Unpacking women's strategies in migration-induced challenges in irrigation systems management in Nepal

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Irrigation Systems Management in Nepal: Women's Strategies in Response to Migration-Induced Challenges

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ABSTRACT: Large-scale male outmigration has placed new pressures on both men and women, especially regarding labour division in farm households and involvement in Water Users Associations (WUAs). This paper illustrates how the interplay between existing gender norms, male migration, remittances, and alternative sources of male labour influence women's agency and WUA decision-making processes in Nepal. Despite official quotas aimed at promoting women's participation in WUAs, some women prefer to monetise membership contributions rather than actively engage with the organisation. Others pursue strategic interests through changing WUA rules and, in the process, bringing about an adjustment of cultural norms. Women's agency is derived not only from their knowledge of irrigation systems features and their ability to manage them; it is also related to their ability to learn new organisational skills and to apply them in the WUA context to negotiate and mobilise rules and resources. Women (re)shape their WUA involvement in conjunction with their farming strategies, their view of the WUA's functionality, and whether they perceive the involvement as either an opportunity for productive engagement or as merely an increase in their already heavy workload.

KEYWORDS: Institutional arrangements, women's strategies, gender, migration, irrigation, Nepal

INTRODUCTION

Globally, migration has significantly (re)shaped processes of agrarian change in the rural context (Elmhirst, 2002; Rigg, 2006; Maharjan et al., 2013; Sugden et al., 2021). Migration has commonly been resorted to as a way for people to diversify their income. This is the case in Nepal, where uncertainty of agricultural production, due to climate variability, increasing unpredictability of rainfall, and rising agricultural input costs have motivated members of rural agriculture-dependent communities to seek alternative livelihood options. Almost half of all Nepali households have at least one family member who is an international or national migrant (IOM, 2019), with young men constituting the majority of migrants. While migrants within Nepal or those who travel to nearby parts of India may return home every few months, others remain away for years at a time. With so many male members of households migrating from rural areas, rural women are left to struggle with the problem of male absenteeism; they must fill

the gender gap around farm tasks and activities that is created by this permanent or temporary/seasonal male outmigration.

Even before male outmigration became a widely recognised global phenomenon, scholars brought to light the importance of off-farm employment, temporary migration, and the remittance economy in (re)shaping Nepal's agrarian structure and production processes (Kaspar, 2006; Seddon et al., 2001; Schroll, 2001). Migration research has focused on how male outmigration impacts the country's economy in terms of remittances and how it affects gendered institutional dynamics and women's workload (Thieme and Wyss, 2005; Kaspar, 2006; Gartaula et al., 2010). Many have also drawn attention to gendered participation in local institutions such as Community Forest User Groups (CFUGs) and Water Users Associations (WUAs) (Giri and Darnhofer, 2010; Udas, 2018), and how such participation is closely interlinked with male outmigration. Little study has been done, however – globally or in Nepal in particular – on how migration may affect the overall functioning and management of irrigation systems. In this paper, we examine the impacts of male migration on irrigation systems management, especially in relation to the functioning of WUAs in Farmer Managed Irrigation Systems (FMISs). We also investigate how a better understanding of gendered institutional dynamics is key to coping with migration-induced challenges in irrigation systems management.

In FMISs, users organise management committees that are comprised of farmer-elected representatives. These committees make decisions regarding the management of the irrigation system. The characteristics of an FMIS include: (1) direct involvement of irrigators; (2) effective monitoring and sanctions; and (3) holding officials accountable (Lam, 1998). Farmers are involved in the day-to-day activities of irrigation management, including the acquisition, allocation and distribution of water, maintenance and operation of infrastructure, decision-making, resource mobilisation, and conflict resolution (Pradhan, 1989). Ownership of the irrigation infrastructure also rests with the farmers' organisation.

In Nepal, FMISs have existed for centuries. About 70% of the country's irrigated area belongs to FMISs rather than agency-managed systems. By and large, these systems are autonomous, self-governing and decentralised entities. Each FMIS is a community-developed water management system of organisational norms and values. These norms are based on obligations and collective action. The roles and functions of the organisation differ according to whether the water management system is for hilly areas, river valleys, or plains (Pradhan, 1989). The physical environment influences the intensity of the tasks performed by the organisation, including water acquisition, allocation, distribution, and infrastructure maintenance. When the organisation encounters and addresses new challenges and complexity, it must maintain transparency and equity.

In hilly areas, systems that include long canals carved through landslide zones have utilised tunnels for certain stretches, along with high gradients and narrow canal cross sections for slope stability. The fragility and instability of the system is often compensated for by regular maintenance organised through stakeholders' contributions. Most of the farmland under rice cultivation is terraced. The size of hill systems ranges from a few to over 100 hectares (ha). Landholdings are generally small compared to those on the plains and mechanisation of farming is limited.

On the plains, systems are generally large. Construction of sturdy water intake infrastructure is crucial because water management systems tap into large, powerful rivers. These constructions traditionally required large amounts of wood, brush and stone which often had to be transported over long distances; more recently, however, cement, gabion wires and iron rods are used as construction materials. The frequency of river flooding determines how often the intake must be repaired; an elaborate mechanism for human and material resource mobilisation is thus required. Farms on the plains are generally flat. Rice cultivation predominates, though some other commercial crops are also grown. Land preparation, harvesting and transportation are becoming increasingly mechanised (Pradhan, 1989) and transport networks are increasingly becoming available.

