Local Whispers on Community Boreholes: Unveiling the Sociocultural Path for Borehole and Groundwater Sustainability in Rural Zimbabwe

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ABSTRACT

Many factors have been identified as contributing to the sustainability of community boreholes and/or groundwater projects, from technical specifications to community power struggles. However, the effect of local sociocultural values and norms on borehole and groundwater sustainability in the region of Sub-Saharan Africa, as they are 'whispered' by the local communities within a socio-ecological milieux, has not been investigated. From the basis of the practical norms concept and socio-ecological literature, this paper explores how people's sociocultural values and norms influence local perceptions of community boreholes and/or groundwater projects. It suggests that 'locally whispered' water stories can enhance our understanding of the boreholes' and/or groundwater projects' societal impact, how they shape local actions, behaviours, and decisions for borehole and groundwater sustainability. The paper uses storytelling to investigate two distinct borehole and/or groundwater tales from Wards 13 and 17 in rural Gwanda, Zimbabwe, possessing a shared commonality. Ward 13's borehole and/or groundwater source, installed near a swamp, where snoop holes or shallow wells were traditionally dug and managed by locals, promotes community identity and ecological wisdom, while Ward 17's system, on dry capped land, reflects failed projects due to neglect of same values or norms. The paper highlights the importance of understanding local sociocultural realities in sustaining boreholes and/or groundwater projects, especially by the technical expertise. It posits the complex relationship between boreholes, groundwater, and sociocultural vibrancy, suggesting that community boreholes and/or groundwater projects should serve as "communal storytelling hubs" for sustainable water solutions.

Keywords: Sociocultural values and norms, practical norms, storytelling, socio-ecological systems, community borehole and groundwater sustainability.

INTRODUCTION

Contextualizing Community Borehole and Groundwater Sustainability within Socioecological Scholarship in Sub-Saharan Africa

In semi-arid regions, such as Sub-Saharan Africa (SSA), where the delicate balance between water scarcity and human sustenance is acutely felt, the significance and value of a groundwater resource should transcend the utilitarian realm, intertwining with the very fabric of local communities the water point is targeting to serve (Manzungu, 2004; Hoko et al., 2009; Adekile and Olabode, 2009; Bvirindi, 2019; Tagutanazvo and Bowora,

2019; Tiwari et al., 2019). There is need for greater appreciation of the role of both social and ecological dimensions in ensuring the sustainability of rural groundwater resources, in the face of the multifaceted cultural, economic, and environmental change (Van Riper et al, 2018; Danert et al., 2020; Chitata et al., 2021; Zwarteveen et al., 2021; Chitata et al., 2022; Cleaver et al., 2023). Research has highlighted socioecological dimensions as fundamental cornerstones for the sustainability of community-based water resources (including boreholes and/or groundwater projects), in regions like SSA (see the academic works of Harvey and Skinner, 2002; Derman and Hellum, 2007; Mitchell et al., 2012; Bernet, 2010; Karamunya, 2016; Beetz, 2017; Shoko and Naidu, 2018; Komaketch and de Bont, 2018; Zwarteveen et al., 2021; Chitata et al., 2021; Chitata et al., 2022; and Cleaver et al., 2023). Recognizing the socioecological context, therefore, ensures that interventions are contextually relevant to provide the governance structures necessary for equitable and enduring groundwater governance (Van Riper et al., 2018; Zwarteveen et al., 2021; Cleaver et al., 2023).

Recent interest in groundwater's potential role in such agrarian initiatives like irrigated agriculture has grown in SSA and even beyond, with research on social dimensions like power, access, community regulation, stakeholder engagement, and land ownership emphasized as being crucial for its development and management (Mitchell et al., 2012; Cleaver et al., 2023). Ecological understandings, local, subjective, embodied, and socially sanctioned, along with formal measurement technologies, significantly influence aquifer and groundwater flow understandings (Komakech and de Bont, 2018; Zwarteveen et al., 2021; Chitata et al., 2022). Scholars such as Patra et al. (2006) and Chitata et al, (2021) argued that farmers and well diggers, who work with aquifers and groundwater, create, and apply knowledge that influences groundwater views, access, and sharing within local economies, thereby influencing their growth – and that groundwater knowledge is shaped by practice, technology, imagination, and socio-ecological contexts. It is encountered by technicians, planners, and engineers in professional and social milieux. Thus, the literature above stimulates the comprehensive understanding of the interplay between social and ecological systems as being crucial for developing sustainable groundwater governance strategies. In principle, this should include recognizing the dependence of communities on the local ecosystem, understanding the ecological impacts of groundwater extraction, and acknowledging the reciprocal relationship between human activities and environmental health. Such an understanding ensures that interventions are contextually appropriate, accounting for the intricate dynamics between communities and their natural surroundings.

