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Functionality of Rural Community Water Supply Systems and Collective Action: a Case of Guras Rural Municipality, Karnali Province

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Abstract

Ensuring the long-term functionality of community-managed rural water supply systems has been a persistent development challenge. It is well established that the technicalities of keeping the systems going are impacted by complex political, social, financial, and institutional challenges. While the shift to federal, three-tiered governance allocates concurrent responsibility for drinking water management to the local government with federal and provincial governments, water and sanitation user groups continue to shoulder the management of local supply systems voluntarily. All three levels have jurisdiction over water-related services resulting in confusion of roles. This study focuses on the local level, where community management of water and sanitation decentralisation is the key approach in this complex tangle of diverse institutions with different actors managing and governing water. User Groups and their Committees in the Guras Rural Municipality of Dailekh district, Karnali province, in West Nepal, provided the case study, which was analysed using Ostrom's well-recognised Eight Principles for Sustainable Governance of Common-Pool Resources. The community-based model, established formally through the Water Resource Act 1992 (2049 BS), is critically analysed in light of the changing socio-economic context through the intervening years. The results highlight the need for stronger collaboration between the rural municipality and users to achieve good water supplies and the risks of losing access and voice in water management for women and marginalised people when inactive user groups are replaced by private or group interests taking control of the water access.

Keywords: water; Ostrom's design principles; community-managed water systems; functionality of water systems; commons; water user groups

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1. Introduction

Functionality of community-managed rural water supply and sanitation (WASH) systems has been a persistent problem, challenging for governments and the international development community and a constant struggle for local water users (Carter & Ross, 2015; Carter & Howsam, 1999). The system is functional if an adequate amount of water for household needs is discharged from a water supply endpoint such as taps. According to the World Health Organization (WHO), the international standard water requirement per capita per day is between 50 and 100 litres per person per day (UNDESA, 2014). In Nepal, 100 litres per person per day is categorised as adequate, and 45 litres per person per day is the minimum requirement (Department of Water Supply and Sewerage Management, 2019).

The literature has shown that overlapping technical, political, social and institutional problems are the major causes of the premature breakdown of rural domestic water infrastructure, leading to insufficient and intermittent supply(Oates & Evance , 2018; Wiles & Mallonee, 2017). Similarly, gender inequality and social exclusion also heavily influence access to water (Bonsor, MacDonald, Casey, Carter, & Wilson, 2018; Wiles & Mallonee, 2017). The WASH Sector Development Plan (2015-2030) highlights the need for meaningful engagement of women and socially excluded groups in decision-making in the WASH sector (Ministry of Water Supply and Sanitation, 2016).

According to the Department of Water Supply and Sewerage, only 28.13 per cent of water supply infrastructure is fully functional. Among the water infrastructure, 38.07 per cent need minor repair, around 10 per cent require moderate maintenance, 15.85 per cent require major repair, and the remaining 7.93 per cent need to be demolished and reconstructed (Department of Water Supply and Sewerage, 2019). The functionality problems in Nepal arise mainly due to the user committee's lack of institutional, technical and financial capacity, disregard for water safety principles, inadequate funding for maintenance in favour of new projects, and negligence (Ministry of Water Supply and Sanitation, 2016).

Article 35(4) of the Constitution of Nepal has provisioned access to clean drinking water and sanitation as a fundamental right. However, as many as 666,718 (12.12%) households are deprived of basic drinking water, lacking access to a minimum of two litres per person per day of water within a 30-minute walk (Department of Water Supply and Sewerage Management, 2019). The problem persists despite the set up of a community-based model of water management decades ago by the Water Resource Act, 1992.

A Water and Sanitation User Group (WSUG) includes all the users of the supply system, and its democratically elected eleven-member Water and Sanitation User Committee (WSUC) functions as the group's executive body. It is mandatory to reserve at least 33% of members of the WSUC women and one member from a socially disadvantaged group such as *Dalits* or *Janjatis*. (Government of Nepal, 2000).

Although the Rural Water Supply and Sanitation National Policy (2004) gave the mandate to the WSUCs for the management of these systems, the ownership of the infrastructure and assets, including the water source, is vested in the State (Ministry of Physical Planning and Works, 2004). A community group aspiring to use local water resources for collective benefits has to register in the District Water Resource Management Committee and form a WSUG led by a WSUC along with the confirmation to comply with the quotas. The WSUG should also have the skills and resources to maintain the water system alongside a clear tariff system and water safety plan.

