359 households were surveyed in Kovié. This slight increase results from a desire to optimize the surveyors' movements by completing the grids in certain dense areas. These final numbers ensured the statistical robustness of quantitative analyses and the validity of inter-locality comparisons.

In Table 1, the "step" represents the fixed interval between selected households, calculated according to Equation (2):

$$\text{Step} = \frac{N}{n} \quad (2)$$

Where n is the theoretical minimum sample size of households to be surveyed and N is the total number of estimated households in the city.

The difference in the sampling "step" is explained by the higher population density in Kovié. This method enables a more even geographical dispersion of the sample while minimizing biases associated with spatial proximity.

2.4. Integration of water point mapping

A central element of the methodology is the participatory mapping of existing water points in the two localities. Produced from global positioning system surveys, field observations, and interviews with users, this mapping enabled the identification of the location, condition, functionality, and use of hydraulic structures. It facilitated the spatial analysis of disparities in access to water, highlighting the gaps between the physical availability of resources and effective accessibility for populations. This mapping also enabled the cross-referencing of survey results with the actual distribution of infrastructure.

Table 1. Number of people surveyed by location

City	Population[a]	Estimated households[b]	Households surveyed	Step[c]
Noèpé	9,796	2,130	333	9
Kovié	20,834	4,530	356	4

Note: [a]Data based on the 5th general population and housing census (RGPH-5) from INSEED.[19] [b]Calculated based on the average household size in Togo, estimated at 4.6 people in the 5th General Population and Housing Census (RGPH-5) of INSEED.[19] [c]The selection of households was conducted using a systematic method with a constant clockwise step, after random selection of the first household in each area.

2.5. Statistical analysis

For data collection and analysis, several tools were used, as summarized in Table 2.

For data analysis, all interviews were recorded, transcribed in full, and analyzed using a thematic coding approach. To ensure the robustness of the interpretations, methodological triangulation was applied across documentary sources, institutional discourse, and field data. Analytical criteria included the recurrence of issues; consistency between levels of governance; discrepancies between formulated policies and their implementation; and the dynamics of interaction among public, private, and community actors.

Meanwhile, quantitative data from the questionnaires were processed using the Statistical Package for the Social Sciences software. Categorical variables were cross-referenced with thematic codes from the qualitative analysis to facilitate correlation between stakeholder profiles and their respective discourse or positions. Contingency tables were constructed to

Table 2. Data collection and analysis tools

Name	Description	Role in this study
Global positioning system (GPS)	GPS (Garmin Etrex 10) is a system of satellites that can determine the precise geographic position of a user or object anywhere on Earth	Located the coordinates of the districts and structures of the two city centers
Kobo toolbox	Kobo Toolbox is a data collection platform designed to facilitate field surveys	Developed questionnaires that collected data related to governance and access to water in the two centers
Android phone	A smartphone running the Android operating system, offering applications, connectivity, and customization for users	Hosted the Kobo Toolbox database, conducted interviews, and took photos
Quantum geographic information system (QGIS)	QGIS is an open-source geographic information system (GIS) software that enables the visualization, editing, and analysis of geospatial data	QGIS helped to make maps (Study areas, water sources)
Statistical Package for the Social Sciences (IBM SPSS 27)	IBM SPSS is a statistical software package used for analyzing complex data, including modeling, predictive analysis, and data management functions	Used for data analysis and processing, statistical analysis, and creation of graphs and tables, which were then improved using Microsoft Excel 2019

explore associations between variables, and Chi-square tests of independence were performed to assess the statistical significance of these relationships. When significant associations were identified ($p<0.05$), Cramer's V coefficient was calculated to measure the strength of these links (weak, moderate, or strong). This mixed approach reinforced the validity of the results by combining statistical rigor with interpretive depth.

2.6. Theoretical framework of analysis

This research analyzed community water management in the context of the articulation between Ostrom's theory of the commons and the approaches to environmental justice and equity proposed by Schlosberg and Fraser.[19-21] The former allowed us to understand how local communities can govern vital resources, such as water, without resorting to centralized state structures or privatization. According to Ostrom, "common-pool resources," such as water, can be sustainably managed by organized users.[20] She highlights key principles that promote the sustainability of shared resources, including active user participation, clear access rules definition, local monitoring, graduated sanctions, and conflict resolution mechanisms. These elements are particularly relevant in the semi-urban areas of Togo, where the state is sometimes absent, leaving communities to manage water points on their own. Thus, this theory enabled us to assess the extent to which local structures met the conditions necessary for effective and sustainable water governance. In addition, Schlosberg and Fraser's theory of environmental justice and equity introduces a critical dimension that questions the equity of resource distribution, the recognition of marginalized groups (e.g., women and poor households), and the participation of all users in decision-making processes.[19,21] According to Schlosberg,[19] environmental justice is based on three complementary dimensions: (i) the redistribution of resources and environmental burdens; (ii) the recognition of identities, local knowledge, and marginalized groups; and (iii) equitable participation in decision-making processes.[19] Fraser[21] also emphasized the importance of procedural and distributive equity in systems marked by unequal power relations. Within the context of this study, this framework enabled the analysis of inequalities in access to water and the mechanisms of contestation or negotiation within the community.[21]

Integrating these two approaches enabled the analysis of organizational effectiveness and capacity for fair, inclusive, and sustainable governance of community systems within a socioeconomic context characterized by persistent inequalities. Ostrom's commons theory provided a framework for analyzing local governance of natural resources, emphasizing the importance of collective rules, user participation, and sanction mechanisms.[20] Furthermore, the concepts of environmental justice and equity allowed us to examine the dynamics of inclusion and exclusion, as well as inequalities in access to water.