A key argument in the literature, therefore, is the need for an integrated approach that brings together socioecological dimensions as gathered at multilevel community settings (Hoko and Hertle, 2006; Kangwere et al., 2014; Karamunya, 2016, Van Riper et al, 2018). Academics like Zwarteveen et al., (2021) sternly advocate for the pluralization of groundwater governance scholarship, arguing that community initiatives to maintain, share, or recharge aquifers are valuable, alongside government efforts to regulate extraction. Diversifying the conceptual vocabularies needed to comprehend, envision, and interact with groundwater is another prerequisite for conceiving and implementing groundwater differently (Hoko and Hertle, 2006; Kangwere et al., 2014; Karamunya, 2016; Zwarteveen et al., 2021). An important source of inspiration here is the actions of individuals who band together to cooperatively access, share, and maintain groundwater—often in defiance of pressure to over extract. It is necessary to record and comprehend these kinds of activities to shift focus from the way government attempts to control and regulate people's pumping behaviour to how people value and support one another's efforts to share, recharge, and care for aquifers (Zwarteveen et al., 2021). In their work, Chitata et al., (2021) discussed three processes: understanding and interaction with groundwater, reshaping infrastructure through agency and creativity, and reshaping social relations of power due to ongoing modifications. They highlighted how the evolving form and materiality of infrastructure shape people's understanding and behavior, and how diverse individuals use their agency and creativity to reshape infrastructure; also demonstrating how, at least in part, the contingent coming together of various people, knowledges, water(s), and infrastructure results in distributions of power and water (Chitata et al., 2021). This approach recognizes that effective groundwater governance requires not only an understanding of the ecological context but also the development of social institutions that empower local communities to govern their resources sustainably, further emphasizing the need for flexible and adaptive governance structures that can respond to changing socioecological dynamics, promoting the resilience of community water supply systems (Karamunya, 2016; Chitata et al., 2021; Zwarteveen et al., 2021).

Local Water Resources Governance in Matabeleland South, Zimbabwe: Historical and Indigenous Practices The current paper explores the 'locally whispered' sociocultural values and norms surrounding two borehole and/or groundwater extraction systems situated within a common and unique socio-ecological context of Gwanda Rural

District, Zimbabwe —one operational (in Ward 13) and the other dysfunctional (in Ward 17). It is prudent, therefore, to situate the two borehole and/or groundwater extraction cases herein referred to, around the sociocultural embeddedness of the local governance of water resources by the indigenous peoples of Matabeleland South region in semi-arid Zimbabwe, where Gwanda Rural District is located, as discussed below. This should help in showing how the evidence from the two case studies remains inclined or not towards the traditionality and culturality of managing local water resources such as boreholes and/or groundwater projects in the present or future contexts.

Matabeleland South, a region housing mostly the Ndebele and Sesotho-speaking people, including those domiciled in the Gwanda Rural District of semi-arid Zimbabwe, has a rich history of indigenous or local water resources governance that intertwines with cultural beliefs, spiritual practices, and ancestral ties (Nyathi, 2005). The indigenous peoples of this area have long relied on traditional methods and spiritual guidance to manage and/or use their water resources, reflecting a deep connection to their land and its sacred sites (Alexander and Ranger, 1999; Nyathi, 2005; Dube, 2012).

Historical and Cultural Context: Historically, water resources in Matabeleland South have been governed or managed through a combination of practical techniques and spiritual practices. Such places as the Matopos Hills, a UNESCO World Heritage site, are a significant cultural and spiritual center for the local communities (Nyathi, 2005). These hills are home to the Njelele and Zhilo Shrines, which are important rainmaking sites where rituals are performed to invoke rain, a practice rooted in the belief that the spirits of ancestors can influence weather patterns (Nyathi, 2005; Dube, 2012). Such rituals are a testament to the indigenous understanding of and reliance on spiritual guidance for managing or utilizing the local water resources.