Critical institutionalism research, "explores how institutions dynamically mediate relationships between people, natural resources and society" (Cleaver and de Koning, 2015: 1). Building on this, we examine the dynamic interaction between the (re)shaping of local institutional arrangements, the way these new arrangements bring about institutional change, and how, in the process, an overall shaping of women's agency (Kabeer, 1999) occurs in the context of WUA organisational functioning and as an integral part of structure-agency relations (Giddens, 1984). In particular, we draw on Cleaver and de Koning's (2015: 4) concept of institutional bricolage to illustrate how groups of women, "assemble and reshape institutional arrangements, drawing on whatever materials and resources are available", including through (in)formal networks (Shrestha and Clement, 2019). Actors' decisions to assemble and shape these arrangements are driven by, and rooted in, both conscious and non-conscious aspects of everyday practices that sometimes further perpetuate existing power asymmetries and inequalities. Whaley brings this aspect of power asymmetry to light in his distinction between the strategies of more powerful groups to control, and the "necessary improvisation" that less powerful actors use to manoeuver within pre-existing limits or constraints (Whaley, 2018: 150). Processes of bricolage thus resemble the complex entanglements of institutional (re)shaping; in both cases, there unfolds a process of making rules and setting boundaries that are embedded in existing, often unequal, power relations. As stated by Whaley (ibid: 139), "Critical institutionalism therefore draws attention to the messy complexity of institutional life, ingrained in everyday practices and imbued with power relations and cultural meaning". Making institutional complexity and embeddedness central to her analysis, Cleaver uses the concept of institutional bricolage to outline key challenges in understanding institutions, including how they come into being, are sustained, and are reproduced. She also uses it to highlight the importance of looking at everyday practices as the embodiment of structure and agency working in tandem. The case studies we examine illustrate how different groups of women have developed strategies to cope with the various challenges of male outmigration and how these strategies are linked to the way that women view their involvement in WUAs in relation with their socio-economic background, age, caste, and ethnicity.

This paper takes as case studies the Janakalyan and Kalleritar irrigation schemes in Nepal's Chitwan and Dhading districts, respectively. It examines the strategies developed by women with regard to their farming activities following male out migration. It considers how rule-shaping and the local institutional arrangements that are embodied in WUAs' organisational functioning come to be (re)created, sustained, and modified by women. The paper looks at water distribution and canal maintenance practices in relation to women's roles and their involvement in irrigation systems management. It links these practices to WUAs' organisational functioning following male outmigration and how this functioning shapes, and is (re)shaped by women's various strategies for coping with migration-induced challenges. We show how the concept of institutional bricolage connects structure with agency (Giddens, 1984); we also show how it reveals what Bourdieu called a "feel for the game" (1990), in which agency is shaped through the coexistence of habitualised and creative forms of behaviour (Cleaver, 2012). As stated by Whaley (2018: 148), "for critical institutionalists agency is also, and often, less-consciously or non-consciously exercised by people engaged in their various social practices". In particular we examine: (1) women's diverse views on, and strategies for responding to, male outmigration and how this (re)shapes their involvement in WUAs; (2) how these views and strategies are embedded in women's varying knowledge and capabilities to (re)negotiate and (re)produce local institutional arrangements pertaining to: (i) contributions for canal maintenance, (ii) water service provision (including securing access to water regardless of their involvement in WUAs), and, (iii) labour arrangements throughout the different farming stages; we also examine, (3) how this varying knowledge and these capabilities are linked to women's different positions in the household, their social status, and the networks to which they belong; and (4) its implications for WUAs' overall organisational functioning, in particular in relation to women's access to (in)formal decision-making processes and how they view WUAs. Rather than viewing women as a homogenous group, we look at their different positions within households, their social status, their

ethnicity, their connections to WUA leadership and management, and how all of this influence their views and strategies regarding their involvement in WUAs.

The paper contributes to a better understanding of the role of women and local institutions in responding to male outmigration and to processes of agrarian change. It does so in two ways. First, it brings to light how women's coping strategies post male outmigration are closely interlinked with the importance they place on their involvement in WUAs. Second, it shows how women's involvement in a WUA is rooted in its organisational characteristics and functioning. The paper argues that, whether or not women participate directly in WUAs, they exercise agency in securing access to water and meeting labour obligations. In order to adjust to formal WUA rules and practices, women also leverage informal engagement strategies through mobilising social networks. Most importantly, the paper shows that women's empowerment requires structural changes in how WUAs operate. These changes must go beyond formal quotas for women's participation, in that the organisational rules and mechanisms of WUAs must be brought more in line with the grassroots realities of irrigation systems management. From a policy perspective, the paper highlights key challenges in understanding institutional (re)shaping and the need to unpack the complexities of irrigation systems management, with the focus on the current functioning of WUAs as they respond to male outmigration.

GENDERED INSTITUTIONAL DYNAMICS IN WUAS: WOMEN (RE)SHAPING INSTITUTIONAL BRICOLAGE

Patriarchal ideology in Nepal delineates specific gender roles, with social norms positioning males as socially, economically, physically and politically 'superior' (Ghimire, 2005). Although women participate in productive agricultural labour, gender norms limit their productive contribution since they are expected to prioritise domestic duties such as housework and caregiving (ibid). Irrigation in Nepal is considered to be a masculine role since it is assumed that men are physically stronger than women and hence more suited to the Jharali (labour contribution) for maintenance, though both men and women can participate. Women's direct participation in systems operation and maintenance are further restricted by beliefs that working in the canals during menstruation could physically and ritually pollute water bodies and their surroundings.

Scholars have introduced a variety of concepts to better understand how institutions emerge, are sustained, reproduce, and evolve over time (Ostrom, 1990, 2000; Long, 2001; Cleaver and de Koning, 2015). Mainstream institutional thinking assumes that institutions can be crafted on the basis of several identifiable causal relationships between contextual factors, institutional attributes, and projected decision-making outcomes; critical institutionalists, in contrast, argue that institutions are often multipurpose, intermittent in their operation, dynamic, and thus constantly changing and evolving. An especially important contribution of critical institutionalists has been the development of the concept of institutional bricolage; this explains processes of both change and continuity in institutions, while also considering power dynamics and the role of human agency in the shaping of institutions (Cleaver, 2002, 2012; de Koning, 2011, 2014;). As explained by Cleaver and de Koning (2015: 4):

> Institutional bricolage is a process through which people, consciously and non-consciously, assemble or reshape institutional arrangements, drawing on whatever materials and resources are available, regardless of their original purpose. In this process, old arrangements are modified, and new ones invented. Institutional components from different origins are continuously reused, reworked, or refashioned to perform new functions. Adapted configurations of rules, practices, norms, and relationships are attributed meaning and authority. These refurbished arrangements are the necessary responses to everyday challenges and are embedded in daily practice.

At the same time, it is the attribution of meaning and authority to bricolage arrangements that makes bricolage more than just everyday adaptation.