3. Results

3.1. Infrastructure and governance

Noèpé and Kovié lie in the transitional zone between rural and urban areas. Consequently, they are often excluded from planning policies that target either major cities or rural areas. This situation has created a divide in terms of access to drinking water in these areas. In Noèpé, mapping showed 6 functional boreholes (4 private), 29 standpipes (7 nonfunctional), and a 50 m^3 water tower installed in 2008. This reveals two weaknesses: the existing infrastructure is often poorly maintained or inoperable, and the population heavily relies on private initiatives, particularly for boreholes and connections. In addition, 88 out of 238 private connections have been cut off due to nonpayment, which further reduces effective access to water.

Figure 2 shows that the spatial distribution of water sources in Noèpé is organized differently, with a concentration of hydraulic infrastructure along the main roads. This configuration suggests planning oriented toward accessibility, which facilitates supply to densely populated areas. The presence of most private boreholes in certain areas suggests the use of private solutions for accessing water, which could accentuate inequalities between neighborhoods. Conversely, more dispersed reservoirs and standpipes seem to meet community needs. The dam and water tower are located on the physical periphery but occupy positions central to network operations, which underscores their role in regulating and distributing water. Thus, this map highlights the development efforts aimed at providing efficient services as well as the persistent challenges related to equitable and sustainable access to water.

Kovié presents a similar situation. However, the water tower in Kovié was larger (255 m^3 and installed in 2013), the distribution network covered only 14 km, and only two public boreholes supply the entire system. Furthermore, 10 of the 31 standpipes were out of service, which severely limits the usefulness of the installed infrastructure.

Figure 3 shows the spatial distribution of hydraulic infrastructure in Kovié, reflecting the geographic dynamics