Traditional Water Management Practices: Indigenous and/or local water resources governance in Matabeleland South includes the use of snoop holes, wells, and reservoirs (Dube, 2012). Snoop holes, shallow wells dug near riverbeds, have been a traditional method for accessing groundwater during dry seasons. These snoop holes are carefully maintained and protected, often regarded as sacred spots where community members can gather groundwater. The knowledge of where to dig these snoop holes is passed down through generations, based on the understanding of the land's hydrology and spiritual insights (Alexander and Ranger, 1999; Nyathi, 2005; Dube, 2012). Boreholes, a more recent adaptation, have been integrated into the local water management practices (Dube, 2012), and while these boreholes are often seen as modern solutions, their placement and use are still influenced by traditional beliefs. For instance, the community might consult spiritual leaders or conduct rituals before drilling a new borehole to ensure the site is blessed and will provide ample groundwater. This practice shows a blend of modern technology with age-old spiritual beliefs, ensuring continuity of cultural practices while adapting to new needs.

The Role of Sacred Sites: The sacredness of places like the Matopos Hills plays a critical role in the governance or management of water resources. These sites are not only spiritual centers but also repositories of traditional ecological knowledge (Nyathi, 2005). The reverence for such places ensures that water sources within and around them are protected and managed sustainably. For example, it is believed that the spirits residing in these sacred sites protect the groundwater sources, and any misuse or disrespect could lead to water scarcity (Nyathi, 2005; Dube, 2012).

Thus, as evidenced in literature, local water resources governance in Matabeleland South is deeply embedded in the cultural and spiritual fabric of the community. The practices surrounding snoop holes, wells, and boreholes are not just about accessing groundwater but also about maintaining a respectful relationship with the land and its spiritual guardians. The sacredness of sites like the Matopos Hills reinforces the sustainable management of these resources, ensuring that the practices of the past continue to support the needs of present and future generations. Through a blend of historical knowledge and spiritual beliefs, the indigenous peoples of Matabeleland South, including those in rural Gwanda, have developed a resilient and culturally rich approach to managing their vital groundwater resources.

However, while the existing literature has made commendable progress in exploring the multilevel socioecological dimensions crucial for community-based borehole and groundwater sustainability in SSA, including rural Gwanda, where the current study is situated, a discernible gap exists in the integration of 'what local communities say' from their sociocultural fabrics, that might somehow shape local actions and behaviors, pertaining to the sustainable governance of community boreholes and/or groundwater projects. Prevailing

research tends to prioritize broader frameworks, often overlooking the nuanced ways in which local communities can, to some extent, 'silently speak out their thoughts' regarding borehole and/or groundwater projects within their unique sociocultural contexts.

This paper, therefore, seeks to bridge this gap by exploring the impact of what it aptly terms the 'local whispers' of the sociocultural values and norms surrounding community boreholes and/or groundwater projects in rural Zimbabwe, situating them from both existing literature and the perspectives of local communities.

It kicks off by defining and explaining what these 'local whispers' entail, or should entail, and how they are contextualized in this study as a fundamental or complementary basis for charting an inclusive sociocultural path for community borehole and groundwater sustainability in SSA, respectively.

What 'Local Whispers' are, and why they are relevant for this paper

Definition:

In this paper, local whispers refer to tacit, collectively shared but rarely formalized sociocultural meanings and practical norms through which communities interpret, negotiate, and respond to borehole and groundwater interventions. They are embodied expressions of approval, resistance, responsibility, and identity that circulate informally within communities, shaping behaviour, participation, and long-term sustainability of water systems. Local whispers operate as a subtle yet powerful social feedback mechanism that reveals how deeply a water project is culturally integrated—or disconnected—from the lived realities of its users.

Theoretical grounding:

The concept of "local whispers" draws primarily from the theory of practical norms (Olivier de Sardan, 2015; Bierschenk & Olivier de Sardan, 2014; Hagmann & Péclard, 2011), which explains how everyday behaviour is guided not only by official rules but by implicit, socially embedded logics. In this study, therefore, local whispers are treated as culturally situated expressions of such practical norms, revealing how communities interpret water governance beyond formal institutional arrangements.

This perspective is complemented by socio-ecological scholarship emphasizing that sustainability emerges from the interaction between social values, cultural meaning systems, and ecological practices (Cleaver et al., 2023; Van Riper et al., 2018; Foster et al., 2019). Together, these frameworks position local whispers as indicators of sociocultural integration, collective ownership, and adaptive governance—critical determinants of borehole sustainability in rural subSaharan Africa.

Through this lens, the paper interprets community "whispered" water stories as diagnostic signals that reveal whether groundwater projects resonate with local values, knowledge, and identity, thereby shaping their sustainability trajectory.

