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Stakeholder engagement for inclusive water governance in a rural community in Brazil

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Stakeholder engagement is an integral part of water governance to provide long-term sustainable water services (e.g., water storage, distribution, treatment). Yet, evidence-based studies documenting how community engagement contributes to water governance objectives are scarce. This Community Case Study describes key findings of a three-year experience by Global WaSH executing the Água Viva Program. The study recounts the process of building community engagement among stakeholders in the rural district of Monte Verde de Minas, in the city of Juiz de Fora, Brazil. The study is presented through the viewpoint of the Bridging Organization, Global WaSH. The Program had four main phases: Discovery and Planning, Awareness, Engagement, and Intervention. This study demonstrates the importance of multi-stakeholder participation and the crucial role of the community to reach sound governance. This article also shares the challenges of connecting the interests of distinct actors. It emphasizes the role of a team of WaSH specialists with relationship-building experience in merging community demands and government concerns.

KEYWORDS

Agua Viva Program, stakeholder engagement, rural school, water supply, water quality, water committee, Global WaSH

1 Introduction

Stakeholder engagement is a key component of sustainable water services (e.g., water storage, distribution, treatment). Water services in rural communities can involve users of water, community organizations, government agencies, private service providers, researchers, organizations involved with learning or knowledge management, Non-Governmental Organizations (NGOs) supporting communities in the field, health institutions, and donors. Although the participation of this diverse group of actors and perspectives is recognized, it is difficult to bring them together to build and sustain the infrastructure and governance required to provide clean water access for all, continuously (Conallin et al., 2017; Mussehl et al., 2023).

When stakeholder engagement is conducted in an *ad-hoc* or tokenistic process, the long-term sustainability of water services is threatened (Reed, 2008). Often, stakeholder engagement is built in water projects or programs without a participatory and collaborative approach and

without all parties having a voice in decision-making. Ineffective participation in decision-making processes can lead to discredit and rejection of certain decisions made by some. This can result in conflict, ineffective management of water systems, and increased capital and operating costs (Reed, 2008; Conallin et al., 2017). Relationships with stakeholders should be a process of collective social learning, creation, and accumulation of experiences that generate evidence-based knowledge from which decisions can be made (Reed, 2008; Sterling et al., 2017; Wehn et al., 2017).

The provision of water services is effective when all interested parties are actively involved. However, a great mobilization and articulation work is needed for water service provision, which is more complex than one-off projects or programs. Thus, more planning and funding is required to institutionalize the stakeholder engagement process and ensure all actors function smoothly and align their efforts so that water services can operate efficiently. The institutionalization of social participation is important to reach genuine community-led communication in water services (WACC, 2015).

In rural areas, the success of water services depends on the relationship of three strategic fronts: (1) Education and Social Participation, (2) Technology, and (3) Services Management (Brazil, 2019). However, the implementation of PNSR in Brazil still has a long way to go, as water access falls short for at least 16 percent of the population (SNIS, 2021). Significant improvements are required in the three strategic fronts. Because Education and Social Participation disproportionately affect rural communities in Brazil, in this study we focus on building stakeholder engagement and social participation in decision-making.

Here we present a community case study that implemented a three-year social mobilization program named Água Viva in Brazil. A qualitative study of this program is shared here to document the process of stakeholder engagement. The program is described here in an effort to create a shared understanding of the importance of stakeholder engagement in the provision of water services. The Program Agua Viva was implemented in the rural district of Juiz de Fora, in Minas Gerais. The next section presents the community followed by a section contextualizing the program and the stakeholders involved. The discussion section highlights social participation as a key strategy to guarantee sustainable water services for the community. Finally, the critical discussion presents the challenges and lessons learned and identifies synergies and gaps in scientific literature.

2 Context

According to the National Sanitation Database (SNIS, 2021), there are about 36 million Brazilians without access to a safe water supply. In addition, a portion of the population who does have access to water receives intermittent service. In rural areas, drinking water has reached, at most, 9.5 million people leaving behind 23 million without adequate water services (SNIS, 2021). The situation worsens depending on the territory, education, and social class of the population, race, and gender. The adequate provision of water services to rural populations is often hindered by geographic dispersion, political and geographic isolation of localities, and difficult road access. Financial or personnel limitations in the municipalities can impact their ability to provide water services. Water access can also be affected by the absence of strategies that encourage social participation and empowerment of rural populations. Finally, water access can be particularly impacted by the lack of or insufficient public policies for rural sanitation at the municipal, state, or federal levels (Brazil, 2019).

Monte Verde de Minas (Monte Verde) is one of eight districts that are part of the municipality of Juiz de Fora, located in the sub-region of Zona da Mata Mineira. The municipality's population is 568,873 inhabitants (IBGE, 2012), of which 93.8 percent live in the urban area and 6.2 percent in the rural area (PJF, 2021). Monte Verde is considered a rural district, which is approximately 25 kilometers from the center of the municipal headquarters and has around 800 families registered at the local health center (Rubim et al., 2021).