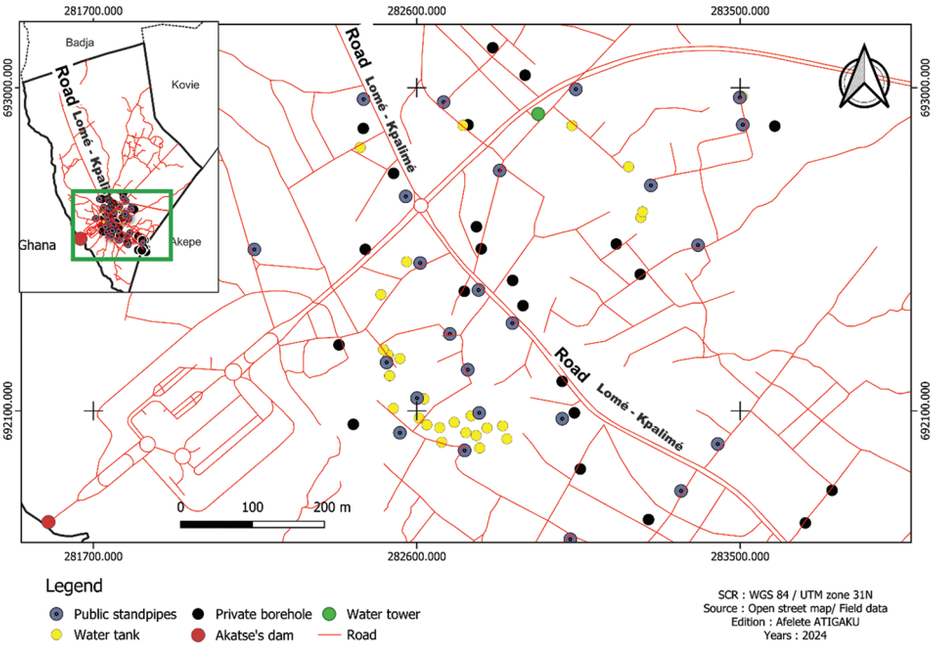

Figure 2. Map of Noèpé's water sources

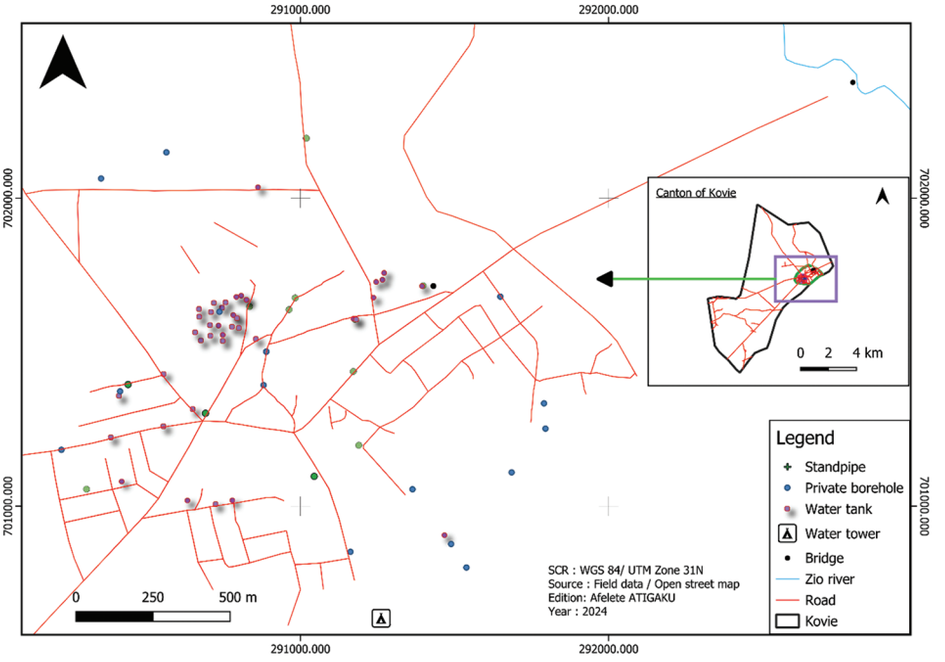

Figure 3. Map of Kovié's water sources

and development priorities. Standpipes (green dots) are primarily located near roads and densely populated areas, indicating a desire to provide public access to water in strategic locations. In contrast, private boreholes (purple dots) are concentrated in specific sectors, often far from collective infrastructure, suggesting an individual response to a public service deficit.

Although fewer in number, the water towers (red squares) and reservoirs (blue squares) occupy central or elevated positions, indicating their role in large-scale distribution. The Zio River, which is crossed by several bridges, also influences spatial organization and serves as a natural landmark and potential resource. This configuration highlights the coexistence of community

solutions and private initiatives while revealing disparities in access that could inform future regional water management policies.

3.2. Typology of community water governance

In Kovié and Noèpé, as in other semi-urban or rural areas in Togo, the central government, civil society organizations, and community members have established water service management mechanisms to improve access in these areas. The most influential initiatives were those led by the Water Users Committee/Water Committee (CUE/CE) and the Association of Drinking Water and Sanitation Service Users (AUSEPA), community bodies whose membership primarily comprises local users and community representatives, often supported by NGOs.

Water User Committees/Water Committees are grassroots bodies established for a water point or cluster of points and formed by members of the beneficiary community. Typically elected from among the inhabitants, CUE/CE is responsible for daily management, collecting fees, maintaining hydraulic infrastructure, managing conflicts related to water access, and coordinating with local authorities or technical partners. They are generally composed of a president, a secretary, and a treasurer. The effectiveness of their committees relies on the active participation of users, transparency in the management of funds, and the legitimacy of these members in the eyes of the community.

In the context of Noèpé and Kovié, these committees faced significant challenges, including a lack of training, internal conflicts, unclear governance, low social representation, particularly of women, and the absence of an external monitoring mechanism. These dysfunctions led to a profound questioning of this model. In response, more formalized and legally recognized structures, such as the AUSEPA, emerged.

The AUSEPA is a non-profit community management structure, created to represent users in the management of drinking water supply systems (boreholes, mini-networks, standpipes, etc.), particularly in rural and semi-urban areas. These structures evolved from the CUE with the objective of professionalizing water management in semi-urban and rural areas by providing a more structured organizational level, particularly when the water service is more complex (e.g., piped networks, water tower). Each AUSEPA is composed of five members: a president, secretary, treasurer, maintenance manager, and cleanliness manager. These associations ensure better local governance of water infrastructure and more effective collaboration with technical operators and authorities. However, water services remain largely deficient in several Togolese communities. A lack of stable financial resources, insufficient member training, difficulty ensuring regular technical infrastructure monitoring, and weak institutional coordination compromise the system's sustainability.

This reality is particularly evident in Kovié and Noèpé, two areas where water services are substandard. Residents have irregular access to water, experience frequent breakdowns, and often face delayed or inadequate repairs. There is a severe lack of transparency in financial management, with no clear reporting on the use of collected funds. The situation is further complicated by unfulfilled promises of expansion and price improvements by some managers and local authorities, which fuels user frustration. Furthermore, coordination between the various stakeholders, including local authorities, state technical services, and private operators, often remains weak or conflictual. In some cases, management is characterized by low involvement of women and youth, as well as reduced community participation, due to growing discouragement and disinterest. Finally, the lack of technical and administrative expertise within local management structures prevents the sustainable improvement of services.

Several users directly criticized community water management. A man from Kovié said, "Every month, we pay for water, but we never know what they (AUSEPA) do with the money." Another from Noèpé insisted, "The AUSEPA are never accountable. It is like it's their own business." A woman from Noèpé highlighted the lack of participation: "we use the water every day, but we are never asked for our opinion." Another woman from Kovié also stated her frustration.