Scholars have introduced a variety of concepts to better understand the (re)shaping of women's agency and empowerment, while highlighting the need to unpack gendered institutional dynamics in natural resource management (Agarwal, 1994, 2001; Meinzen-Dick et al., 1997; Kabeer, 1999; Cleaver, 2010; Leder et al., 2017). Leder et al. (2017) argue that women's empowerment is a holistic concept comprising socio-economic and political dimensions. Kabeer (1999), in her analysis on women's agency, similarly highlights the key importance of understanding women's access to resources and decision-making processes around resource use and management. As stated by Kabeer (ibid: 436), "[Empowerment is] the process by which those who have been denied the ability to make strategic life choices acquire such an ability". Kabeer argues that empowerment is linked to one's ability to act even when others try to deny that ability. Linking empowerment with agency in institutional bricolage, critical institutionalists argue that agency is not simply a form of conscious and deliberative thought or action; on the contrary, people exercise agency while engaged in both conscious and non-conscious aspects of everyday practices. Here, agency is linked not only to one's ability to act, but also to (access to) knowledge, sociocultural values, and how these are embedded in the wider socio-economic and political contexts. In turn, this knowledge and these values (re)shape one's goals and objectives as well as their strategies and tactics (Cleaver and Whaley, 2018).

Even before the effects of male out migration on irrigation system management in Nepal and other developing countries became known, feminist irrigation scholars were highlighting the need for greater recognition of women's role in irrigation system management, both institutionally and at farm household level (Zwarteveen, 1997, 2006; Meinzen-Dick and Zwarteveen, 1998; van Koppen, 2002) Nepal has a long history of male migration, one that dates back to the recruitment of Gurkha soldiers for the British-Indian Army from 1816 onwards (Pariyar, 2020; Rathaur, 2006); however, in recent years the scale of male outmigration has risen. In this paper, we examine how such migration affects irrigation systems management, especially in relation to the workload of women in farming households and the gendered dynamics of WUA organisation. International donors and national governments worldwide have come up with various policy measures to ensure that women take a certain proportion of positions within WUAs' formal organisational structure; they have called for, for instance, quotas for women in membership and in leadership roles such as WUA executive committees. With widespread male migration, policy discussions among donors on women's agency and empowerment have entered new institutional terrain, with greater attention to the roles that women play in WUAs and irrigation management.

Irrigation scholars have brought to light the centrality of WUAs to irrigation systems management. They have highlighted: how this centrality is derived from the recognition of farmers' important role in systems management (Subramaniam et al., 1997; Cernea, 1991; Chambers, 1988; Bottrall, 1981); how such recognition is translated into the inclusion of WUAs as part of international donors' global-level development policy agenda (World Bank, 1986; Coward, 1986); and how this has resulted in the formation of government-induced WUAs (Suhardiman, 2015; Turral, 1995; Uphoff, 1986). These measures have, in turn, led to organisational dysfunction and to WUAs as organisations that exists only on paper; they have also at times led to the transformation of WUAs into vehicles of elite capture (MacDonald, 2019; Yu, 2016; Suhardiman, 2008). In this paper, we position WUAs as both generic government-induced farmer organisations, and as entities resembling Farmer Managed Irrigation Systems (FMISs), on which WUAs are based (Suhardiman and Mollinga, 2012; Hunt, 1989; Bromley and Cernea, 1989). Therefore, rather than engaging with the debates on the poor design of WUAs, we view and position WUAs as one of the many organisational platforms that were set up to strengthen rural livelihoods; we consider them as entities in which both men and women farmers could participate and where they could interact while pursuing their individual and collective interests in irrigation systems management. Our analysis thus looks at WUAs not strictly in relation to their organisational origins and their contested role in irrigation systems management, as this lies outside the scope of this paper; rather,

it considers them mainly in relation to their ability to adapt to new gendered dimensions in terms of their overall functioning following male outmigration.

Building on the concept of institutional bricolage (Cleaver and de Koning, 2015), the paper shows how women (re)shape their participation and involvement in WUAs. Placing this within the context of gendered institutional dynamics in irrigation systems management, the paper looks at the (re)shaping of women's various strategies in relation to their changing role in irrigation systems management following male outmigration and how they view WUAs' actual organisational functioning and importance. In particular, we look at how women (re)assemble existing local institutional arrangements, both pertaining to their household's farming strategies and the WUA's organisational functioning, while also relying on their access to remittances, (external) labour, and (in)formal connections and kinship within the WUA. We identify different elements that affect women's abilities to create and (re)shape institutional bricolage; we also consider how these are embedded in the wider socio-economic and political contexts and how they (re)shape women's agency, their views, and their strategies. We look at how women's views and their particular type of agencies are embedded in their households' farming strategies; we also examine how this process of agency shaping is linked with the WUAs' organisational characteristics and we consider how a modified WUA can better facilitate women's active involvement. Here, we look at women as a heterogeneous group with different access to resources (for example, WUA leadership, remittances, family labour and social networks) and how they use these resources differently – based on their diverse interests – to sustain and improve their livelihoods while also (in)formally strengthening their agency.

In both case study villages, institutional bricolage is embodied In (1) how women (re)shape their agencies, as manifested in different types of involvement within WUAs and in relation to their farm household's strategies; (2) how such involvement is translated into their (in)ability to use their new membership position in the WUA as a means to push for institutional change within the organisation towards greater representation of women's needs; and (3) how this (in)ability is also linked with the way women view WUAs' organisational importance in relation to their farming strategies and in relation to their perceived gendered norms. In Janakalyan, institutional bricolage is most apparent from the way women used remittances to reduce labour constraints and navigate their involvement in the WUA through informal networks. In Kalleritar, women's ability to negotiate for rule change in the way canal maintenance is done shows how bricolage processes are embedded in changing gendered relations.

RESEARCH METHODOLOGY

We employed an in-depth case study approach (Burawoy, 1991; Yin, 1994) that was focused on the communities of Janakalyan and Kalleritar in Chitwan and Dhading districts, respectively, of Nepal's Bagmati province (Figure 1). We considered the irrigation schemes in these communities, examining how different groups of women view and (re)shape their strategic responses in order to better cope with the agrarian change resulting from male outmigration These two sites were selected because they were being studied by the Farmer Managed Irrigation Systems Promotion Trust [1] (FMIST). FMIST was specifically examining: 1) the representation of water systems in hilly areas and in the Terai (the lowland plains region of southern Nepal) in order to better understand their diverse histories, water management practices, decision-making processes, and their histories of gendered participation; and 2) the phenomenon of outmigration at these sites so as to understand its impact more fully on gender-role – related changes in agricultural practices.