The Program is executed by two non-profit organizations: Global WaSH (GW), an NGO involved with learning and knowledge management in the water sector, and the Albert Sabin Institute, the charity arm of a local health institution and major donor of this study. GW launched an engagement process in 2021 that occurred at two different governance scales (local and district) (Figure 1). The local scale involved the Padre Caetano Municipal School (The School) and the district scale involved the district of Monte Verde.

3 Agua Viva Program

The Agua Viva Program arises from the demand made by the principal at The School. Unhappy with the water services, the Principal sought the non-profit organization Global WaSH, which initiated the program in 2021 with a volunteer technical team made up of members of GW.

Figure 2 presents the Program timeline.

3.1 Phase 1: Discovery and planning

During 2021, the GW team carried out a WaSH needs assessment in the community (the Discovery and Planning as shown in Figure 2) (Rubim et al., 2021). Although the Discovery included all three portions of WaSH: Water, Sanitation, and Hygiene, here we reference the water needs only in the context of the program Agua Viva. At the time, the program team identified the three water resources (two springs and one stream) used by the local population for drinking, none of which had any level of treatment (Rubim et al., 2021). The School uses these resources to supply water to 200 students and 36 staff. The Discovery study was published at the Brazilian Conference "National Meeting for Human Rights to Water and Sanitation" (Rubim et al., 2021), and thus it is not repeated here. The authors reported the views of residents and members of the school staff who suffer from health problems, which they attribute to poor water quality.

Water services in Monte Verde, and particularly in The School, represent a very sensitive point to the community, as clean water supply has a ripple effect in education. About one third of schools worldwide do not have basic infrastructure for water supply. This means that 584 million children are not receiving basic water service (UN News, 2023). Data from 2021 in Brazil shows that 43% of rural schools do not have water services - no facility or unimproved (WHO/UNICEF, 2022). When a school lacks access to safe water services, higher rates of infectious, gastrointestinal, neuro-cognitive and

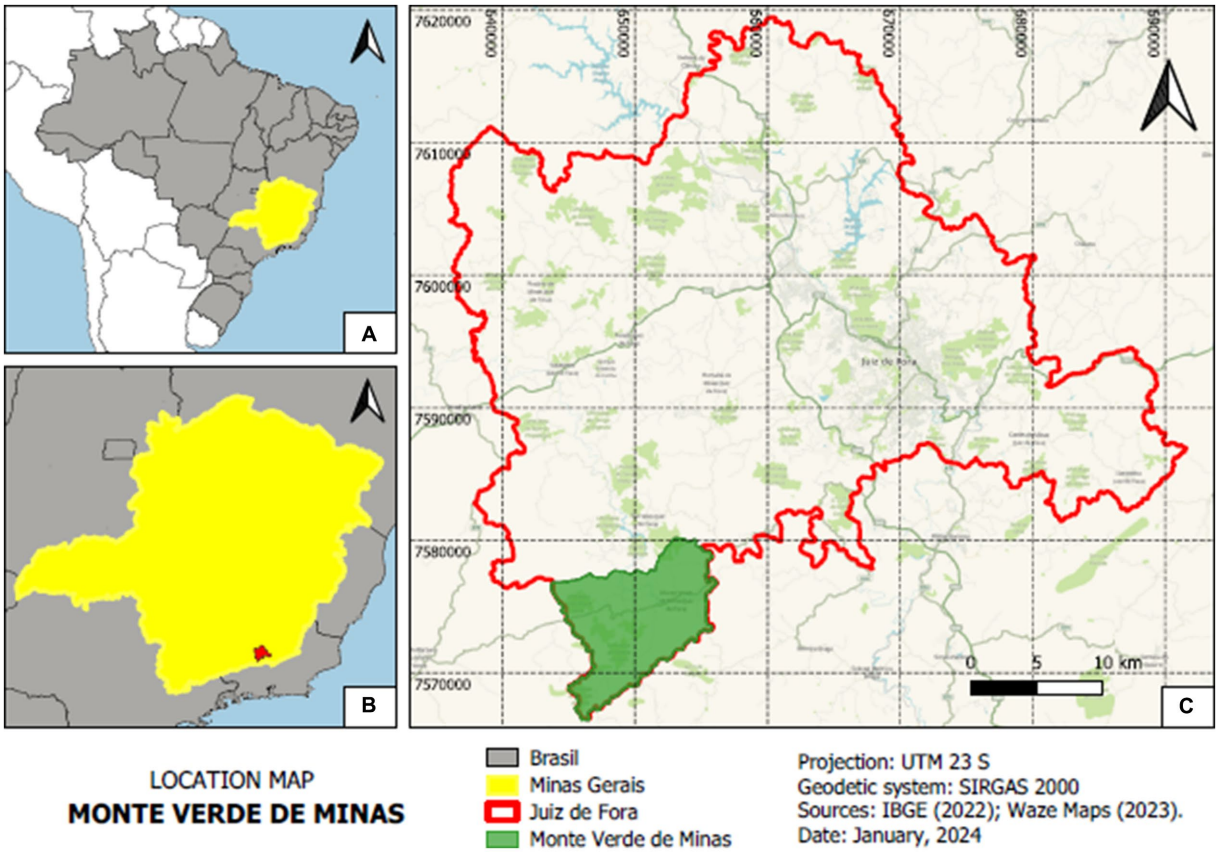

FIGURE 1
Água Viva Program location. **(A)** Brazil; **(B)** Minas Gerais State, **(C)** Monte Verde de Minas.