While all water user groups are required to register with the Government, in reality, out of an estimated 42,000 WSUGs across Nepal, barely 16,400 have been registered. (Department of Water Supply and Sewerage, 2019). Many registered groups are not functional, with only 39% (or less) having available technicians, only 34.5% with adequate tools and spare parts, and only 5.7% managing maintenance funds (Department of Water Supply and Sewerage Management, 2019).

The prescribed governmental requirements appear to have been overlooked for several reasons, including those described in the paper. Rural Nepal has a long history of poverty-driven out-migration for employment, and migration is a predominantly male phenomenon requiring women left behind to take on many previously traditional male roles, including water management (Udas, 2006; Asian Development Bank, 2010). The out-migration of male plumbers and technicians from villages in Nepal has been one of the well-documented causes of the frequent breakdown and delayed repairs of community-managed water supply systems, as the women do not generally practise these skills.

Although the work burden on women increases after men's migration for work, they are expected to actively participate in community-level initiatives such as the Water and Sanitation User Committees (WSUC). A study in 1998 noted that women's participation in water user groups in South Asia tends to be compromised by women's time constraints, high opportunity costs and other social risks. (Meinzen-Dick & Zwarteveen, 1998). In rural Nepal, 84.4 per cent of the water collection burden or household use falls upon women (Central Bureau of Statistics, 2019) . Thus, the

ability of women to influence WASH management and governance decision-making is limited despite participation (Pandey, 2019; Maharjan, Bauer, & Knerr, 2012). Other studies corroborate that women's decision-making, especially concerning water user committees, is passive and secondary (Lama Ang Sanu, Kharel, & Ghale, 2017; Rajkarnikar, 2017). The research of the Asian Development Bank also shows a similar finding that the gendered burdens of domestic labour limit women's ability to attend WSUC meetings (Asian Development Bank, 2015).

In this paper, we examine the WSUGs and the WSUCs that manage the local water supply systems within the new context of Federalization. Using a case study approach in Ward number eight of Guras Rural Municipality, Dailekh district, the study follows a mixed-method research design. Elinor Ostrom's well-recognised Design Principles for the good institutional functioning of water user groups in managing community water supply systems are used to frame data analysis.

2. Objective, Research Area and Methodology

2.1 2.1 Objective of the study

The objective of this study was to understand the dynamics of social and gender issues in the functionality of water supply systems and identify their implications on policy.

2.2 2.2. Research Site

The institution of the Federalism system has divided the country into seven provinces with 77 districts and 753 local levels. The researchers visiting two rural municipalities, Guras and Mahabu of Dailekh district, identified Ward eight (Guras) as the most suitable for the research due to the existence of multiple water and sanitation user groups, both functional and non-functional water supply systems, diverse ethnicity, and male out-migration as a common phenomenon. In addition, the local level had granted permission to conduct research, and accessible areas were the other reason for the choice of the research site.

Dharam Pokhara, a small town and the commercial node of Guras Ward eight, consists of 427 households and a total population of 2,400 (Guras Rural Municipality, 2019). The population is diverse - 62% are Brahman and Chettri, while 25% are from socially disadvantaged communities, including Bishokarma, Kami, Nepali, and Sunar, and the remaining 13% are indigenous groups, including Raute. Chettri is the largest ethnic group in the country, comprising 16.6 % of the population, while 12.2% are Brahman. The representation of Brahman and Chhetri in Ward eight is

disproportionally higher than the national average (Ministry of Foreign Affairs, 2021). The dominance of the privileged castes usually results in their prevalence in public offices and local organisations.