[1] Founded in 1998, FMIST is an NGO that is dedicated to the advocacy and promotion of farmer managed irrigation systems in Nepal through research on FMISs; it organises international conferences and publications in collaboration with governments and other NGOs. See also https://fmistnepal.wordpress.com/2014/04/09/introduction/.

Our case study systems are similar in size (116 ha for Janakalyan, 120 ha for Kalleritar), with widespread male migration in both, but differ in topography and broader social and economic processes. Documentation of these two case study communities goes back at least 35 years. There is thus a basis for understanding changes over time in the practices and representation of women in WUAs. This is particularly relevant as male outmigration continues to constitute a pertinent source of non-agricultural income and as it has increasingly brought women into agricultural decision-making.

Figure 1. Location of Irrigation systems studied.

Source: Map of Nepal: Pradesh Division (http://ncthakur.itgo.com/map15.htm).

The research is primarily based on fieldwork conducted in both of the selected irrigation schemes by the second author in December 2019. Information was collected using a combination of focus group discussions (FGDs), and in-depth semi-structured interviews with key informants and with members of 10 farm households in each village representing a range of caste and wealth categories. The FGDs included men and women from various castes, socio-economic backgrounds, and ethnic groups. Two FGDs were conducted in each village, one with a mixed male and female group and another with only women. Following these FGDs, 10 women from farm households in each village were selected for in-depth semi-structured interviews. The women interviewed were representative of the range of 1) family typology, either (i) nuclear households comprised of members of the direct family (husband, wife and children), or (ii) joint family households that included one or more nuclear families as well as, for example, parents-in-law and/or unmarried sisters; (2) position of women in the family, for example, daughter-in-law, daughter, mother, or mother-in-law; (3) membership status in the WUA (general or executive); (4) caste, including high castes such as Brahmins or Chhetris, and low caste Dalit households;[2] and 5) family migration history. Discussions focused on four key aspects: (1) changes in the division of labour between men and women and shifts in gender-based workload before and after male outmigration; (2) farm

[2] The caste system, which has its origins in Hinduism, divides Nepalis into four socially defined categories: Brahmin, Chhetri, Vaishya and Sudra, with distinct hierarchies and discriminatory relationships between the castes as they are ranked here. Although the Constitution of Nepal and the prevailing law do not recognise the caste system, in practice caste-based discrimination is not uncommon.

households' characteristics, livelihood, and farming strategies; (3) women's views and strategies regarding their involvement in WUAs; and (4) the degree to which they envisioned involvement in WUAs as providing a window of opportunity for creating women's agency and empowerment within and beyond the WUA's organisational structure and functioning. Key informant interviews included representatives of village administrative bodies, village elders, and WUA leaders. The second author did not use a translator for these interviews.

WOMEN'S PARTICIPATION IN WUAS: KEY CHALLENGES AND OPPORTUNITIES

Nepal has a long history of communities managing water without external support. Since the 1980s, however, waves of irrigation system rehabilitation programmes have been implemented with support from various international donors such as the World Bank and the Asian Development Bank. Almost all FMISs have received some external support, either from international donor-funded programmes or through government subsidies. These external interventions have fundamentally altered the organisational characteristics of FMISs, though many continue to rely on community-based management (Liebrand, 2019).

The Irrigation Policy of 1992 mandated that women must comprise 20% of WUA general membership and the Irrigation Policy of 2002 subsequently established that at least two members of each WUA executive committee should be women (Ghimire, 2005). The 2003 amendment of the 1999 Irrigation Regulation increased the required participation of women and marginalised groups from 20 to 33% (Goodrich et al., 2017); this measure was instituted in part to cope with male outmigration. Women have always been part of irrigation systems management, albeit informally (Meinzen-Dick and Zwarteveen, 1998; Panta and Resurrección, 2014); these more recent policies, however, have mandated women's official involvement through membership quotas and through required representation on executive bodies, which is seen by many as a starting point in the formal promotion of greater involvement by women in WUAs (Udas, 2014). Scholars nonetheless have also shown how policy implementation often resulted in token participation by women and that their involvement in WUAs did not result in greater decision-making authority or bargaining power (Zwarteveen, 2006; Udas, 2018).

In this section, we look at how women (re)shape their involvement in WUAs through institutional bricolage. The process of bricolage is embedded in women's strategies and in the strategies of farm households in general for coping with male outmigration. It is also relevant to the way different groups of women view their involvement in WUAs as either an opportunity to convey their needs and make their voices heard, or merely as an addition to their already heavy workload.

Janakalyan case: Labour constraints shaping women's participation in WUAs

Janakalyan lies on an all-weather road in the inner Terai plain, six kilometres from the main market centre of Parsa Bazar. The Janakalyan irrigation system was developed by farmers in the 1970s. The WUA has 150 to 200 members and covers a command area of 116 ha (Pradhan et al., 2015); it manages irrigation provision, including water distribution and system maintenance. More than half the men have left the village for extended periods, travelling for work to other parts of Nepal or outside the country depending on the availability of employment in these other locations.

For the past 15 years, WUA rules have allowed women to provide the labour that fulfils their household's required contribution to canal maintenance. After rehabilitation of the Rapti River embankment, however, farmers have had to dig a canal every year that brings water to the intake of the Janakalyan irrigation system. When it became difficult to mobilise labour for this, the WUA hired an excavator and bulldozer to make this guiding canal and charged all members a cash fee per unit of irrigated land to cover the equipment rental. They subsequently decided to contract for the maintenance work of the entire system. As a result, instead of each farmer contributing labour, they now pay cash based on the size of their landholding. The tasks of cash collection, supervision of work to be done, water

distribution, and conflict resolution are carried out by WUA members. In emergencies such as flooding, when prompt action is required, all WUA members are mobilised for canal cleaning and maintenance, although water users can choose to provide cash in place of labour. Water users, for example, can pay 500 Nepalese rupees (NPR500) per day (US$4) to the WUA to cover the cost of hiring the daily labour to do canal maintenance.