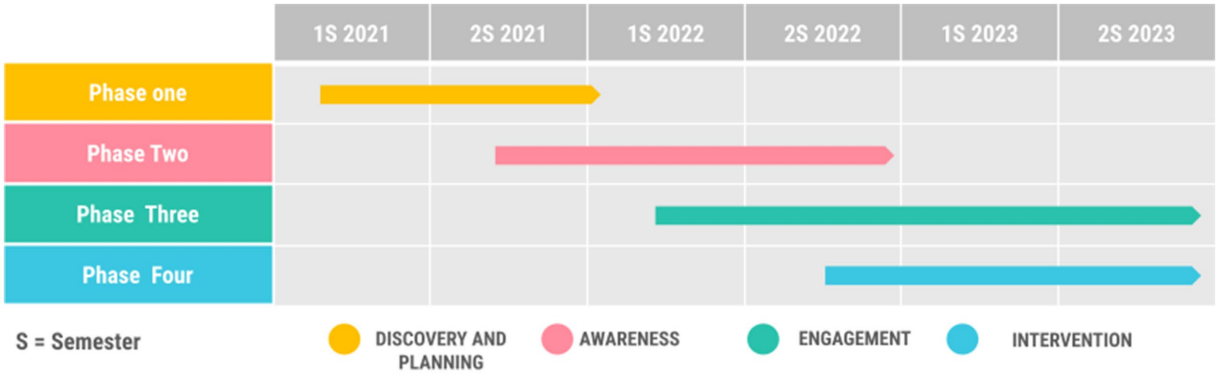

FIGURE 2
Água Viva Program phases and timeline.

psychological illnesses are expected (Jasper et al., 2012). These conditions can affect learning at schools.

Considering this context in the Monte Verde community and The School, GW designed a program to benefit them. The School was chosen by GW as the Primary Beneficiary because we assumed that this setting represented an increased potential for transmission of water-borne diseases. This Program involved community empowerment as well as primary water treatment. Community empowerment is critical to achieve sustainable water services and can be attained through education and mobilization in school settings. The education and mobilization involved the creation of (1) a health education program in The School and (2) a Water Governance Committee (WGC) in the community to integrate public administration officials and other stakeholders. The water treatment portion included the development and installation of a slow filter as a sanitary barrier in water treatment.

During this phase, the stakeholders were mapped based on the technical team's experience using the Project Management for

Development Professionals (PM4NGOs, 2020) guidelines. The selection was done by identifying potential stakeholders and categorizing them into a stakeholders matrix by their level of influence and interest in the Agua Viva Program. Throughout the program execution, stakeholders changed their influence and interest, and new stakeholders were identified. Thus, the matrix was updated periodically, and the last version is indicated in Figure 3.

The selection of the Program stakeholders was done to guarantee the three fundamental principles of stakeholder engagement: inclusiveness, transparency, and commitment (Conallin et al., 2017). To do this, Global WaSH went through an iterative and collaborative process with each stakeholder to understand their role in the Program, as shown in Figure 4. The stakeholders participating in this Program were Global WaSH (GW), Albert Sabin Institute (IAS), the School, the association of residents of the District of Monte Verde de Minas (APM), the water and sanitation municipal company (Companhia Municipal de Água e Esgoto or CESAMA), the Federal University of Juiz de Fora (UFJF), the company Auren Energia (Auren), various departments of the municipality, and National Health Foundation (FUNASA).

The participation of each stakeholder grew organically as needed during the Program development. The community requested the participation of any stakeholder and GW saw the need to involve a stakeholder. Both approaches were utilized throughout the Program.

GW, APM, and the School were present in every phase. GW acted as the Bridging Organization, whereas AMP and The School were the main Beneficiaries. IAS started participating in Phase 2 when a Memorandum of Understanding was signed between IAS and GW. IAS remained as a main donor throughout the Program. CESAMA was involved in Phase 1 given the need to understand the government's role at the time. CESAMA was partially involved in Phase 2 in a School event that resulted in their donation of water books to the students. In Phase 3, CESAMA was highly involved as water supply became the main topic of discussion in the Water Governance Committee (WGC -as discussed in section 3.3). CESAMA declined to participate in Phase 4, although they were called to action. They justified their lack of participation in this phase with conflict of interest. Auren operates a hydroelectric plant in Monte Verde. The community solicited Auren's participation by requesting that GW reach out to this company. GW approached Auren to understand if water could qualify under their social responsibility program. The partnership with UFJF started in 2023 due to the interest of some professors in the Program. Various departments of the Municipality (health, environment, education, planning) were mobilized for Phase 3 to participate in the WGC due to the demands raised by the community. In Phase 4, the Department of Education was involved to oversee the use of funds donated by them. FUNASA was involved during Phase 4 to support the water treatment technology selection as described in section 3.4.