There are one or two women on the committee, but they never speak out. They do not even know what is going on in this association. It is just to say there is a woman. We women are the ones primarily concerned about water. We are the ones who carry it, who filter it, who use it for cooking, for washing the children. But for a long time, we did not listen to it. For 2 years, the water committee has reserved three seats for women. It is not easy to assert yourself, especially when you speak in front of men. But little by little, we are making ourselves heard (A woman from Kovié).

A man from Noèpé added, "Since they were elected, we have never been invited to a meeting. Everything is done between them." These observations reinforce the

notion that local management structures frequently lack accountability, inclusivity, and technical expertise.

In Noèpé and Kovié, the AUSEPA is responsible for operating the drinking water network, which consists of a discharge main and distribution pipes to which the population connects through standpipes or private connections. The network is supplied by two boreholes and two water towers, with capacities of 50 m^3 and 255 m^3, respectively. However, according to the national drinking water supply policy, AUSEPA may not operate the system itself or through a subcommittee that is an offshoot of AUSEPA. The operators they charge with operation must be independent of them, at the financial and decision-making levels, and bound by contractual obligations. According to a man from Noèpé:

On paper, AUSEPA should delegate operations, supervise the operators, and defend our interests... But they do everything without consulting the population. They set prices, manage outages, and collect revenue... yet they are not accountable to the village. No one controls anything. It has cut off water to some subscribers without explanation.

On the management committee side, AUSEPA officials acknowledge the difficulties encountered. One committee member from Noépé explained: "what we collect is not even enough to pay a technician." Others highlighted the lack of external support. An AUSEPA member in Kovié said: "we were trained once, but since then, nothing. We manage as best we can. [...] We are not experts. We volunteer, but it is a big responsibility." His colleague in Noépé believed that they "need real support. [...] Without support from the state, NGOs, or projects, we cannot ensure long-term maintenance or build new water facilities or expand the network." Another AUSEPA member in Noèpé criticized users, saying:

Some users wrongly accuse us of mismanaging or embezzling funds. We try to manage as best we can, but we also need the population to respect the rules. [...] When we decide, there are always people who claim they were not consulted. However, we post the minutes from the meetings. [...] We invite women to the meetings, but they do not always come. Sometimes they say they are too busy. We would like them to participate more, but many are not interested unless there is a breakdown.

These testimonies highlight that the limitations of community management stem not only from internal failures but also from a lack of structural supervision, funding, and institutional recognition. Thus, these findings underscore the urgent need to rethink governance and support mechanisms to ensure reliable, equitable, and sustainable access to drinking water, as well as the structural limitations of the current model.

3.3. Connection to drinking water in Kovié and Noèpé: A clear procedure, a prohibitive cost

An analysis of the drinking water connection procedures in the semi-urban communities of Kovié and Noèpé reveals a relatively structured organization. However, the costs pose a significant challenge for the local population. The process begins with submitting an application to AUSEPA and paying an initial fee of 35,000 FCFA. XOF is used by the West African Economic and Monetary Union, which includes countries such as Togo, Senegal, Côte d'Ivoire, and Mali. One euro is equivalent to 655.957 FCFA (XOF). This exchange rate is fixed by the Central Bank of West African States for countries in the West African Economic and Monetary Union. This fee covers the cost of the estimate and connection. This step is essential to trigger the intervention of a designated plumber, who takes on-site measurements to create a technical estimate. The estimate is then submitted to the association manager for approval before work begins.

In addition to the initial fees, the customer must also pay a flat fee of 20,000 FCFA for the plumber's labor. However, these amounts do not include the materials needed for installation (pipes, fittings, faucets), the cost of which is entirely the customer's responsibility. Depending on the connection distances and the specifics of the land, the total cost of the connection can easily exceed 55,000 FCFA and reach up to 100,000 FCFA in some cases. A resident of Noèpé testified:

when I wanted to connect, I was asked for 55,000 FCFA, without the cost of pipes and other accessories. After evaluation, the cost I would have to bear was around 100,000 FCFA. I was told that I had to pay all the costs myself; otherwise, the work would not be done.

In urban areas, Togolaise des Eaux (TdE) charges 75,000 FCFA for a connection of 0 to 20 m. Beyond this distance, each additional meter costs 2,000 FCFA, with a partially subsidized value-added tax (50%). In contrast, in semi-urban areas such as Kovié and Noèpé, connections made by AUSEPA, for an equivalent distance, often reach 95,000 FCFA, without any subsidy. These costs are often higher than the regulatory price set at 75,000 FCFA, which creates a situation of price unfairness.

Water pricing itself exacerbates inequalities. In Kovié and Noèpé, a 25-L container is sold at the standpipe for 25 FCFA, or 1,000 FCFA per cubic meter. By comparison, in urban centers like Lomé or Kpalimé, users of TdE

standpipes pay 500 FCFA per cubic meter, which is half the amount. This difference is explained by the higher management and maintenance costs in community or semi-private systems managed by AUSEPAs, which are often less cost-efficient than those of the TdE.

The data collected shows that households in semi-urban areas, often living on informal and irregular incomes, struggle to raise the necessary funds to access drinking water. For a family living on <1,000 FCFA per day, raising more than 80,000 FCFA without external support can take several months, or even be impossible. As one head of household in Kovié summed up: "we are forced to pay more for less. It is not normal."