Even though for economically poor households the cost of hiring daily labour is quite high, our respondents from households with one or more outmigrants reported preferring to provide cash instead of labour. The labour monetisation reduced their workload, which accommodated their already heavy household and agricultural responsibilities. Women from nuclear and joint families who were mothers or wives of migrants, and thus who had access to cash from remittances, reported that this option to pay for labour made things easier for them. Because women from different socio-economic and ethnic backgrounds could use the additional income from male outmigration to hire labour, the issue of labour constraint was resolvable by economic means.

Gender norms are nonetheless perceived and acted upon differently by women with diverse identities based on their age, position in the family, and caste, and on the social networks of their household members. Older women stated that conventional gender roles in water management are not always detrimental to women, and they perceived no rationale for changing current gendered labour requirements in canal maintenance. As one older woman, referring to the restrictions governing women's labour for canal upkeep, noted, "That is how things have been happening in WUA, therefore there are no problems for women" (Interview, December 2019). In general, older women agreed that it is not necessary for women to replace men in canal maintenance labour because men have always done this physical work and because women can always opt to instead pay the maintenance fee. Some younger women, on the other hand, have the physical capacity to provide canal maintenance labour and thus welcome that option instead of paying cash; this preference is also shaped by their desire to use remittance money for other expenditures such as clothes, household goods, and farm inputs. Women's multifaceted identities influence their preferences and choices and shape their motivation for adjustments and reforms of WUA rules. Their varied preferences reflect how important it is that the WUA allows them to make choices that are appropriate to their situation. This can include, for example, their particular family topology. Nuclear families with migrant members do not always have a non-migrant male to provide WUA canal labour; a joint family[3] with a migrant man, on the other hand, may have other men who are able to fulfil canal labour requirements.

Compared to the past – particularly prior to the Irrigation Policy of 1992 – women's formal involvement in the WUA has increased, especially in terms of executive committee membership. At the time of writing, the eleven-member Janakalyan WUA executive committee comprises four women and seven men; this is in line with the required quota of at least 33% women on WUA executive committees. Women usually acquire their positions on WUA executive committees through direct appointment by WUA leaders and, theoretically, the quota system paves the way for their greater involvement; their inclusion on WUA executive committees, however, does not automatically result in greater decision-making and leadership roles (Udas, 2014; Ghimire, 2005. The effectiveness of the quota system depends very much on how women view their involvement in WUA organisational functioning and on the degree to which such involvement is valued by the male-dominated WUA leadership. The majority of women executive members are from the higher-ranking Chettri caste and, currently, the most active woman in an executive role has a family background of WUA involvement, including a father-in-law who has previously held a leadership position. Although affiliation through family networks secures WUA positions for some women, it does not guarantee any advantage in terms of influencing WUA decisions.

[3] A traditional joint family in Nepal is headed by a father who manages the family's affairs and is the legal owner of the land. While living under the same roof, the sons, daughters-in-law, unmarried daughters, and grandchildren of the family work together on the family's land and pool their resources (Goldstein and Beall, 1986).

We interviewed a range of women from different socio-economic, social status, and educational backgrounds, including both WUA members and non-members; in general, and for several reasons, women from these different groups did not view their involvement in the WUA's organisational activities as important. First, as water is abundant throughout the year and water scarcity is not an issue for most farm households, women did not view their involvement in the WUA as a key priority among their farming strategies and activities. A young woman in her 20s from a relatively well-off family, who herself is not a WUA member, commented that, "Water is available at the canal, and our male family members provide labour for canal maintenance when required. As for the WUA as a whole and the role of the committee, we do not know much about it" (Interview, December 2019). Another woman, this time from a family that participates officially in the WUA, reported similarly that, "We have sufficient water to do our farming activities regardless of whether or not we are formally involved in the WUA" (Interview, December 2019). Such women do not view their lack of involvement in the WUA as problematic as they feel that WUA involvement would not add value to their actual water distribution practices. Having access to abundant water, women do not view their involvement in WUAs as integral to their farming strategies.

The second reason that women did not view their involvement in the WUA as important was that they were not involved in the overall decision-making process with regard to the water distribution schedule, canal maintenance, or other administrative activities such as the setting of fees and collection times. They therefore did not view their membership as a way to convey and channel their voices in (re)shaping the WUA's organisational functioning. When women WUA members attended meetings, for example, few felt comfortable expressing their views and, even when some managed to make their views heard, they were often sidelined or overlooked by their male colleagues. As an elderly woman interviewee from the Chettri caste commented, "Women are members of the WUA Committee, but we lack any decision-making power. Men are most likely to make decisions for the group" (Interview, December 2019). Another women member of the WUA stated similarly that, "Women lack any decision-making in WUA. Unlike decisions made by older men [that are] valued by both women and men, women's opinions are not valued. Increasingly now, women are part of the WUA Committee, but with less decision-making role, if any" (Interview, December 2019). Our field research suggests that this is likely because men are more familiar with working within the executive committee. Because of the patriarchal social structure, both men and women may also have internalised certain gender roles associated with power, masculinity and decision-making, resulting in high caste men viewing their power position as almost natural. Regardless of their socio-economic backgrounds, ethnicity, and positions in the household, women's lack of decision-making power in the WUA is a result of lack of formal experience in dealing with irrigation systems management in the WUA organisational setting; it is also because WUA organisational characteristics historically favour men's views and foreground their roles in, for example, checking the water flow from the canal to the farmers' fields during the night. Hence, while women from higher castes and socio-economic backgrounds may have access to decision-making processes in WUAs, they lack knowledge and experience on actual water distribution and irrigation systems management. Linking institutional bricolage (Cleaver, 2012) with human agency (Giddens, 1984) reveals how women's capacities and knowledge determine the degree to which they can make use of their access to decision-making processes in WUAs. In this particular case, women's ability to mobilise rules and resources within the organisational functioning of the WUA is limited by their lack of opportunity to gain knowledge and understanding of the irrigation system's characteristics (Whaley, 2018).