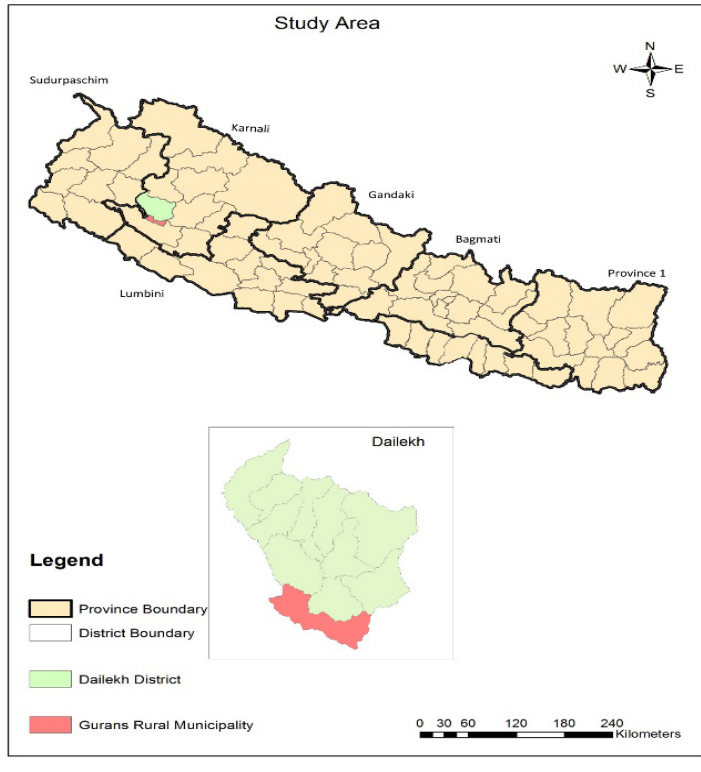

Figure 1: Dailekh District (*Source: IWMI, 2021)*

Although 406 households rely on agriculture as their main source of income, only four households produce enough food to sustain their families throughout the year. Meanwhile, 339 households produce enough for six months, and 84 households produce food that lasts only for three months (Gurans Rural Municipality, 2019). Such food deficit conditions compel at least one member, usually male, to migrate to the capital, India or further abroad for employment.

The water resources, viz. 14 rivulets and streams and 653 natural springs are available, but not all are suitable for commercial or domestic use (Guras Rural Municipality, 2019). Commercial water use includes plant production, restaurants, offices, and stores, while domestic demand refers to drinking, cooking, washing, laundering and other household functions (Britannica, n.d.) The Ward chairperson said that the sources are reliable and abundantly charged during and after the monsoon months,

but the area faces acute water scarcity in the four "dry" months spanning from March to June

3. Methodology

The findings presented are based on qualitative data collected during a three-year research project - A *gender perspective to understand and enhance the functionality of water supply systems: lessons from Nepal* along with a literature review. The project was funded by the Department of Foreign Affairs and Trade (DFAT) and managed by Water for Women, Australia. The project was implemented by the International Water Management Institute (IWMI). This article is based on the review of related literature, data collected during two field visits, and telephone interviews with five chairpersons of WSUCs, the Ward chairperson and local contact for supplementary information.

Field data was collected through the use of qualitative methods including one-on-one interviews, focus group discussions, observation and study of local documents, and social mapping exercises. The first set of data was collected in June 2019 through a focused group discussion with eleven women; two mixed-gender focused group discussions with eight participants each, a round table discussion with the Ward office representatives, including the chairperson, discussions with the Deputy Chairperson and Social Development Officer of the Rural Municipality office, and a discussion session with community members at a local tea shop.

During the second longer visit in November 2019, an in-depth interview with the Deputy Chairperson of the Rural Municipality yielded information on the plans and programs of the rural municipality. Two all-women-focused group meetings were held in the villages of Tallo Garcha, and Gaire Gaun discussed women's participation in WSUGs, the functionality of the infrastructure, and their access to adequate quantiles of water. During the all-women mapping exercises, some men continued to spectate despite being asked to leave. Two of them could not resist directing the women and passing comments while the women were drawing the maps, saying that the women got them all wrong, and one woman even sought advice from a man during the process.

An ad-hoc focus group discussion with parents of high school students was held in the school where they had assembled for a function. Discussion sessions with WSUCs and community members were organised at the local tea shop, where 16 members associated with WSUCs dialogued with the researchers. A similar exercise was held for an all-male group in the village of Tallo Galcha. A lone woman watched curiously from a distance and soon left without interfering.

The field data was later supplemented with phone interviews in August and September 2020. Based on a single Ward of Guras rural, the study highlights key trends and issues observed in the literature before and needs to be more widely tested across Nepal.

4. Conceptual Framework

This study utilises the well-recognised and important design principles of Elinor Ostrom to assess the WSUGs as community institutions exploring their institutional and operational dimensions: how they are organised, who can join, and how effective they are in keeping the water supplies flowing while looking at the externalities in each context that influence them (Ostrom, 1990). It enabled the researchers to identify gaps that need to be addressed when creating and supporting sustainable group-run water supplies, including broader external factors such as gender inequalities and the social context in the study site.