These results highlight a twofold inequality: Economic, due to the high cost of the service, and structural, resulting from the absence of support or subsidy mechanisms tailored to local realities. They emphasize the need for reform of connection and pricing policies in semi-urban areas to ensure equitable access to drinking water.

3.4. Sources of access to water, between informal and structured networks

Faced with high connection costs and a lack of subsidies, the populations of Kovié and Noèpé must rely on various sources to meet their daily water needs. Households rely on sources such as traditional wells, community boreholes, and water purchases from private vendors.

Table 3 shows the relationship between the drinking water source used and the distance from the home to the source. In Kovié, the most frequently used water source is the Zego rice canal (62.7%), which is located more than 500 m away for 88.4% of users. Conversely, sources such as public standpipes and boreholes are primarily located within 500 m of homes, at 79.3% and 85.7%, respectively. The Pearson Chi-square test shows a significant association between the water source used and the distance to the source (χ^2 = 155.23; p<0.001). The strength of this association is high, as evidenced by Cramer's V (V = 0.658).

In Noépé, water from the Akatsè Dam was used the most (44.8%), and 91.8% of users live more than 500 m away (Table 3). Standpipes and boreholes, however, were more accessible, with 83% and 86.7% of users, respectively, living within a 500-m radius. Pearson's Chi-square test reveals a highly significant association (χ^2 = 207.46; p<0.001), and an even stronger association: Cramer's V of 0.767.

This variety of access to water reflects economic constraints, limited network coverage, and local adaptation dynamics.

Table 3. The relationship between households' drinking water source and the distance to access it

Area	Type of water source	Percentage of usage		
		Sources <500 m (%)	Sources >500 m (%)	Total (%)
Kovié	Standpipes	20.3	5.3	25.6
	Private connection	0.6	0.0	0.6
	Cistern (rainwater)	3.3	3.9	7.2
	Drilling	3.3	0.6	3.9
	Rice canal (Zego)	7.2	55.4	62.7
	Total	34.8	65.2	100.0
Noèpé	Akatsè Dam	3.7	41.1	44.8
	Standpipes	25.2	5.1	30.3
	Private connection	4.5	0.3	4.8
	Cistern (rainwater)	2.5	0.6	3.1
	Drilling	14.7	2.3	17.0
	Total	50.7	49.3	100.0

The results presented in Figure 4 highlight the marked disparities in the time required to access different water sources in Kovié. Water collected from the rice canal (Zego) is the most time-consuming option, as 116 of the 225 users (51.3%) report travel times of more than 45 min. In contrast, users who rely on standpipes and boreholes primarily report access times of <15 min, reflecting a more favorable spatial distribution and service reliability. Pearson's Chi-square test yielded a highly significant result (χ^2 = 196.382; p<0.001), indicating that the time required to reach a water source is not randomly distributed among the different types of sources, but is strongly related to the nature of the infrastructure. Cramer's V coefficient, with a value of 0.427, suggests a moderate association, implying that while the type of water source is a significant determinant of access time, other factors, such as household location, road conditions, or socioeconomic status, may also contribute to the observed disparities.

The situation in Noèpé is similar. Of the 158 Akatsè Dam users surveyed, 22% reported needing more than 45 min to collect from the dam, while 17.6% reported using it for <30 min. Users of boreholes and standpipes reported shorter collection times of 15–30 min (14.9% and 14%, respectively; Figure 4). As in Kovié, Pearson's Chi-square confirms a significant association between the variables (χ^2 = 154.159; p<0.001), with a Cramer's V of 0.382 indicating a moderate association.

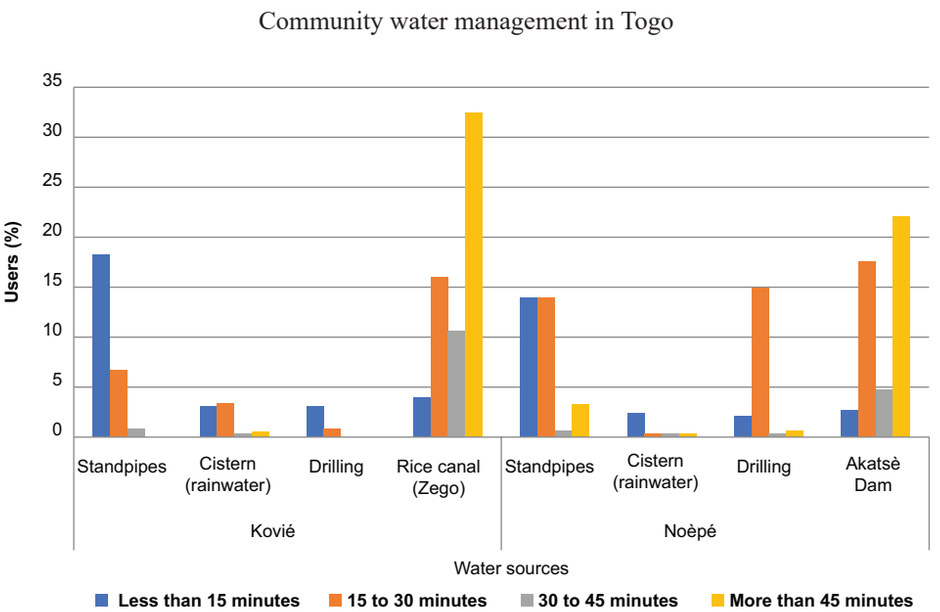

Figure 4. Time taken by users based on the water sources used in the two locations