Few women (including those from well-off and high caste families) attend the yearly WUA General Assembly meeting. Lacking the power to influence overall decision-making and, because of abundant water, perceiving the WUA's role in actual water distribution as rather insignificant, they view the meeting as merely an addition to their already heavy workload. Following male outmigration, women assumed responsibility for both domestic tasks and agricultural chores, which are sometimes accomplished with support from other family members. In some cases, however, both men and women workers are hired from among the agricultural labourers who come to Chitwan from other Terai districts

and from adjoining parts of India. Such labourers provide their services in groups, moving from household to household and village to village on the basis of previous work arrangements. While women from more wealthy households are able to hire labourers, women from poor households are constrained to fulfil all farming and domestic tasks by themselves. Even if they have the money to hire labourers, it is hard to convince women from both poor and better-off households to take time off from their agricultural and domestic tasks to attend WUA meetings (Udas, 2014).

Women often find it to be a better use of their time, and more effective in terms of decision-making in their favour, to convey their water service needs to a male relative who is attending the WUA meeting (Ghimire, 2005; Zwarteveen and Neupane, 1996). This is exemplified in the case of Rasita (a pseudonym); she is a young woman farmer in her 20s who relies mostly on her brother-in-law to carry out agricultural and water-related work in her household. As Rasita explained, her reluctance to participate in the WUA was because,

> Multiple household responsibilities keep me busy and leave me no time to attend WUA meetings. Also, I do not see any reason why I have to be more involved in WUA organisational activities if my brother-in-law could also take care sufficient and reliable water service provision to my fields (Interview, December 2019).

Women in such cases do not make their choice to be involved in the WUA on the basis of its decision-making power in irrigation systems management, especially when they can arrange their irrigation water supply through informal channels, for example via intervention by a brother-in-law. This implies that some women exercise informal and indirect agency in the WUA and are able to make strategic choices by mobilising their social networks and in that way ensuring that their water needs are met.

Rasita perceives participation in the WUA as something that her brother-in-law can do and then inform her as to the decisions made. She does not at all see this as hampering her decision-making role, as she has accepted that WUA work is men's work. As stated by Zwarteveen (1997: 1345), "Improving female participation in water users' organisations may not be easy because in many societies public decision-making and attending public meetings are conceived as typical male activities". While Rasita's decision could be viewed as an example of a woman's dependence on her stronger male family members, we argue that women's lack of direct involvement in WUAs does not necessarily mean that women are not able to organise themselves outside the WUA. On the contrary, women's strong involvement in all-female groups such as microcredit organisations shows that women are capable of taking leadership roles and playing active parts in decision-making processes when the organisational structure and decision-making setup allows them to voice their needs and benefit from their involvement. This is possible not only because of the absence of men in the organisation, but also because women know how to navigate decision-making processes around microcredit rules and mechanisms while relying on their skills and experience to manage their farm household's income and expenditures. There may also be a general agreement around how a woman is expected to behave in the presence of other women where there is shared understanding and expectations. As explained by one of the women from the group,

> It is easier to communicate and negotiate between women within the group, unlike in WUA which has both men and women members. The village is closely knit and since everyone knows everyone, being seen as assertive in front of male counterparts is not something every woman would appreciate, as this contradicts the traditional gender roles (Interview, December 2019).

Women's strategies are thus derived not only from the organisational characteristics of the microcredit group, but also from their understanding of how such groups work. Similarly, Rasita's strategy of partially withdrawing from the WUA is linked to her view of what women are, and are not, able to do to influence WUA decision-making.

This view is not limited to well-connected individuals. Sari (not her real name) comes from a relatively poor household and lacks any familial connection to the WUA; however, she does not think her involvement in the WUA would have made any difference to her agricultural or domestic workload. Like

Rasita, Sari perceives participation in the WUA as less important than the other farming activities – such as land preparation and canal maintenance – that she is responsible for following the outmigration of her male family member.

Thus, while female WUA membership has been endorsed by the government, this has not always resulted in women's greater participation in WUA decision-making. While token participation has been highlighted as one of the key issues hampering women's empowerment, our case study shows that it is merely a symptom and that there are much larger issues; these are rooted In gender roles and norms; in the way that men and women view their unequal gendered positions; in how these unequal positions are reflected in the way women (re)shape their responses and strategies to male outmigration; and in the importance that women place on WUA organisational functioning for their farming activities and irrigation systems management. Although women engage in heavy productive farm work such as carrying fodder, wood and water, gender norms cause their contribution to be overlooked, as women are assumed to mostly carry out reproductive/domestic work. Irrigation falls under men's tasks and responsibilities since they are perceived to be physically stronger than women, regardless of whether this greater physical strength is relevant to the (re)shaping of decision-making processes around water distribution schedules and allocations. Rasita and women from other groups navigate constrained gender roles and norms through processes of institutional bricolage whereby they (re)shape their farming strategies in conjunction with their access to (in)formal networks within the WUA. The processes of institutional bricolage include fine tuning the degree and scope of their involvement in the WUA, while relying on their knowledge and their ability to make the conscious and non-conscious decisions that form an integral part of their farm household's strategies. The Janakalyan case illustrates how women from different social groups shape their involvement in the WUA in relation to their ability to cope with the additional workload stemming from male outmigration; it further shows how remittances are used to hire daily labourers as an end in itself, rather than to free women up to participate in WUA activities and meetings. Women (re)shape their agency in line with their understanding of irrigation systems management, as well as according to how they feel WUAs could and should function in relation to their changing roles and tasks following male outmigration, and in line with how they perceive their roles and involvement within the WUA.

The Kalleritar case: Canal maintenance and the shaping of women's agency

The Kalleritar irrigation scheme is in the hilly area in the north part of the Mahabharat range in the Dhading district of Nepal. It is approximately 50 km from the capital of Kathmandu and is reachable via a suspension bridge, though in recent years the village has become accessible by road. The WUA, formed in the 1990s, has a membership of 200 farm households and covers 120 ha of irrigated land. The executive committee appointed its first woman member in 1996. The government's mandate of female representation was reported to be a major impetus behind this appointment and her father-in-law was on the executive committee when it appointed her; however, this woman has her own land in the system and she has risen to become the deputy secretary. At the time of data collection, the WUA executive committee comprised four women and seven men.