Ostrom postulates that communities have been sustainably managing their common resources over a very long time through institutions they built themselves (Ostrom, 1990). While the situation has changed and the common resources are owned and controlled by the state, Nepal's model requires users to manage local water delivery and access sustainably. Ostrom posited that common pool resources, which cover local level water supply and use in Nepal, are best managed when their users live close by and are substantially involved in regulating the resource with community-based approaches.

Ostrom (1990) proposed eight core principles for robust institutions to effectively manage common resources (Cox, Arnold, & Villamayor Tomas, 2010; Ostrom, 1990). These were based on a close examination of long-standing, self-organised common property regimes, sustainably managing resources such as grazing pastures in Switzerland, forest resources in Japan, and irrigation systems in Valencia, Spain and the Philippines. Between 100 and 1,000 years old, these robust institutions have survived external challenges such as natural calamities, wars, and political and social changes (Ostrom, 1990).

The institutions Ostrom had studied shared many similarities. For example, their participant's ownership of assets, skills, and knowledge was similar. The participants were perceived to be homogeneous in terms of ethnicity and race, which is perhaps why Ostrom's principles do not address gender and social and economic inequalities or ethnic diversity, all prevalent in Nepal. However, we applied the eight principles to the community institutions managing water supply systems in rural Nepal because

they provide clear criteria for successfully managing common-pool resources in the local context. The eight principles are:

a. Commons need to have clearly defined boundaries. In particular, who is entitled to access what? Unless there's a specified community of benefit, it becomes a free for all, and that is not how commons work.	**b. Rules should fit local circumstances.** There is no one-size-fits-all approach to common resource management. Rules should be dictated by local people and local ecological needs.
c. Participatory decision-making is vital. There are all kinds of ways to make it happen, but people will be more likely to follow the rules if they had a hand in writing them. Involve as many people as possible in decision-making.	**d. Commons must be monitored.** Once rules have been set, communities need a way of checking that people are keeping them. Commons don't run on good will, but on accountability.
e. Graduated sanctions for those who abuse the commons. Commons that worked best did not just ban people who broke the rules, which created resentment but had systems of warnings and fines, and generating informal reputational actions in the community.	**f. Conflict resolution should be easily accessible.** When issues come up, resolving them should be informal, cheap and straightforward so that anyone can take their problems for mediation - nobody is shut out.
g. Commons need the right to organize. Commons rules will not count for anything if a higher local authority doesn't recognize them as legitimate.	**h. Commons work best when nested within larger networks.** Some things can be managed locally, but some might need wider regional cooperation

These principles have been extensively tested and modifications introduced over time. Analysing 69 cases in irrigation, fishery and forestry, a study in 2016 found that all eight principles were not equally applicable or fundamental, and their relevance varied according to the type of common resource in question (Perez-Ibara, et al., 2016).

Similarly, a meta-analysis of 91 studies evaluating the design principles showed the principles were "well supported empirically", but additional factors were needed. Factors such as the size of the user groups, heterogeneity within and among groups, and the kind of government the institutions they operate under needed to be added (Cox, Arnold, & Villamayor Tomas, 2010).

These approaches are well recognised by the state, where control and use are handed over to local groups and are seen in practice. For example, many of the participatory principles advocated by Ostrom can be seen at Rupa lake, Kaski district, Nepal, where population growth, open access and a lack of clear group boundaries led to the almost collapse of the lake ecosystem (Chaudhary, et al., 2015). The community reversed this damage by creating a defined co-operative using 'bottom-up' approaches.

A Case of WSUG-3

The drinking water infrastructure was constructed in 2009 with support from a development partner and Nepal Government. The system channeled water from three sources to 136 households. A WSUG and concomitant WSUC were formed with the consensus of the households involved and a constitution was prepared with support of the development agency. In 2015, local road construction undertaken by the Rural Municipality caused a major damage to the pipeline connecting the largest source. Water supply was immediately disrupted. A compensation worth Rs. 24,000 (US$ 200) paid by the RM to the WSUG did not cover the repair costs. Consequently, around 50 households had to devise their own water supply from different sources, bearing the cost themselves. The WSUC was active during the initial year, but the enthusiasm of the users soon waned and the group has been dormant since - no tariff is collected or meeting held for many years. The original infrastructure is still partially functional and any maintenance or repair is undertaken collectively, without any reference to the water user committee. The WSUG or community have not received any support from the local government, besides the compensation amount.

5. WSUCs and the Design Principles

Out of the seven WSUCs in Ward eight, only two worked well during the visits in June and November 2019. Among the five inactive committees, two could not organise a single meeting since their formation due to the migration of key officials after start-up and the lack of motivation among the committee members from the start. Likewise, the other three WSUCs had been inactive for years. In this section, we closely examine the situation WSUGs, and their committees through the lens of Ostrom's design principles.