METHODOLOGICAL REFLECTIONS

1. Socio-Ecological Context of the Case Studies

This study examines two community borehole systems located in Gwanda Rural District (see Figure 1 below), Matabeleland South Province, Zimbabwe, a semi-arid region characterized by low and variable rainfall, drought vulnerability, and strong reliance on groundwater for domestic and livelihood needs. The district's communities maintain deep sociocultural and spiritual relationships with land and water shaped by African Indigenous Faith traditions, where natural features such as swamps, hills, and water points hold cultural and ritual significance (Daneel, 1999; Chitando, 2017).

Both boreholes were installed under the Gwanda Integrated Rural Water Supply and Sanitation Project (IRWSSP), implemented between 1995 and 2000 with support from UNICEF and AusAID. The programme emphasized decentralized, community-based water management. The two wards share similar ecological and cultural settings but diverge sharply in sociocultural integration of the borehole systems—providing a comparative basis for examining how local whispers influence sustainability outcomes.
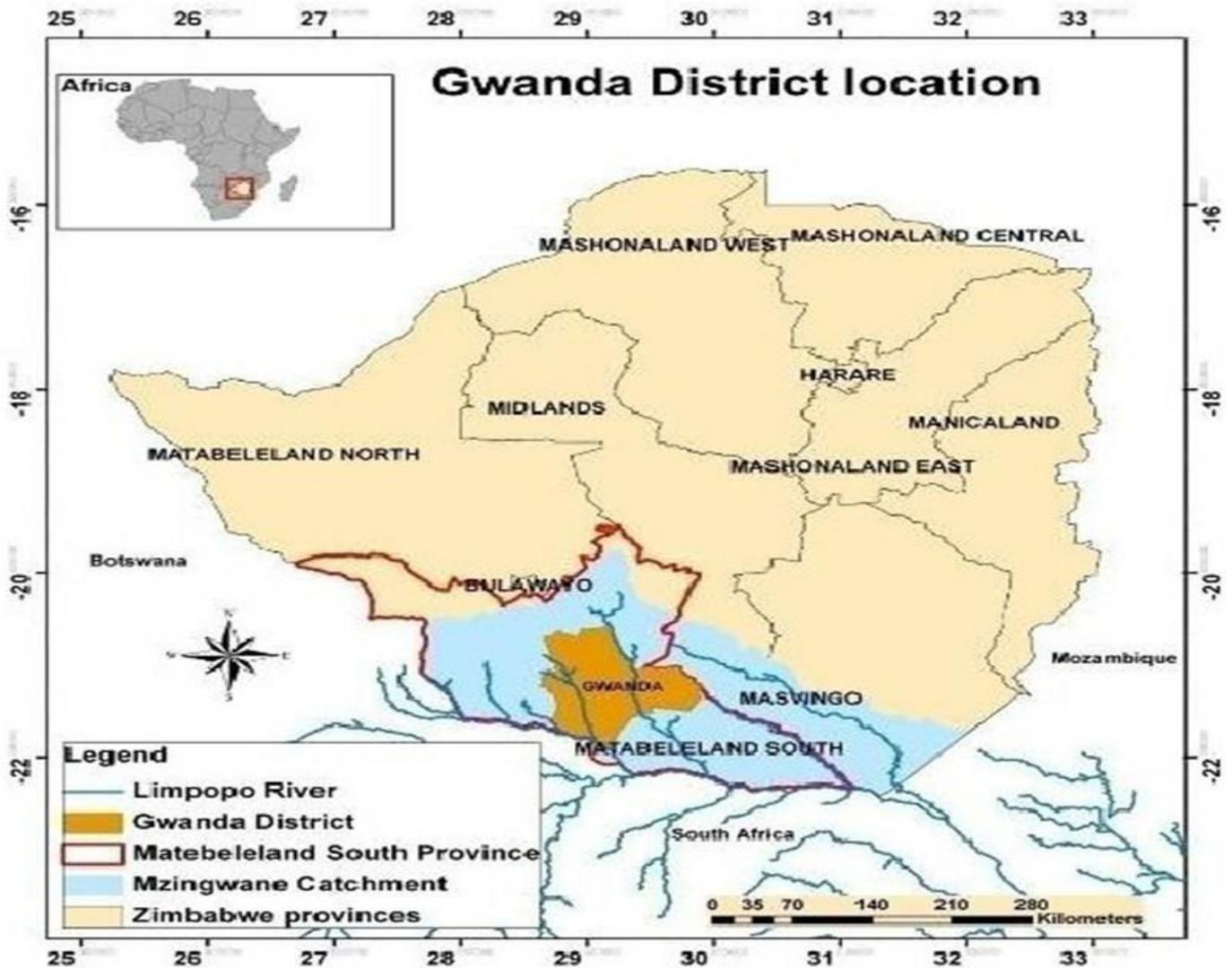
Figure 1: Location map of Gwanda Rural District in Zimbabwe (*Source:* Mulengera, et al. 2012) 2. Research Design and Methods