3.2 Phase 2: Awareness

In Brazil, Law N°. 9.795 published on April 27, 1999, provides guidance on environmental education, establishes the National Environmental Education Policy and other measures. Article 1° states that "Environmental education is understood as the processes through which the individual and the community build social values,

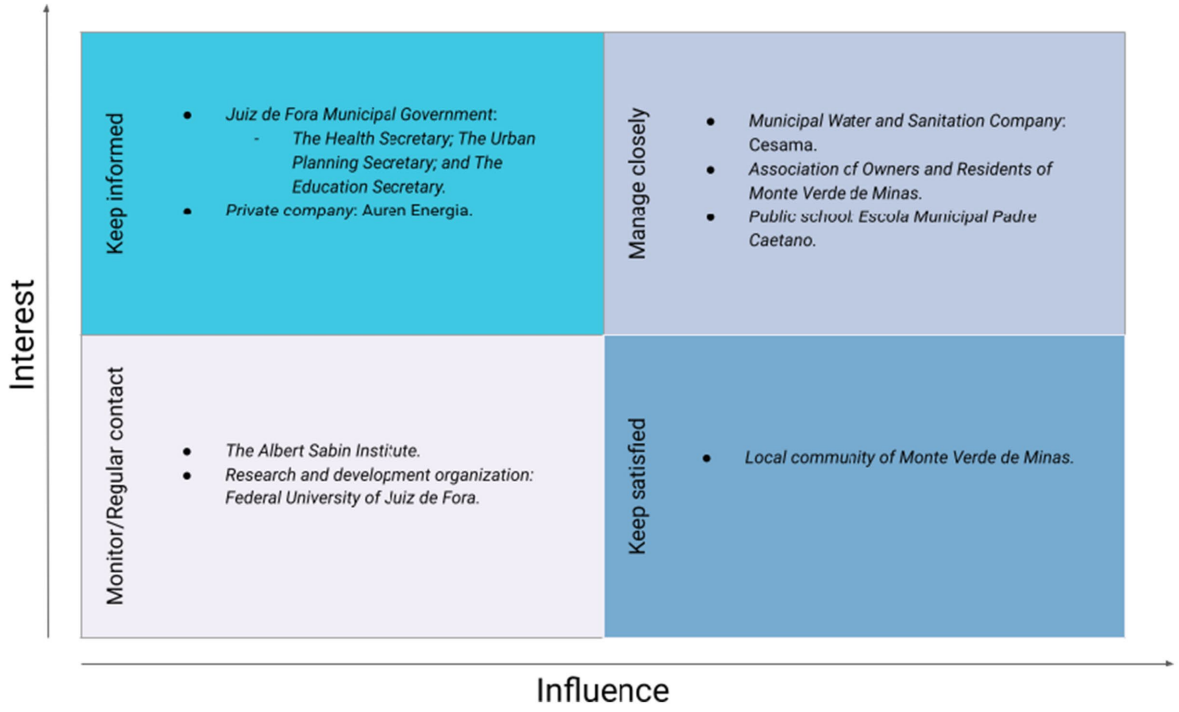

FIGURE 3
Stakeholder matrix. Each stakeholder was identified and categorized by the Global WaSH team according to their level of influence and interest. This was a result of a participatory outcome where the stakeholders discussed their desired level of participation. The Bridging Organization (GW) had the role to facilitate communication between all the stakeholders.

knowledge, skills, attitudes and competencies aimed at conserving the environment, an asset for the common use of the people, essential to a healthy life and its sustainability." (Brazil, 1999). Environmental education is an important and effective instrument for government and nongovernment actors to work in conjunction. However, greater dialog between the actors involved in each of the stages is essential so that the policies are effective in different educational spaces. It is also necessary for civil society and educators to actively participate in the construction of public educational policies (Nery-Silva, 2016).

Based on the Diagnosis conducted in 2021, the Global WaSH team created action plans to mobilize local stakeholders in Monte Verde through an Awareness phase. This phase aimed to help stakeholders articulate the water issues occurring in their community. The School, as the Primary Beneficiary, was selected as the space to conduct the Awareness phase. This phase consisted of two parallel fronts: teacher training and student workshops.

This phase aimed to promote local training, communication, and mobilization to engage the stakeholders of Phase 2 (as shown in Figure 4). It aimed to develop formal and informal means of communication, promote spaces to expand knowledge and practical solutions in the water sector, strengthen communication mechanisms to increase transparency, and implement monitoring mechanisms to communicate the actions taken to the community at large. In this phase, The Global WaSH team used the human rights-based approach (HRBA) to water and sanitation. The human right to safe drinking water was first recognized by the UN General Assembly and the Human Rights Council as part of binding international law in 2010 (UN, 2010). The advocacy role of non-profit organizations, such as Global WaSH, is crucial for communities to recognize their right to water. These organizations empower communities with knowledge about their rights so that they themselves can lead processes to secure sustainable water services (Vietz, 2013).