Boundaries According to Ostrom, a clear boundary around the common pool resource, coupled with an explicit definition of its users, promotes sustained utilisation by restricting access to non-members (Ostrom, 1994). While the members of WSUGs work as a boundary providing access only to group members, none of the committees had maintained a written list of members. This may be unnecessary in closely-knit communities but is needed where households with private pipelines can preclude others from using the water source they have occupied. Although against government policies, this is challenging to contest without written records.

The study has found other boundary complications. Due to federalism, the administrative restructuring of the subnational boundaries had affected the arrangements for sharing water sources between villages. Before federalism, water sources were shared between Village Development Committees (VDCs). However, during the state restructuring, VDCs merged into larger and rural municipalities, and the VDCs that previously shared water have now become part of different municipalities. For example, around ten households of Gairi Gaun, a largely Dalit village, had been sharing a water source from a nearby VDC that was then restructured into another rural municipality. During one of the focus group discussions, the issue of water sharing between different administrative units surfaced:

> *Before Palikas (rural municipalities) were formed, we had access to adequate water through a sharing arrangement with the adjacent VDC. Nevertheless, due to the diminishing water discharge and increasing population, the water demand has increased. Users of the Palika, where our water source is now located, are claiming exclusive over the source. We are at a loss regarding how we will fulfil our water needs.*
>
> Focus group with Men in Dalit Village (Gaire Gaun) 2019

The new administrative units had ruptured the boundaries that previously allowed them access without clarity about how they could now access water supplies.

Monitoring and sanctions Monitoring the water supply systems, another Ostrom principle, is an unpaid participatory service that falls upon the WSUCs and cannot be done properly when they cease to operate.

As noted above, poor monitoring often results in loss of access to water or higher repair costs. Some community groups expect their development partners to actively support the repair and maintenance of the systems they have built. Others took local initiatives to make repairs. The lack of ownership felt by many was compounded by the high costs of repair, which they lack the funds to meet. An inactive WSUC means that tariffs are not collected, and there is no reserve of money for repair work, yet the need for periodic maintenance is clear, especially as the systems age.

The focus group discussion with community members at a tea shop revealed that the whole infrastructure of the seven user groups has become old and needs substantial investment, which was well beyond their capacity. This was confirmed by observation of some of the infrastructure by the researchers. Only with the support of external donor organisations or the government can the community fund the costs caused, for example, by constant breakages in the system and improving the make-do repairs by users that break down quickly. The researchers noted that pipelines along the motor

road were exposed and especially vulnerable to breakage.

One of the most common difficulties facing even the well-functioning WSUCs is enforcing tariff policies and applying sanctions. Village communities are closely-knit, and family relations bind many households. In such circumstances, enforcing tariff rules or applying punitive measures can affect the community and family harmony. In the study site, only WSUC # 1 had installed a special lock on each tap to cut off supply for non-compliance to the common rules of the group. Non-payment is not sanctioned except in this well-functioning WSUC-1, which charged Rs. 50 per household per month, and those who fail to pay their fee for three consecutive months have their taps locked.

Any WSUCs did not practice graduated sanctions (recommended by Ostrom). Rules about repair and maintenance are not enforced, nor is the absence in attending meetings, a voluntary action, penalised.

The water supply is primarily for domestic use, while agricultural use is forbidden during the dry months. However, vandalism - such as cutting pipelines upstream for agricultural use - was reported, especially in the dry season, and such actions deprive houses downstream of their fair share of water for domestic use. It is very hard for the community to prevent this or to call the culprits to account.

> *"My house is downstream, and it is challenging to access water because people upstream cut pipes to water their crops. Sometimes they do it at night, making it difficult to recognise the culprit. Even if they know, it is difficult to hold them responsible because most living upstream practice it themselves."*
>
> An elderly woman during a social mapping exercise, 2019

Government monitoring and oversight are largely missing at present because the role of the rural municipality in monitoring or supporting the WSUCs is currently unclear at the community level in research site. Instead of engaging with the WSUCs, the Rural Municipality formed a new nine-member water and sanitation working group and is channelling its budget through that group rather than supporting the WSUCs. As temporary employees, the working group function under the direction of the Rural Municipality and is not obliged to support the WSUCs unless specified by the Rural Municipality.