These statistical results were corroborated by several field testimonies. A Noépé resident declared: "the dam is far from the house, but we have no choice. The water from the standpipes does not always flow." A woman from Kovié agreed, stating: "when we cannot afford it, we go to Zego. It is free, even if it is not clean and far away." Others, like a man from Noèpé, highlighted service disruptions: "when the pump breaks down, our wives and mothers turn to the rivers and wells... And by going there all the time when the pump is broken, they end up choosing the river route as the preferred route at all times." Social reasons were also present: "in our neighborhood, everyone goes to Zego. It is a habit," declared a woman in Kovié. This confirms that access to water depends on cultural, economic, and technical factors, not just distance or time. In addition to physical considerations, such as distance, time, and cost, several women emphasized that the journey to the backwater canal plays an important social role. It provides an opportunity for women to engage in informal exchanges and discuss personal and family matters, especially if they lack convivial settings. One respondent said, "We talk about household problems on the road. Sometimes it feels good."

Thus, the choice of certain distant water sources cannot be explained solely by material constraints. It can also provide an opportunity for social interaction in contexts where women have limited opportunities to express their challenges. The relational and emotional aspects of traveling to water sources deserve consideration in public policies on access to water to avoid rendering this social dimension invisible.

Table 4. Level of satisfaction with community management

City	Level of satisfaction		Satisfaction tests by source and city		
	Satisfied (%)	Dissatisfied (%)	χ^2	*p*-value	Cramer's V
Kovié	3.1	96.9	27,653	0.000	0.278
Noèpé	2.3	97.7	18,819	0.001	0.231
Total	2.7	97.3	43,685	0.000	0.248

Analysis of the data in Table 4 reveals a highly concerning level of dissatisfaction among users with the management committee's management of water points in Kovié. Only 3.1% were satisfied, while 96.9% were dissatisfied. Satisfaction remained low regardless of the source. For instance, among standpipe users, 10.9% were satisfied, while 89.1% were not. Statistical tests indicate a significant relationship between water source and satisfaction (χ^2 = 27.653, p<0.001), but the strength of association is only moderate to weak (Cramer's V = 0.278). This suggests that even if the type of source has a slight influence on satisfaction levels, widespread dissatisfaction persists.

The situation in Noèpé is equally alarming. Only 2.3% were satisfied with the committee's management of their water source, while 97.7% were dissatisfied (Table 4). This area's water sources are standpipes, dams, and boreholes. However, no source garnered significant satisfaction. For example, standpipe users demonstrated a satisfaction rate of 0%, which is highly indicative of the committee's disengagement or

ineffectiveness. Chi-square tests confirmed a statistically significant relationship between the water source used and satisfaction (χ^2 = 18.819, p=0.001). However, the measure of association (Cramer's V = 0.231) indicates a weak degree of association. This means that the water source does not fully explain the level of dissatisfaction: the failure appears to be systemic. In Noèpé, management committees were perceived as ineffective, if not absent, and the population expressed frustration with management that fails to meet their needs or expectations.

The lack of transparency in infrastructure management (37.4% in Kovié and 30.5% in Noèpé; Table 5) is the main source of discontent, reflecting a perception of governance as opaque and unaccountable. This distrust is reinforced by the lack of reliable information on distribution schedules (13.6% in Kovié and 17% in Noèpé), breakdowns, and repair criteria. This lack of information fuels frustration and community conflict. Recurring technical problems, such as frequent breakdowns (21% in Kovié and 22% in Noèpé) and overloaded water points (17% in Kovié and 15.3% in Noèpé), reflect a lack of maintenance and aging equipment. These problems also reflect an imbalance between supply and demand. A statistical analysis confirms these findings. The results of the Chi-square test were highly significant (p<0.001) and associated with very high Cramer's V values (>0.79). This highlights a strong correlation between the type of water point used and the nature of the problems encountered. Each infrastructure type has its own vulnerabilities: standpipes have irregular schedules and are often overloaded, irrigation canals are unsanitary and remote, and boreholes frequently experience breakdowns and poor water quality.