Study Design

A qualitative comparative case study design was adopted to explore how sociocultural meanings shape borehole sustainability across two contrasting wards.

Participants and Sampling

Ward 13 (Functioning system): 10 participants

Ward 17 (Non-functioning system): 10 participants

Participants were purposively selected to reflect diversity in gender, age, and social roles, including community elders, water point committee members, farmers, youth, health workers, traditional leaders, and local activists.

Data Collection Techniques

Semi-structured interviews exploring experiences, beliefs, and perceptions of borehole use and governance.

Storytelling workshops used as a culturally grounded method to elicit collective memories, symbolic meanings, and "whispered" narratives about water systems.

Field observations documenting borehole condition, usage patterns, and sociocultural practices around water points.

Data Analysis Procedure

Data were analysed using thematic analysis following four steps:

1. Familiarisation with transcripts and narrative material: Initial coding of recurring meanings related to cultural values, participation, and governance.

2. Development of thematic categories reflecting sociocultural integration vs. disconnect.

3. Interpretation through the lens of practical norms and socio-ecological theory to explain sustainability outcomes.

Ethical Considerations

Ethical clearance was obtained from the relevant institutional review body. Informed consent has been secured from all participants. Anonymity was also ensured through pseudonyms and removal of identifying details. Data for this study has been securely stored and used solely for academic purposes.

FINDINGS: ANALYSIS AND DISCUSSION

This section provides a comprehensive analysis and discussion of the findings against the concept of 'local whispers,' and its 'practicality' as embodied in the sociocultural values and norms attached to boreholes and/or groundwater projects by the local communities. It spells how these whispered water stories can be translated towards strengthening, validating, and elucidating the existing literature on socioecological dimensions of community water resource governance, and chart a sociocultural path for borehole and groundwater sustainability in SSA. The findings are reflective of the sociocultural values and norms, as lived experiences 'uniquely whispered' by the community borehole and/or groundwater users gathered from each of the two distinct case study areas. The analysis encapsulates the distinct 'practical' perspectives expressed and weighed against the local communities' socio-ecological contexts, as well as the existing literature on the factors determining the success of boreholes and/or groundwater projects through community participation, offering a structured overview of the diverse viewpoints and interpretations pertaining to borehole and/or groundwater project functionality, community integration, and sociocultural significance. This comprehensive presentation serves as a valuable synthesis, allowing for a systematic examination of the 'local whispers' as 'reflective practical norms' highlighting a nuanced picture of the local insights provided by each participant, possibly heard out only if drawing closer to the targeted people or project beneficiaries, themselves. It facilitates a holistic understanding of the complex dynamics of community borehole and groundwater sustainability as determined by the regard and/or disregard for the sociocultural values and norms in the respective wards of a same political district or legislative setting. **Table 1** below summarizes the comparative description of the findings:

Table 1: Comparative Overview of Local Whispers and Sustainability Outcomes

Dimension	Ward 13 – Functioning System (Sociocultural Integration)	Ward 17 – Non-Functioning System (Sociocultural Disconnect)
Cultural meaning	Borehole embedded in community identity, tradition, and a sacred landscape	Borehole perceived as foreign and culturally empty
Community participation	Strong involvement in siting, governance, and maintenance processes	Minimal participation; decisions largely externally driven
Collective responsibility	Shared ownership motivates sustained financial and social support	Weak sense of ownership and declining care
Daily life integration	Borehole is central to social interaction, cultural practices, and health routines	Borehole is disconnected from everyday routines and rituals
Sustainability outcome	Functional, well maintained, and socially valued infrastructure	Abandoned, deteriorated, and viewed as a symbol of disappointment

This comparison highlights the paper's central argument: the degree of sociocultural integration revealed through local whispers strongly shapes groundwater sustainability outcomes.