In the teacher training, the facilitators, who were part of the GW's technical team, presented interactive and playful examples about WaSH that teachers could use in the classroom. A total of 36 teachers received this training during 7 sessions. The sessions were conducted in the pedagogical meetings already planned by The School allowing facilitators to present and discuss the theme in one to one hour and a half. The sessions were organized in presentation (~20 min), debate (~40 min) and feedback (~10 min). Feedback questionnaires filled by teachers indicated that most of them believed in the importance of their roles as mobilizers in the water sector. The feedback questionnaires indicated that the teachers understood their role to educate the community about water and sanitation. The questionnaires also highlighted the importance of advocacy within the municipality as the government constitutes the primary provider of water service.

The student workshops aimed to describe the water-health nexus, raise awareness of the water and sanitation needs in The School, and identify the role of students within this context. The workshops occurred in The School on Saturdays and the dates were pre-defined by The School. Generally, the students were divided by fundamental 1 (ages from 5 to 10) and fundamental 2 (ages from 11 to 15). GW developed a series of recreational activities related to WaSH with them. The objective of these activities was to awaken reflections in students and provoke questions about how water and sanitation in Monte Verde impacted their lives.

Attendance at the student workshops had a wide range due to transportation issues and lack of engagement. Between 15 and 30 students attended the workshops. The number of students attending was subject to their attendance to School on Saturdays, which was the main challenge. School Saturdays occur to compensate for a holiday in the academic calendar. As this is a rural school, the attendance is typically low because the School bus does not operate on saturdays. To improve attendance, the teachers awarded points in science classes to those who attended the Água Viva program workshop. The second challenge was engagement of the students. When it seemed difficult to engage students, the facilitators asked feedback about the preferred type of activity and adapted it to include a WaSH theme. For example,

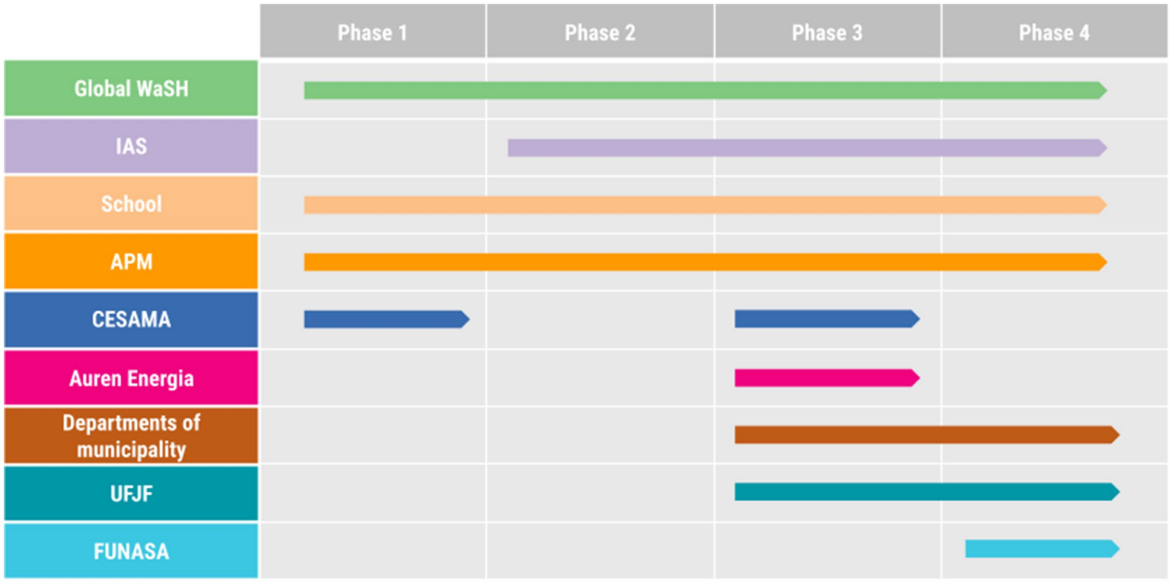

FIGURE 4
Stakeholders by Program phase.

the students wanted to record videos in social media dancing as part of the activity and did not want to follow the activities the GW team proposed. Thus, the facilitators requested that the students change the song lyrics to include water-related topics. By far, this activity was the most engaging.

Education activities implemented by Global WaSH within the school attained acceptance and participation, gaining the attention of other stakeholders. This was the case of FUNASA, which joined the Program shortly before building the water infrastructure. FUNASA contributed with a technical visit and guidance to identify the water technology for The School. UFJF was also introduced to the Program and conducted water quality analysis with logistical and material support from the Albert Sabin Institute. In addition, construction materials were donated by the local private company Petra Agregados.