Like in the case of Janakalyan, women farmers in the Kalleritar irrigation scheme have little time to come to WUA meetings. As expressed by one female interviewee in her late 20s who lived in a nuclear household, "Women have so many works to be completed. We do not have time to go to meetings. If I sit for a little while, I am already worried that I would not complete my work in time" (Interview, December 2019).[4]

[4] The size of the land owned by this woman farmer was not disclosed. On average, women own significantly less land than men. According to 2011 data from Nepal's Central Bureau of Statistics, only 19% of women in Nepal owned land (CBS, 2011).

Within the Kalleritar command area, however, there is a strong women's cooperative with 250 members; it facilitates savings and loans for agricultural inputs, horticultural activities, and livestock. Local women are also members of several other organisations such as drinking water committees and forest users groups. Experience in these organisations complements women's involvement in WUAs, giving them confidence to speak in meetings.

Unlike in Janakalyan, labour crews from the plains are not available and there is only a limited supply of expensive agricultural labourers from surrounding villages. The cost of hired labour is thus relatively high and it is more difficult for women to contract labourers for employment. Lack of time and the difficulty and/or cost of hiring daily labour significantly influence women's decisions to participate in WUA organisational activities. As commented by an older woman from a joint household: "We are trying to do everything by ourselves because additional agricultural labours would also mean additional higher production cost" (Interview, December 2019).

In addition to the relative unavailability of agricultural labour crews in Kalleritar, the nature of male migration there also differs from that of Janakalyan. Many men from Kalleritar migrate to work in the police or army and are therefore usually able to come back during peak agricultural seasons to provide the needed labour. To a certain extent, the introduction of agricultural machinery has reduced the workload of farmers, though this also depends on the specific function of the machines. Rice harvesters, for example, have reduced the number of manual paddy harvesting days, which is traditionally women's work. The use of a tractor for ploughing, on the other hand, has eased men's labour burden but has resulted in increased work for women. As one woman explained, "While men use tractor for ploughing the field, the land would still need to be levelled and the latter has become women's new task as well" (Interview, December 2019).

Following the annual WUA General Assembly meeting, the executive committee decides on canal maintenance activities and on how farm households should contribute. Initially, only men were allowed to do the work because canal maintenance was seen as heavy labour that would be difficult for women to perform; moreover, because the main supply channel bringing water to the system is 11 km long, it was perceived to be difficult for women to travel up the canal without neglecting their responsibilities at home. Approximately 15 years ago, women advocated to be allowed to work on canal maintenance when men were not at home; however, experiences with households sending elderly women or young children for labour prompted the WUA to ban women from providing maintenance. As one male WUA executive committee member stated,

> In the past, if a household could not contribute to the maintenance because it lacks an able male family member presence during that time, the household would need to compensate financially, to get the maintenance done by male farmers or labourers. This is because canal maintenance requires good physical condition, which women are lacking (Interview, December 2019).

Participation of both men and women in the WUA has evolved over the years, partly driven by male outmigration. Women from outmigrant households insisted that they could also provide labour for canal maintenance instead of paying the additional fee or hiring labour; they thus demanded that the rules be reformed. As more and more farm households were unable to fulfil the male labour obligation due to outmigration, the WUA executive committee agreed to let women between 15 and 60 years of age do labour for canal maintenance.

Women were originally seen as providing inadequate labour; however, as the diligence of women became evident, some came to perceive men as being lazy. This contradicted the traditional belief that men have superior technical competence and are able to get more work done than women. As shared by a woman in her late 30s from a nuclear household, "Women had to work hard to prove themselves that they can do physical work for the canal maintenance to men. But men, on the other hand could just do whatever they want related to canal maintenance, as they know nobody would scrutinise their work" (Interview, December 2019). One older woman from a relatively well-off joint family commented that,

"During one of the canal maintenance activities, women were working diligently without being side-tracked by small talks. Men, on the other hand, were not working and were engaged in various conversations instead, causing in delays of the work needs to be done" (Interview, December 2019). Confronted by women, some of these men later proposed to the executive committee that they do not allow women to provide their labour for canal maintenance and that the new rule be retracted. Ultimately, the WUA agreed that men would do the maintenance of the more distant parts of the supply channel, while women would bring gravel up from the river and do maintenance near the settlement; this was also heavy work but was easier to combine with their domestic tasks. As one woman leader observed, "in that way the men supported us" (Meinzen-Dick et al., 2022).

In this case, institutional bricolage and the (re)shaping of women's agency is rooted in women's ability to act while relying on their knowledge and understanding of how canal maintenance can and should be done. This ability is closely interlinked with women's organisational skills and with their leadership roles in the women's cooperative as they learned and practiced negotiating and speaking in public.

Water supplies are not as abundant in Kalleritar as in Janakalyan, so women (and men) cannot count on getting water without effort. The long canal supplying the system requires considerable labour for maintenance. As reported in another study, a middle-aged Kalleritar women pointed out that, "We don't do maintenance to save money, but to bring water to the farms" (Meinzen-Dick et al., 2022). Women's direct involvement in canal maintenance also gives them a space to discuss and negotiate their needs and to be involved in WUA organisational activities. Women's labour provision for canal maintenance is, in effect, translated into the right to water (Coward, 1986).

While final formal decisions were still being made at the executive committee level, women learned from such incidents about the importance of their representation on the executive committee, and they now hold a majority – four of the seven positions. This illustrates how women's decision to challenge gender and social norms regarding the role of men and women in canal maintenance is derived from their evolving understanding of how, following male outmigration, both men and women can contribute to this work.

In addition to their involvement in the WUA, women are strongly involved in various small farmer groups; these range from microcredit groups to cooperatives providing agricultural inputs. As in Janakalyan, women in Kalleritar reported feeling more comfortable working with other women, as they would then not need to worry about being perceived as lacking experience and/or as challenging traditional gender roles and norms.

Women's perception of involvement in WUAs also differs by generation and caste. Younger women from the Brahmin and Chettri castes perceive their involvement in WUA meetings as problematic, both in terms of decision-making power and time constraints for labour contributions; some of the older women from the Dalit caste, in contrast, highlight the importance of women's involvement in WUA meetings and decision-making processes. As shared by an older Dalit woman from a joint household, "Being a member of WUA would safeguard women's rights. Women should use their representation in WUA as a means to achieve their needs, even when this means they have to interact differently with men" (Interview, December 2019). Surprisingly, older Dalit women were more interested than younger Brahmin and Chettri women in being formally involved in WUAs. This may reflect the more restrictive gender norms among high caste communities and it may also follow from the greater time constraints on younger women whose heavier domestic responsibilities limit their attendance at public meetings; older women, on the other hand, may have gained a status that makes them more able to engage with men in public spaces, thus revealing women's increasing ability to negotiate their water use over time. Important to note is that while age may be a factor influencing women's perceptions, their other associated identities may also frame their perspectives.