Case Study 1: Ward 13 — Sociocultural Integration and Sustainability

Cultural Identity and Embedded Meaning

In Ward 13, local whispers frame the borehole as part of cultural identity rather than merely infrastructure. Participants described its placement near a traditionally protected swamp and its continuity with ancestral water practices.

These narratives reflect practical norms of stewardship and respect for sacred water, reinforcing collective responsibility and long-term functionality (Manzungu, 2004; Derman and Hellum, 2007; Adekile & Olabode, 2009; Kwangare et al., 2014; Van Riper et al, 2018; Danert et al., 2020; and Cleaver et al., 2023). A respondent who is a community elder said:

Our sealed and fenced borehole as you see, is located near our traditionally fenced swamp (ixhaphozi), which has been our water source from generations back. It's not just about water; it's a part of our identity. The borehole project respects that tradition, since we recommended that it should be situated here.

Generational Continuity and Shared Responsibility

Community narratives emphasize continuity between past and present water traditions. The borehole is perceived as a bridge linking heritage and modernity, strengthening intergenerational learning and reinforcing maintenance practices.

Here, sociocultural integration produces durable governance structures and sustained collective care (as noticed in the works of Tagutanazvo and Bowora, 2019; Van Riper et al., 2018; Foster et al., 2019; Anderson, 2020; Zwarteveen et al., 2021; Chitata et al., 2022; and Cleaver et al., 2023). A respondent who is a Community Water Point Representative said: Managing water sources isn't just technical; it's a social pride and responsibility. The borehole respects the sociocultural structure we've had for ages.

It has been through such structure that we get inspired to pay for our borehole maintenance, because we value it. Even the water committee is respected.

Participatory Decision-Making and Ownership

Participants reported involvement in site selection and governance, creating strong ownership. This aligns with socio-ecological theory suggesting that locally embedded governance increases system resilience and sustainability (Tagutanazvo and Bowora, 2019; Van Riper et al., 2018; Foster et al., 2019; Anderson, 2020; Zwarteveen et al., 2021; Chitata et al., 2022; and Cleaver et al., 2023).

As one elder noted:

Here we treat our boreholes with the same reverence as the sacred water holes or wells our ancestors dug, fenced, and protected in swampy areas; they are a gift from our ancestors.

Sociocultural Vibrancy and Local Development

The borehole functions as a social and symbolic hub supporting communal interaction, identity expression, and livelihood activity. Local whispers therefore reveal deep sociocultural integration, which translates into operational sustainability (Tagutanazvo and Bowora, 2019; Van Riper et al., 2018; Foster et al., 2019;

Anderson, 2020; Zwarteveen et al., 2021; Chitata et al., 2022; and Cleaver et al., 2023). One community leader reflected:

Just as our ancestors have always protected the water resources such as snoop holes (imithombo) or shallow wells they dug in the swampy places located in the revered Hills or Mountains, through some dignified rituals and respect, we ensure that the boreholes of our own time and the generations to come are maintained and not misused.

Case Study 2: Ward 17 — Sociocultural Disconnect and System Failure

Technological Imposition and Cultural Disregard

Local whispers in Ward 17 describe the borehole as externally imposed and culturally disconnected.

Participants associated its failure not only with technical issues but with neglect of local knowledge and sacred ecological relationships—indicating a breakdown in sociocultural integration (Hoko et al., 2009; Komakech and de Bont, 2018; Tiwari et al., 2019). A respondent who is a political activist said:

The borehole, which was just brought here through modern ways of detecting underground water, was meant to be a blessing, but it became a source of disappointment. It's a reminder of promises unfulfilled, disconnected from our daily lives. As you can see it is just in a dry, hard ground surface.

Unmet Expectations and Erosion of Trust

Community narratives frame the borehole as a "promise unfulfilled," symbolizing failed engagement and declining confidence in water interventions. This weakens collective commitment and maintenance behaviour (Manzungu, 2004; Derman and Hellum, 2007; Adekile & Olabode, 2009; Kwangare et al., 2014; Van Riper et al, 2018; Danert et al., 2020). A social and water activist had to say:

Our generation expected better, but this borehole stands as a disappointment to us. It's not part of our vision for a culturally rich community.

Disconnection from Daily Life and Social Practice

Unlike Ward 13, the borehole is described as foreign, unused, and socially irrelevant. Its lack of integration into everyday routines undermines both functional and cultural sustainability. (Hoko et al., 2009; Komakech and de Bont, 2018; Tiwari et al., 2019). A local farmer echoed:

Our connection to water used to be through the land, but this borehole feels foreign. It's not part of our daily rituals; it's a deserted structure in the landscape.