Table 5. Factors for dissatisfaction with community governance

Factors	Kovié (%)	Noèpé (%)
Lack of transparency	37.4	30.5
Opening hours are not respected	11	15.3
Too many breakdowns	21	22
Overloading of water points	17	15.2
Lack of communication	13.6	17
Statistical analysis tests		
χ^2	900,442	1,067,470
p-value	0.000	0.000
Cramer's V	0.792	0.869

Despite the many difficulties related to access to water, local populations are developing resilience, which is sometimes expressed through simple yet meaningful words. "For us, it is the coolness of the weather," say some residents. This indicates that beyond breakdowns, missed schedules, and a lack of transparency, the quality of the moment experienced—often very early in the morning or late in the evening—also marks their daily lives. This sentiment reflects their forced adaptation to fluctuating access times and resignation in the face of failing public services. It poignantly illustrates how a technical constraint becomes an integrated part of social practices. However, behind this "coolness of the weather" lies a less poetic reality of fatigue, wasted time, and unequal access. This underscores the urgent need to rethink water supply policies in a more humane and equitable manner that is grounded in local realities.

4. Discussion

4.1. Community governance: From participatory utopia to structural crisis

This study offers new insights into the governance of water services in semi-urban areas of Togo, combining empirical fieldwork with two theoretical perspectives: Ostrom's commons theory and Fraser's environmental justice theory. Unlike previous studies that focused on rural or urban contexts, this research sheds light on the unique challenges faced by transitional zones such as Kovié and Noèpé, which are plagued by institutional neglect and fragmented infrastructure planning.

The results confirm the structural crisis in community water governance, characterized by symbolic participation, weak institutional anchoring, and a lack of accountability mechanisms. The findings align with Harvey and Reed,[9] who argue that community management is only sustainable when supported by external supervision. However, this study goes further by showing how the absence of polycentric governance and regulatory clarity leads to operational opacity and user disengagement.

The AUSEPA's overlapping roles—both managerial and operational—contradict national policy and foresters' conflicting interests, echoing Ostrom's warning about the risks of centralized control in commons management.[20] In this context, Jiménez and Pérez-Foguet[17] also emphasize that institutional clarity and the separation of roles are essential prerequisites for the effective performance of rural and semi-urban management systems, particularly in avoiding bureaucratic excesses and local clientelism, as

observed in large African cities.[16] Community models require real institutional support, formal frameworks, transparency mechanisms, and technical capacities to be sustainable.[9,11,16,17]

In the cases of Noèpé and Kovié, this mismatch between the legal framework and actual functioning is accompanied by a low level of transparency in decision-making, a lack of accountability, and low user representation in governance structures. This situation is not isolated: It reflects a model of community management in crisis, already described by Adams *et al*.[16] in their analysis of hybrid urban systems in sub-Saharan Africa, where the state is gradually discharging its responsibilities without providing local structures with the necessary resources.[15]

4.2. Connection to drinking water: A luxury for semi-urban areas in Togo

The study reveals that connection to drinking water remains prohibitively expensive for many households, with costs exceeding 95,000 FCFA—an amount disproportionate to local incomes. However, households located in semi-urban areas are the most vulnerable to economic insecurity and, therefore, are financially unable to bear the costs of connecting to and maintaining drinking water services independently. This finding highlights a paradox: the most vulnerable populations often pay more for a service that is less reliable than in urban areas. This echoes findings from sub-Saharan Africa and South Asia, where pricing models exacerbate inequalities in peripheral zones.[22,23]

This results in limited access to drinking water, increasing the health risks associated with the use of unsafe sources. The lack of affordable access to drinking water pushes households to resort to unsafe sources such as backwater, dams, wells, irrigation canals, increasing the incidence of waterborne diseases such as diarrhea, cholera, or typhoid.[24,25] Studies confirm that access to drinking water significantly reduces the prevalence of these diseases, highlighting the importance of targeted interventions for vulnerable populations.[24]

Access to drinking water in semi-urban areas of Togo remains deeply unequal, primarily due to high connection costs and the lack of support mechanisms for vulnerable households. Subsidy policies, installment plans, and collective connections are needed to ensure equitable and sustainable access to drinking water. These solutions would not only democratize access to water but also strengthen community resilience in the face of health and economic challenges.

4.3. Physical accessibility of water: Spatial and social issues

Beyond economic barriers, spatial inequalities shape access to water. The mapping shows that infrastructure is concentrated along main roads, leaving peripheral neighborhoods underserved. This spatial bias reflects planning logic that prioritizes visibility over equity, as noted by Dos Santos *et al*.[5]

Importantly, the study highlights the social and symbolic aspects of water collection, particularly for women. The journey to informal sources becomes a space of exchange and solidarity, rarely acknowledged in policy design. This aligns with Whaley *et al*.,[8] who argue that water access is embedded in gendered social practices. The originality of this study lies in its integration of these relational aspects into the governance debate, suggesting that future planning must consider not only physical access but also social meaning.

4.4. Hybrid governance as an alternative perspective

The limitations of the community models call for hybrid governance frameworks that combine participation with professional management and institutional oversight.[20,26,27] This study supports Ostrom's[20] proposition of polycentric governance. This requires the existence of transparent mechanisms, effective sanctions, open information exchange, and effective coordination between actors. Jiménez and Pérez-Foguet[17] demonstrated that the sustainability of the service in Tanzania relies on a structured, formalized, and inclusive governance and monitoring framework.[16] Nkolola and Phiri,[18] on the other hand, developed a systemic model for Mbala (Zambia), suggesting that infrastructure sustainability depends on community management integrated with monitoring mechanisms, ongoing training, and institutional support.[17]

The contribution here is the contextualization of these models in semi-urban Togo, where the absence of municipal capacity and regulatory enforcement undermines the sustainability of services. The study proposes concrete levers: performance contracts, technical training, gender inclusion, and citizen oversight. These recommendations are grounded in real-world field experiences and provide a roadmap for reform.