Participation and flexibility of rules to fit the context *is a*nother key principle. Participatory decision-making was compromised in several ways in these structures. Among them, an obvious one of which is the role of external actors. The water systems

are generally funded or co-funded by development partners and designed in line with Government requirements by urban-trained engineers through development partners. Users suffered when the projected supply of water proved inadequate, generating a clear lack of ownership. Expectations of outside support often stem from populations not being involved in siting the points or asking for them, so they lack any sense of belonging to them.

"Readymade water supply models do not work in a community setting."

Chief, Drinking Water and Sanitation Division (DWSD)

"Lack of water supply infrastructure ownership by the community is common as development actors design the projects without full community involvement."

Ward Chairperson, Ward eight, Guras Rural Municipality, 2019

According to Ostrom, participatory decision-making in water access and supply works through the user groups. The users elect the executive committee for a fixed period using the principle of inclusivity or quota system to ensure the participation of often excluded groups of women and minorities. Despite the inclusivity policy, there is evidence that women and minorities are not well informed about WSUCs or their decisions, which risks their participation. It means that those most vulnerable to water crises are largely omitted from decisions making and discussions against the stated government policy around their inclusion.

"Who will include us in the WSUG? We have heard that there is a water group. Our father-in-law used to attend those meetings, but he stopped"

A woman in an all-women PRA exercise, Tallo Garcha Village, November 2019

In the case of WSUG-1, the monthly meetings were known and open to all the users in the group, indicating a democratic and participatory process; men and women from different ethnic and social groups were given equal voices in expressing their opinions or concerns. Another group, WSUG -3, functioning well until early 2020, before the pandemic, also entailed participatory processes, periodic meetings and proper financial management. However, the committees were dormant in the other five WSUGs, and no formal meetings were held for years. In such cases, the government-assigned quotas for women and minorities become ineffective, and there is no formal way to consult women or minorities, including people with disabilities, at each stage of the water supply system. This matters as we noted in one location where the installation of a community tap, initially picked by men, was shifted when women became involved in the decision.

Without well-functioning WSUCs, participation and inclusion in decision-making become impossible and of concern. It opens up avenues for elites to capture control of local water resources.

Another aspect affecting participation is the assumption that voluntary labour is freely available. However, in reality, it is much rarer now due to the increased opportunities for earning an income and the high opportunity cost of offering unpaid time for the work of managing the common resources. This directly impacts the functioning of WSUGs as the executive members are required to serve voluntarily.

We found that user participation, essential for a robust community institution, according to Ostrom, varied greatly among the WSUGs in Ward eight. In five of the WSUCs, the participation of women and minority groups in the executive committees existed only on paper as the committees have been inactive for years. The assumptions that women have the time and motivation to join groups on a voluntary contribution basis and can be heard often turned out to be false in many cases. In reality, women are compelled to take over men's roles in agriculture and household chores in cases where men have migrated for employment. Furthermore, women continue to be marginalised, particularly in rural Nepal, where traditions and practices in daily life are still patriarchal.

Giving women quotas does not work when organisations are weak or failing, as in the inactive WSUCs of Ward eight. It is still difficult for women to become leaders in rural Nepal, and many who were elected were playing tokenistic roles, unheard and lacking a say in decision-making, despite the assurance of participatory representation in the constitution of the user groups.

At the research site, each WSUG was bound by a written constitution with rules governing its operations, a requirement for the group's registration with the government. The constitution documents of the user groups were written by the Rural Village Water Resource Management Project (RVWRMP) in consultation with community members. However, full flexibility to design the constitution to fit the local context was constrained by the policy-prescribed quotas for the representation of women and minority groups in the WSUC. The WSUCs, by the policy, must include at least 33% women and some representation of minority groups.

Chairpersons of five WSUCs stated that the constitution was used only to register the user group with the government. The constitution documents are similar across WSUCs and do not reflect the differences between the villages, yet a village with a low-income Dalit population has very different needs to a village with a socio-

economically privileged population. In line with Ostrom's principles, community institutions require flexibility, control and support in designing their rules and regulations if they are to fit their local circumstances.

> *"The constitution document was written by the NGO involved in the water supply project construction in consultation with us."*

Chairperson, WSUG - 4, 2021, via phone interview

Conflict resolution, another critical design principle, calls for a well-functioning, fair and affordable conflict resolution mechanism to be in place. In principle, the WSUC is the primary responsible body for conflict resolution in the water system, which is not happening in reality. The conflict in the research site was on water sharing and distribution; cutting distribution pipelines upstream to irrigate land during the dry season was one of the common and recurring issues.