And added:

It's a reminder of promises unfulfilled, disconnected from our daily lives.

Call for Re-integration and Collective Action

Some whispers express the borehole as a wake-up call for renewed participation and culturally responsive governance. These narratives highlight the need for holistic approaches that integrate technical, social, and cultural dimensions (Hoko et al., 2009; Komakech and de Bont, 2018; Tiwari et al., 2019). A social or water activist said:

It's not just a broken infrastructure; It's a call for us to come together, and work towards a shared goal.

A Water Point Representative added:

Definitely, something has to be done to this borehole, it cannot continue like this, because it is a disappointment to us and may be a sign that we cannot re-engage our traditional culture of coming together into one force, in this case with the project sponsors and implementers and talk about how we can solve this water issue.

Synthesis of the Findings

Across both cases, local whispers act as diagnostic signals of sociocultural integration. Where whispers reveal identity, ownership, and cultural embedding (Ward 13), sustainability emerges. Where they reveal alienation, exclusion, and cultural disconnect (Ward 17), failure follows. This confirms the theoretical proposition that practical norms and socio-ecological relationships fundamentally shape groundwater governance outcomes.

CONCLUSION

This paper highlights the importance of community boreholes and groundwater projects in everyday community life as "uniquely whispered practical norms" embodied by local communities. These projects reflect social integration, preservation of sociocultural heritage, and a negotiated balance between tradition and modernity. According to the captured local whispers, community boreholes and groundwater points symbolize continuity, cultural resilience, and shared identity, reflecting collective narratives and locally grounded values. They are embedded within the sociocultural fabric of the community rather than existing solely as technical infrastructure.

Insights provided primarily by indigenous residents of Ward 13 demonstrate that the principles guiding the management of newly introduced groundwater sources are not new; rather, they represent a continuation of long-standing cultural practices historically associated with snoop holes and shallow wells traditionally dug and protected in swampy and spiritually revered landscapes such as hills and sacred areas. The integration of these traditional values into contemporary borehole management illustrates the enduring influence of cultural heritage on sustainable groundwater governance. This reveals a symbiotic relationship between technical expertise and locally embedded knowledge, particularly in areas proximate to traditional water swamps.

Water swamps hold both cultural and practical significance as sacred gathering spaces for ceremonies, community interaction, and livelihoods. When the local whispers are integrated into the socio-ecological governance of groundwater resources, technical practitioners are encouraged to engage closely with communities, listening to lived experiences and culturally grounded values expressed through everyday interaction with boreholes and groundwater systems.

In this sense, "whispering" signifies the subtle yet powerful ways communities communicate their perceptions, priorities, and expectations regarding groundwater projects. Recognizing these perspectives enhances the design and sustainability of groundwater supply systems, transforming boreholes and groundwater points into sociocultural as well as technical resources. Accordingly, technical, scientific, and engineering approaches must incorporate socio-ecological complexity and local value systems to foster community-supported innovation and bridge the gap between formal science and lived local knowledge.

The study further demonstrates a positive relationship between borehole functionality and sociocultural vitality. Well-maintained groundwater points motivate collective action, strengthen shared ownership, and stimulate community-driven socio-economic initiatives. Borehole and groundwater governance emerges as a "whispered community narrative"—a reflective practical norm connecting people, heritage, and resource stewardship.

In Ward 13, a groundwater system located near a traditional swamp functions as a communal storytelling space, illustrating how sociocultural narratives sustain collective management and reinforce longterm functionality. Storytelling and shared meaning-making at groundwater sites therefore constitute an essential governance mechanism, fostering collective responsibility and strengthening the relationship between communities and their water resources.

This paper advances the concept of a "locally whispered practical norm" as the foundation for heritage-based and collective governance of community groundwater systems in semi-arid Sub-Saharan Africa. It reframes boreholes and groundwater points from purely utilitarian infrastructure to symbols of cultural heritage, social identity, and environmental stewardship. By demonstrating how sociocultural values influence functionality, maintenance, and community engagement, the study answers its central research question: community norms, values, and culturally embedded practices are critical determinants of groundwater system sustainability and effectiveness.

The findings therefore establish that sustainable rural groundwater management cannot rely solely on technical or engineering solutions. Instead, it requires governance approaches that recognize and integrate sociocultural heritage, collective memory, and locally grounded practical norms. Heritage-based governance is not optional but imperative for strengthening groundwater security, sustaining functionality, and enhancing community resilience in semi-arid regions. Integrating technical expertise with culturally informed community governance offers a durable pathway toward socially rooted, environmentally sustainable, and community-owned groundwater systems.