APM played an important role in mobilizing various community members. The participatory process led to all stakeholders converging in the WGC (3.3. Phase 3 - Engagement), which is made up of professionals from the school, the health network, the municipality, and residents of the district. The importance of environmental education activities for social mobilization is well stated in the literature (Jacobi et al., 2009; Piccoli et al., 2016; Zikargae et al., 2022). This approach on Phase 2 (Awareness) was important to gain trust and engage more stakeholders to Phases 3 (Engagement) and 4 (Intervention) of the Program.

Government participation was also crucial to improve the sustainability of the Program. In 2022, The School requested GW to act as the Technical Advisor in support of a funding request through the Programa Dinheiro Direto na Escola (PDDE). The PDDE is a tool to support school management developed by the Brazilian Ministry of Education through Resolution CD/FNDE/MEC N°. 15. The PDDE allocates funds to schools in rural areas, traditional and indigenous communities that lack access to safe drinking water. The Agua Viva Program included a water treatment portion, which consisted of a sanitary barrier formed by a pre-filter, a slow sand filter, and a chlorination system that were built with PDDE funds (3.4. Phase 4 - Intervention). The approval of the PDDE was possible thanks to the articulation between the school management and the Department of Education of the Juiz de Fora Municipality in 2018.

3.3 Phase 3: Engagement

In parallel with the Awareness phase, the Program included an Engagement phase aiming at creating a collaborative space among the stakeholders (APM, CESAMA and other departments of the municipality). In 2021, an advocacy process started by GW began with the municipal water and sanitation branch of the government (CESAMA). At this time, CESAMA acknowledged its legal obligation within its institutional structure to act as the provider of water services. At the time, CESAMA had started to prioritize the rural districts in the area for water services.

In February 2022, a meeting was held between the community of Monte Verde and the local Mayor. The first demand raised by the community was 'a better solution for water supply'. The Mayor stated that the water problem would be resolved in 2023 and that a bidding process would be opened in February 2023 to subcontract the drilling of a community water well. In April 2023, the community was informed that the bidding process had failed as there was only one bidder, who did not meet the selection criteria in terms of cost. In May the same year, CESAMA began reformulating the bidding process and reviewing the budget to drill the well to adapt the price to the new market conditions.

While waiting for updates from the public administration and CESAMA, in August of 2022, a meeting was held between GW and a representative of the APM to discuss the community's participation in water governance to avoid a highly technocratic approach. The community voiced their need to communicate their water demands directly to the municipality and the private companies present in the area, particularly Auren.

Subsequent meetings were held with various stakeholders to invite them to participate in the WGC. The government entities included CESAMA, the Environmental Secretariat (SESMAUR), the Urban and Regional Planning Secretariat (SEPUR), the Health (SÁUDE) and Education Secretariats (SEDUC). Other stakeholders, such as UFJF and Auren, were invited to participate in the WGC. The WGC meetings began in September 2022 with a joint commitment to meet monthly. The municipality committed to send a representative, when required and approached by the WGC for specific issues. The WGC today has representatives from all stakeholders, and it was evaluated in an academic study conducted by UFJF (Santos, 2023).

The ability of a committee to create trust and commitment between all the different stakeholders is key to water governance and the sustainability of water services. When social capital is high (all parties participate), there is confidence that groups and individuals will demonstrate greater reciprocity, where they are more willing to invest in collective actions. Conversely, when social capital is low (only a few participate) collaboration is scarce or inexistent, which typically leads to higher costs in decision making (Tan et al., 2008). Accordingly, ensuring engagement of all stakeholders in the WGC would increase the trust required to build functional relationships for effective decision making to occur.

Despite all stakeholders being informed and engaged in various stages, there was difficulty in engaging all of them in the WGC, in particular government entities. The government (CESAMA and the Juiz de Fora Municipality) had three main limitations to participate in the WGC consistently: (1) the long distance of the meeting locations to their headquarters, (2) the times selected for the meetings were outside of their working hours, and (3) the labor and budget constraints to allocate resources among all the districts served. A study about water and sanitation councils in Brazil identified similar limitations in stakeholder engagement (Aguiar, 2011). Accordingly, the government's *ad-hoc* participation in the WGC was secured by adapting the WGC meetings to an online environment where members could join virtually and occasionally when needed. On one hand, these limitans turned the group into a tokenism tool for the public administration to exchange information. On the other hand, the community was gaining power to claim their right to water. The study of UFJF describes how the participants of the WCG see their involvement as an opportunity to improve the quality of life of the entire community (Santos, 2023).

Although no decision was made by CESAMA and the municipality through the Committee until now, a cooperative environment was created through the work of the Bridging Organization, GW. In this context, GW had the role of building a common, neutral ground for all entities to build trust. The effective role of Bridging Organizations in stakeholder engagement is well

documented in the literature (Carr and Wilkinson, 2005; Sternlieb et al., 2013; Mott Lacroix et al., 2016).