With the frustration of frequent disruptions, households downstream were collectively constructing their private supply system. Such actions were taken by those affected due to the lack of a formal mechanism for conflict resolution and monitoring. The mechanism did not exist, or the victims were not heard. Also, the speculation of accentuating conflict could be made as the water demand is ever-growing, but most of the WSUGs are inactive, and the formal channel to raise complaints is unavailable. Seeking external mediation has not been practised so far. The rural municipality is relatively new, and its role in conflict resolution of water supply remains unclear.

The right to organise and nested institutions are two basic tenets among Ostrom's eight principles required for rhobus, sustainable community organizations. First, the social and political environment must allow community members to form formal organizations and self-govern. Second, the organizations work better when are linked with larger enterprises.

The freedom to form unions and associations is a constitutional right (Article 17, d) for Nepali citizens. The same provision applies to WSUGs. However, the right to organise alone is inadequate for developing robust and sustainable institutions. In WSUGs, capacity development and continued support are required as the groups experience recurring changes in group membership due to migration. In addition, the overall changing socio-economic parameters, such as access to new sources of employment and income, significantly affected motivation and a commitment to participate voluntarily.

Thus, clarifying the terms of engagement of the rural municipalities with the WSUGs

could help to ensure some much-needed support to the groups. Rural municipalities and other subnational government bodies are relatively new and may still be establishing their priorities and modes of engagement with the WSUGs. However, Ward eight, where the rural municipality decided to form and work through a water and sanitation working group independent of the WSUGs, posits an example where the local government's priority may not be to work directly with the WSUGs. However, each WSUG can join the Federation of Drinking Water and Sanitation Users Nepal (FEDWASUN), a national umbrella organisation of the water and sanitation user groups. The organization is present in 58 districts, including Dailekh and has as many as 4100 WSUGs members (FEDWASUN, 2022).

This study found that none of the seven WSUGs has links with FEDWASHUN, partly due to a lack of information and motivation of those leading the WSUGs to connect with FEDWASHUN. The groups have no institutional affiliation with other local organisations, such as Mother's Groups and User Associations of Forest and Agriculture.

The 'nesting' Ostrom describes within her eight principles is missing, while the roles and responsibilities between levels and their articulation remain undefined. The fact that none of the WSUGs in the research site had any formal operational linkages with the local government means they are mainly detached from local government, and not being a member of FEDWASHUN means all the WSUCs are essentially working on their own. None comply with Ostrom's principle of nested institutions working better.

Discussion A close examination of the WSUGs in Ward eight of Guras rural municipality confirms that a complex web of social and economic factors affects the functionality of the water supply systems. When the WSUCs become inactive, and water supply is affected, community members come together informally and act independently to ensure continued water supply. While this informal mechanism helps to ensure water supply, it lacks official recognition and the socially inclusive practices ensured in the formal WSUGs.

It is clear that there are many areas in which the core principles laid out by Ostrom are not being applied or implemented in these WSUGs, even though the government is committed to the core approaches of collective action: promoting participation, setting clear rules and boundaries, supporting monitoring and maintenance. It directly affects the outcomes around the adequacy of providing a good and adequate water supply for all households and their needs.

Ostrom's model, which highlights many key principles that would help to support

control, flexibility and participation at the local level, essential for community responsibility and control of the water supply systems, fails to properly take account of the heterogeneous and highly gendered roles within Nepali society. Here the divisions created by caste, class and disability resulted in marginalised groups still being excluded from access to adequate and safe water. The assumption of a homogeneous community is not useful in understanding where power lies, who wields it and the intersectional nature of unequal gender relations. These determine who has power and control over the different resources and who can and cannot easily participate in organising the commons, in this case, the water supplies.

6. Conclusion and Policy Implications

This study has presented the critical issues facing WSUGs of Ward eight, Guras rural municipality of Dailekh district, using Ostrom's design principles. The study found many of the principles relevant in understanding the strengths and weaknesses of the current approach at the local level. It has also highlighted key gaps to be addressed in keeping up with the fast-changing social and economic contexts.

The Water Resources Act 1992 established the community management model of water supply systems by forming user groups at the local level. The concept of user groups was driven by community participation and voluntary contributions to strengthen the management of common pool resources and enhance community ownership, giving communities control of their water resources.