4.5. Implications for public policies

The results of this study underscore the need for drinking water supply policies in semi-urban areas to shift from a technical, infrastructure-centric approach to a systemic approach that integrates multi-stakeholder and multi-level governance, transparency, local

ownership, and the social dynamics of water. The example of Kovié and Noèpé demonstrates that poorly governed infrastructure can quickly become a source of frustration, conflict, and exclusion. Authorities must also incorporate gender-, age-, and status-specific realities into the design of management structures. Meaningful inclusion of women in decision-making bodies, beyond mere symbolic representation, remains an imperative, as does the establishment of regular mediation and consultation mechanisms between users and managers. The municipality must be strengthened as a project owner capable of contracting, monitoring, and evaluating AUSEPAs. This requires significant technical and institutional support, in line with the recommendations of Jiménez and Pérez-Foguet[16] and Nkolola and Phiri.[17] The creation of municipal units to monitor delegated operations (technical, financial, social) can enable effective supervision while ensuring increased transparency.

Faced with the structural limitations of the community model, some actors propose delegating the technical and financial management of water services to qualified private or semi-public operators through delegation contracts supervised by the municipalities. This approach, already tested in certain urban contexts in Africa,[15] would guarantee a better level of service and increased continuity. This model must be designed progressively and adapted to local capacities, drawing inspiration from positive experiences of mixed management (community-operator), as proposed by Harvey and Reed[9] and Machado *et al*.[7] It is nevertheless essential to maintain consultative community participation in shared local water governance, through private operators, local authorities (municipalities and regions), the state and its decentralized services, the regulatory authority, citizen offices, or citizen dialog spaces.[8,20]

4.6. Limitations of the study

However, the study has limitations. The analysis does not include precise technical measurements of water quality, flow rates, pressure, or frequency of outages. Despite the comprehensiveness of the interviews and focus groups, certain population groups remain underrepresented, particularly young people, people with disabilities, and the most vulnerable households. The study was based on data collected at a given point in time, without longitudinal follow-up. It therefore does not allow for an assessment of changes in governance practices or the long-term effects of reforms or interventions. Although the study mentions the risks associated with using unsafe sources, it does not directly measure the health impacts.

4.7. Recommendations

To sustainably improve water service management at the local level, it is essential to establish performance contracts with local operators. These contracts enable the establishment of clear objectives in terms of service quality, coverage, maintenance, and financial management, while empowering local stakeholders and promoting a results-oriented culture. At the same time, the establishment of participatory governance frameworks that include women and marginalized groups is essential to ensure inclusive and equitable decision-making, in line with the real needs of communities. This participatory approach enhances the transparency and legitimacy of the actions undertaken. Finally, the design of sustainable financing mechanisms, aimed at reducing dependence on short-term donor projects, is crucial to ensure the continuity of investments and the financial autonomy of services. These mechanisms can include public-private partnerships, revolving funds, or local contributions adapted to users' capacities.

5. Conclusion

This research highlights the structural dysfunctions of the community-based water management model in semi-urban areas of Togo. It reveals a persistent gap between the theoretical principles of participation and observed practices in the field. The study shows that inadequate regulation of local governance can perpetuate social and territorial inequalities, thereby compromising equitable access to a vital resource. The study's main contribution is its articulation of organizational dimensions (efficiency, transparency, and delegation) in relation to environmental justice concerns (recognition, redistribution, and participation). Through a mixed-methods approach that incorporated users' perspectives, the study provides a nuanced understanding of local tensions and identifies actionable strategies for improvement.

To improve local water service management sustainably, the following recommendations are proposed:

(i) Performance-based contracting: Define clear objectives regarding service quality, coverage, maintenance, and financial management in performance contracts with local operators. These contracts promote accountability and a result-oriented culture.

(ii) Inclusive participatory governance: Develop participatory governance frameworks that actively include women, youth, and marginalized groups to ensure equitable decision-making that aligns

with community needs. This approach enhances transparency and legitimacy.

(iii) Sustainable financing mechanisms: Design long-term financing strategies to reduce reliance on short-term donor projects. These strategies may include public-private partnerships, revolving funds, or locally adapted user contributions to ensure financial autonomy and the continuity of investments.

These recommendations support the development of hybrid governance models involving public, private, and community actors. These models should be governed by clear contractual arrangements, sustainable financing, and continuous capacity-building for managers. Strategically including women and youth in decision-making bodies should be prioritized to strengthen legitimacy and foster social innovation.

Future research could include comparative analyses of water governance models across semi-urban municipalities; evaluations of the effects of performance contracting on service quality and financial transparency; and assessments of the territorial impacts of water governance on social cohesion and local development.

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Conflict of interest

The authors declare no conflict of interest.

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Availability of data

Data will be made available upon request to the corresponding author.

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