The creation of the Committee is a key component to sound water governance by promoting a common understanding of the water issues in a community and ensuring the process is driven by the people who are the most impacted (Mott Lacroix et al., 2016). To date, the WGC has prioritized two issues raised by the community: water supply for all the households and the protection of the spring used as a water source by the population of Monte Verde and The School. In that context, the WGC opened two fronts of action: (1) a spring protection project and (2) reinforcement of advocacy with CESAMA.

The WGC conducted several visits to the spring along with various stakeholders, including community members, an engineer experienced in spring protection, FUNASA, and SESMAUR. FUNASA joined the visits to evaluate The School's water needs. SESMAUR addressed questions regarding the legal process in the municipality. CESAMA conducted the water quality analysis of the spring and the district water reservoir. Stakeholder engagement became critical when searching for funding for the capital expenses required to protect the spring. In search of funding, the Agua Viva program team presented the project to Auren. This engagement spiked their interest in water issues in the community and shortly after, Auren joined the WGC. Furthermore, Auren expressed their commitment to financially support the project upon receiving approval by the municipality.

Another sensitive issue requiring dialog between stakeholders was the management and use of land where the spring is located. The spring is inside private land owned by several landowners. Thus, the project requires consent from all landowners to protect the spring. The landowners are currently in negotiation to install a protective fence that would allow the cattle to continue using a portion of the land freely while also protecting the spring. Resistance to environmental protection - e.g. spring protection - by rural property owners is reported in other studies in Brazil (Rodrigues et al., 2016; Salomão et al., 2022).

The second front involved a continuation of advocacy with CESAMA that had started in 2021, as aforementioned. Periodically, CESAMA updates the WGC on the company's actions in the district in order to install the water well. In 2022, CESAMA received bids from subcontractors for the geological study and the well drilling. The subcontractor began drilling the well in July 2023. Toward the end of 2023, CESAMA began installing the underground piping distribution system in the district for each household to receive water.

Although the spring project is still pending completion, the advocacy efforts with CESAMA proved effective as CESAMA took action to deliver water to Monte Verde. Furthermore, in the last WCG meeting of 2023, CESAMA indicated that the committee had enabled them to prioritize rural areas in their corporate planning. The WGC enabled the community to build trust and create ownership needed for functional relationships between different stakeholder groups, which follows the findings in other studies (Santos, 2023).

Transparency was sought to ensure all stakeholders have the information required to understand what they can and cannot influence. A key element of engagement was to listen to the community in all stages of the spring protection. The WCG continues to be an instrumental tool for the community to influence water governance. The participatory approach of creating the WGC was perceived as complex for organizers and participants. However, it is clear that the WGC secured the commitment and participation of various stakeholders.

3.4 Phase 4: Intervention

The Intervention phase involved the installation of a water treatment system. In 2018, a report was issued by The School administration to the Department of Education with the status of water services in The School. The report indicated that low water quality was available to students, staff and teachers. Federal resources were then requested through the PDDE. Funding was released in 2023 and, as a result, The School engaged GW as a Technical Advisor.

In order to design a water treatment system that was culturally appropriate for The School, the GW team consulted technicians from FUNASA. Accordingly, the technologies selected were a pre-filter, followed by a slow sand filter (SSF) and a disinfection stage using chlorination. The SSF was chosen because it is a technology that presents low operational complexity, it is simple, safe and involves low capital and operating costs (Freitas et al., 2022). This system is typically used for the treatment of raw water with low turbidity and color and can be used at both household and community scales, particularly in small communities.

In the SSF process, water clarification occurs through the combination of physicochemical and biological processes along the filter medium (Freitas et al., 2021). This combination promotes, in addition to impurity retention, the removal of organic/inorganic compounds and various pathogens responsible for diarrhea (Mahlangu et al., 2012). The strategic objective of a primary sanitation barrier is to improve health. After the installation of SSFs at home, cases of diarrheal diseases can reduce between 47 and 74 percent, including among children under 5 years of age (Stauber et al., 2009; Tiwari et al., 2009; Liang et al., 2010; Aiken et al., 2011). Operational, geographic, and cultural factors, among others, influenced the efficiency of the systems throughout the field studies evaluated. All of these studies concluded that the SSF is an effective method and robust option for treating domestic water in rural communities (Fiore et al., 2010; Clark et al., 2012; Andreoli and Sabogal-Paz, 2020; Freitas et al., 2022; Paasche et al., 2022; Maiyo et al., 2023).

In order to treat waters of higher turbidity with an SSF, a pre-filter preceding the SSF is required. There are several pretreatment methods applicable to the SSF. The adoption of a certain type of pre-treatment depends on several factors. These include, for example, the quality of the raw water, the topography at the collection site, the distance from the collection site to the treatment plant, the volumetric water flow, the level of technical instruction of operators and those responsible for maintenance, the availability of granular material in the region, and the ease of cleaning, among others (Di Bernardo et al., 1999). Other Important factors considered in the selection of this technology was the use of prefabricated and easily acquired materials, such as polyethylene reservoirs, and the use of geotextiles in the filtering medium to provide a low cost of system assembly, in addition to simplified maintenance operation.