However, the cumulative effect of complex socio-economic changes arising through the years has affected the underlying assumptions made about how user groups work. The model largely based on assumptions of voluntary participation, gender and social inclusion, and community leadership is facing a very different context now. With the influx of remittance income, many village residents can now afford to install private pipelines, and voluntary participation, assumed to be a free resource earlier, is now difficult. New economic opportunities have enhanced the value of people's time, so they are less willing or able to contribute free time to common pool resource management. Furthermore, the governance system and rural water management under federalism need to specify roles and responsibilities because the Water Resource Policy of 1992 governing the WSUGs has not yet been updated. The fact that most user committees are inactive in the Ward sends a strong message that it is time to consider adjusting the model to keep up with the changing social and economic context.

From the start, the WSUGs have had the responsibility of managing the local water

supply systems without having any established or regular support (financial or managerial) or the ability to enforce tariff policies or apply punitive measures for non-compliance. These have been an issue for five out of seven groups in Ward eight, leaving them with a lack of funds for operation and maintenance and a limited capacity to keep water supplies running well for everyone. The lack of a well-functioning group renders the commitment to quotas and the inclusion of women and the most marginalised redundant.

Where the WSUCs were dormant or defunct, the water supply systems continued functioning at different capacities, supported by the community and private initiatives. The communities have devised alternate means of managing their water systems, for example, with some households sharing the same supply systems. Three chairpersons of inactive committees said that whenever a breakdown occurs, users turn to them for repairs, but this often causes delays because funds have to be collected, a repair technician hired, and repair materials purchased. In these cases, a few active user group members worked with the chairperson on the repairs; it is ad hoc and lacks formal organisation and representative participation.

When formal institutions break down, opportunists take advantage. Inactive WSUGs render the socio-economically weak and disadvantaged communities vulnerable to losing their share of water to more powerful members, and without mechanisms to check vandalism, they become victims. Furthermore, the lack of formal conflict resolution processes means the victims are neither heard nor compensated when issues arise.

In essence, this study found that the majority of water and sanitation user groups of Ward eight, Guras rural municipality, are not robust institutions per Ostrom's design principles nor functioning as envisioned in the Water Resource Act 1992. The user groups have shortcomings on both the institutional and operational dimensions. Deficiencies in core elements of participation, ownership, autonomy and basic managerial systems have impaired the envisioned community-managed equitable water access for all. If Nepal is to realise its aim to achieve its water-related targets in national and international commitments, including the SDGs, the community-led water management model needs to be widely and rigorously tested and, if necessary, reformulated.

7. Policy and Programmatic Implications

- A nationally-representative study on the state of WSUGs across the country is recommended for a more comprehensive picture for effective policy

development to ensure sustainable management and equitable distribution of rural water supply at the community level.

- Voluntary contribution, the backbone of the community-based water management model, is becoming scarce. In case a larger national-level study corroborates this finding, the current community-based model may need to be adapted to the present context through the revision of related provisions in the Water Resources Policy 1992. The community models based on voluntary contribution such as the WSUGs may have been feasible 30 years ago when the Water Resource Act 1992 was enacted. The socio-economic context has changed considerably, but the model has not been updated to fit the current context – this is the core finding of our study and it is recommend that a more extensive nationally representative study on the WSUGs is required.
- A policy-based cross-boundary water-sharing mechanism at the local level can help to resolve cross-border conflicts. Likewise, dispute settlement procedures must be in place with specific responsibilities to address water-related issues between users at the community level.
- Poor tariff collection has resulted in chronic funding deficiency for the repair and maintenance of the water supply systems. Policy interventions at the local level may be required to ensure financial sustainability of the water supply systems. .
- The WSUGs need continued technical and managerial capacity development and financial support to ensure functional infrastructure and inclusive and equitable distribution of water.
- The membership quota system of the WSUCs has resulted in the inclusion of women and minority groups. However, often the participation of women and minorities in the WSUCs is tokenistic. Periodic monitoring of the application of the quota system in community water management can ensure genuine commitment and effective engagement of women and minorities in WSUCs. A robust monitoring mechanism must be in place with the WSUGs to help curtail water leakages and vandalism and identify technical issues at the initial stage. Likewise, the Government monitoring mechanism must incorporate the WSUGs to ensure their smooth operation.
- With the strengthening of the community-based model through technical, managerial and financial support in place, pilot testing of new models of managing rural water supply systems with varying roles of the community, government and the private sector will help to find a long-term, viable and sustainable solution in the rapidly changing social and economic context.

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