Key Takeaways

Community Boreholes as Sociocultural Anchors

Boreholes and/or groundwater projects are more than just technical infrastructure — they are deeply embedded in the sociocultural fabric of communities. They carry symbolic meanings tied to heritage, tradition, and identity, particularly in places like Ward 13, where they echo ancestral water practices.

Integration of Traditional Knowledge and Modern Practices

The study shows that local groundwater management practices are not new but rooted in longstanding traditions (e.g., snoop holes or shallow wells near sacred swamps). These practices inform how communities view, manage, and preserve groundwater sources today, emphasizing a continuity of indigenous water wisdom.

'Whispered Norms' and Silent Voices

The concept of "whispers" underscores the silent, often overlooked sociocultural values expressed through borehole use and community engagement. These 'silent stories' are powerful tools for understanding community dynamics and priorities related to water use and governance.

Water Points as Storytelling Hubs and Community Builders

Boreholes near traditional swamps serve as communal storytelling spaces. They foster collective identity, strengthen community ties, and act as centers of local knowledge exchange. This promotes shared ownership and sustainable usage practices.

Socio-Ecological and Technical Synergy

Effective groundwater management must integrate technical expertise with local sociocultural understanding. Engineers and hydrologists are urged to engage directly with communities to uncover the "whispered" values that shape local water practices.

Sociocultural Significance Inspires Sustainability and Leadership

Functional boreholes are linked to community pride, leadership engagement, and grassroots socioeconomic initiatives. The reverence for these water points motivates better maintenance and inspires new community-led water projects.

Heritage-Based Governance Models

The study introduces the concept of "heritage-based governance" — grounding groundwater management in cultural values and communal narratives. This presents an innovative approach to water policy, especially in semi-arid sub-Saharan Africa (SSA).

Reframing Boreholes from Utilitarian to Symbolic

The paper shifts the perspective from seeing boreholes as mere water supply mechanisms to recognizing them as "living entities" — sources of identity, memory, and resilience. This redefinition could influence national and international water governance frameworks.

Implications for Further Research

Cultural Mapping of Groundwater Points

Future studies could map the sociocultural histories associated with specific groundwater sites, including traditional swamps and sacred water locations, to inform more culturally aligned groundwater development strategies.

Understanding 'Whispered' Governance Norms

Ethnographic research could further unpack how local communities encode their governance norms silently — through rituals, practices, or spatial relationships — and how these can be decoded for inclusive water governance.

Evaluating the Socioeconomic Role of Sacred Swamps

Investigate how swamps traditionally revered for cultural reasons might be sustainably developed for agriculture and climate adaptation, while respecting and integrating sociocultural sensitivities.

Measuring the Link Between Functionality and Cultural Vibrancy

Quantitative and qualitative studies could assess whether and how cultural engagement enhances borehole performance and long-term community commitment to water point sustainability.

Interdisciplinary Water Governance Frameworks

Research is needed to design governance frameworks that combine hydrogeological, engineering, and sociocultural inputs — particularly for rural SSA contexts where formal institutions may be weak.

Policy Implications

Community-Driven Water Governance Policies

Governments and development partners should adopt policies that formally recognize and incorporate local cultural norms and traditional water management practices into rural water supply planning.

Capacity Building Through Cultural Literacy

Water sector professionals should be trained in local cultural literacy to engage communities more effectively and respectfully, especially in sacred or traditionally significant water zones.

Designating Boreholes as Cultural Assets

Policies could support the classification of community boreholes and swamps as socio-cultural heritage sites, with protections and support for their maintenance and storytelling functions.

Sustainable Development Around Sacred Swamps

Development strategies should carefully balance economic use of swamps (e.g., for agriculture) with cultural preservation, possibly through community-led eco-agriculture or agroecological zoning.

Inclusive Monitoring and Evaluation

Introduce participatory monitoring systems where community members narrate their experiences and perceptions as part of performance assessment of groundwater projects.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data Availability Statement

The data underpinning this study's findings are accessible upon reasonable request. Researchers interested in

accessing the data may contact the corresponding author. Data sharing will align with the IJRSI's data management policy. Sensitive or personal information has been anonymized to ensure participant privacy.

Where ethical or legal constraints prevent full data access, aggregated or summary-level data may be provided. No additional data were generated beyond those utilized in the study.

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