The water treatment system was designed by the GW volunteering team specifically for The School. It was scaled for the demand of 200 students and 36 employees. The installation of the system was completed by a team of bricklayers hired by The School. The Agua Viva technical team monitored the construction and start-up phases.

In addition, the technical team conducted water quality analysis to validate the assumptions about the site physicochemical conditions.

The School actively participated in ensuring that a treatment solution was found in the short and medium term. A long-term solution involving a centralized water treatment system is currently being considered by Juiz de Fora Municipality and CESAMA. As requested by The School, GW provided volunteers to plan and execute the Program Agua Viva. However,respondents across all stakeholder groups recognized that a more sustainable, long-term solution is required from the local government authorities. Although Agua Viva did not receive direct support from the municipal water and sanitation sector, the technical support from FUNASA and resources from the federal government proved to be invaluable.

We emphasize that a permanent solution to supply water for The School and the community at large is the responsibility of the public authorities, which have been carrying out specific interventions in the area to date.

4 Discussion

In the past 3 years, the Água Viva Program has sought to mobilize stakeholders to improve the water supply in The School and support the community to claim their right to water. GW built a team of WaSH and project management experts volunteers to execute the process. Besides their WaSH expertise, the team built relationships, managed conflicts, and merged expectations of a range of stakeholders. Although they had limited availability due to the voluntary nature of the organization, the Program outcomes were satisfactory for both the community and The School.

The points for improvement occur mainly within the scope of the WGC, where difficulties emerged in keeping members engaged. The primary difficulty was finding times to meet where everyone was available. The WGC prioritized the participation of community members over public authorities. Unfortunately, the WGC could not fully engage the public authorities as much as the WGC members hoped. The committee was restricted to the *ad-hoc* participation from the government and focused on actions that the community itself could take in the water sector. A similar approach was done in Nicaragua where Potable Water and Sanitation Committees for rural areas were created involving different level stakeholders, including coalitions, public administration and multilateral agencies. Different from the WCG of Monte Verde, the Committees were scaled to different parts of the country. But similarly, the role of a bridging organization (an NGO) was a facilitator in the advocacy process (Romano, 2017). The WGC is expected to involve more government representatives in the future and to be leveled up to an official Committee of the municipality in order to monitor and support the systems management when installed, as happens in other countries of Global South (Naiga et al., 2015; Calzada et al., 2017; Méndez, 2020).

The greatest challenge in the installation of the SSF was creating a process for operating and maintaining the filter. The SSF system was designed as a pilot with innovations in several areas. Thus, it is difficult to compare its operation and maintenance (O&M) with other systems. However, the Program highlighted the monitoring of the system with a defined cleaning frequency of each 4 months and got support from the School staff. The WGC can also support the O&M of the system while the public administration is not directly supplying water. In Brazil, the local government has the responsibility to supply water to rural areas. However, the involvement of the community in O&M is often required depending on the remotenessess of the area, as it is seen in community associations throughout Latin America (Ballestero et al., 2015; Calzada et al., 2017; Méndez, 2020).

The School and the community have shown interest in continuing the Program activities for a fourth year. This interest converges with the intentions of the Bridging Organization (GW) and the sponsoring organization (IAS) in continuing to improve the Program. The School intends to continue monitoring the system in partnership with UFJF and generate research to subsidize future projects. The water education project within the Água Viva Program has achieved important outcomes such as the acceptability of low doses of chlorine, the understanding of the water cycle and water quality. These achievements show the importance of a sensibilization related to water use, quality and impacts in life, translating science and technical knowledge to the broad communities, as it was also highlighted by other studies in the United States and Morocco (Cockerill, 2010; Amahmid et al., 2019).

Considering the interest of stakeholders in continuing the Program, the plan for the future is to reinforce the educational phase. That is, conducting the workshops with teachers and students again but with a different approach. For 2024, science and geography teachers will have a main role, executing activities in their classrooms, for the training to be less *ad-hoc* and more institutionalized in The School. Also, the SSF monitoring will continue for another year to understand the system performance and the operations and maintenance strategy. The Water Governance Committee will be reformulated with APM and community members taking a leadership role. This would allow the WGC to have a more participatory approach led by the community with involvement of the public administration. Furthermore, UFJF has the intention to institutionalize the Água Viva Program as part of the university's extension program and ensure its continuity.

The Água Viva Program can be conducted in different contexts (rural or urban, facing water issues) but adapted to the local environment. Programs and projects are most effective when they are adapted to the local realities they want to change. They are most effective when the opinion of the main beneficiaries is considered, and when these programs and projects are institutionalized by the local government or other public institutions to ensure the sustainability of water services.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

FM: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Validation, Writing – original draft, Writing – review & editing. PF: Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. RM: Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review &

editing. LO: Funding acquisition, Project administration, Resources, Validation, Writing – original draft, Writing – review & editing. IM: Conceptualization, Formal analysis, Supervision, Validation, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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