Setting quotas for women's representation in WUAs could theoretically serve as a policy measure to create space for women. In its application, however, the system is challenged by women's labour

constraints and by male domination of WUA decision-making and processes (van Koppen, 2002; Zwarteveen, 1993). WUA formation and organisational functioning have been driven mainly by men's views and perspectives, which significantly overlook women's roles as water users and resource managers. An elderly woman interviewee from a well-off joint Kalleritar household commented that,

> Information on formation of WUA Committee as well as other important irrigation decisions were taken by men. Changes in composition of group on participation of women has been pushed by the government's policy, quota system. Some women participate and have become members of the Committee. Nonetheless, their ability to do so is closely connected with their relations with men Committee members (Interview, December 2019).

This highlights the importance of bringing men on board for women's quest to change traditional gender roles. It also highlights the role of the state in projecting existing gendered relations and norms in the context of the WUA (Tamang, 2000). As shared by a young woman from a well-off joint household, "Letting women fight alone to change age-old gender norms could take a lot of time. Hence, there is a need for men to understand the value of women participation, so that they can also support women's membership and decision-making in WUA" (Interview, December 2019).

The Kalleritar case shows how women (re)shape processes of institutional bricolage while relying on their viewpoint, understanding and experience of WUA's organisational functioning following male outmigration. Women's agency is linked to: (1) their understanding and experience of gender inequality in irrigation systems management; (2) the organisational skills they have gained through involvement in the women's cooperative; (3) their ability to negotiate their ideas on how canal maintenance should and should not be done in adjusting to male outmigration; and (4) how they, in turn, could mobilise existing rules regarding the WUA's functioning.

GENDERED INSTITUTIONAL DYNAMICS AND THE (RE)SHAPING OF WUA ORGANISATIONAL RULES

We argue that women's views and strategies for coping with male outmigration, including their level of involvement in WUAs, is closely interlinked with WUA organisational rules and functioning and how these have developed over time. These organisational rules include: (1) the role of the WUA executive committee in discussing and deciding on the water distribution schedule; (2) the role of maintenance contractors or appointed irrigators;[5] and (3) the centrality of labour provision for canal maintenance to WUA organisational activities and functioning.

In general, WUA executive committees would discuss and decide on the water distribution schedule on an annual basis, mostly to match the irrigation water delivery schedule with planting schedules. To channel irrigation water to the right area at the right time and for the correct duration requires a lot of technical knowledge; it also requires astute insights as to, among other things, how the irrigation scheme works, the different physical infrastructures that play key roles in water diversion and water distribution practices, canals conveyance, and actual gate operation. The flexible delivery of irrigation water delivery to meet crop needs, for example, relies on different water channels passing through natural and concrete field passages; this, in turn, requires comprehensive knowledge of the irrigation system such as where field channels will turn into irrigation canals and/or drainage canals as well as a topographical overview. Historically, physical and management systems were developed that assumed there to be men with the appropriate knowledge and insights to do the maintenance tasks. Over the decades, such men played key leadership roles within the WUA in (re)shaping its organisational functioning and activities.

Formal provisions for women's attendance at and involvement in WUA meetings are not necessarily the same as women's agency, especially regarding women's decision-making and leadership roles within

[5] Appointed irrigators are WUA members whose responsibility is to ensure reliable and equal irrigation water supply to all farmers.

the WUA. Women attendees at WUA meetings did not necessarily have the knowledge and insights to follow the discussions of water distribution practices or participate in decision-making; therefore, exposing their lack of expertise and their inability to contribute knowledgeably to the discussion risked further undermining their position and confirming the traditional perception of their roles as being primarily domestic. In most cases, the government's quota system combined with women's lack of technical knowledge of the irrigation schemes have resulted in women taking the role of treasurer and focusing mainly on administrative work within the WUA executive committee; however, even conducting administrative work without full knowledge of the system can be problematic. A woman treasurer of the Janakalyan WUA commented that, "[Occupying the position of] treasurer does not automatically enable women to fulfil its full mandate when financial transactions for WUA continue to be done by men Committee members" (Interview, December 2019). While male executive committee members may inform women about expenditures (for example, buying cement for canal maintenance), women lack both the decision-making power and the technical knowledge to review such decisions.

Similarly, common irrigators, or WUA members that are assigned with the task to oversee and arrange the overall water distribution practices, play an important role in ensuring reliable and sufficient irrigation water supply to farmers' fields. Women, however, cannot take on this role as it requires extensive technical knowledge on, for example, how the system works, technical bottlenecks, and flexibility in terms of which canals can be used to channelled water; it also calls for physical day or night presence in the field. One woman WUA member stated that, "Even when women want to and have the technical knowledge of the irrigation scheme, [they] could not be a [common irrigator] because this means they would have to work during late night hours, especially when water allocation is arranged during night time" (Interview, December 2019). Many would argue that women could be actively and meaningfully involved in WUA organisational functioning even without being able to be common irrigators; however, leadership roles within the WUA executive committee are very much linked to the ability to work year round with the common irrigator to ensure reliable and sufficient water supply to farmers' fields, particularly in March and April when water is limited. In most cases, it is not uncommon for WUA executive committee members to come along with the common irrigator on his irrigation rounds in order to ensure that water is distributed equally among the different areas. For women occupying WUA executive committee leadership positions, establishing a close link with common irrigators' work and decisions in the field is key to (re)shaping their role and position within the organisation. Women's leadership role and agency would derive from their knowledge about the irrigation systems' characteristics and their ability to understand its operational components; they must master these technical aspects of irrigation systems management before they can mobilise and negotiate rules and resources and influence WUA decision-making.

WUA organisational activities are centred on the need to maintain the canals. The contributions of physical labour that ensure that it is done appropriately are key to efficient WUA organisational functioning. Prior to male outmigration, this work would generally be done by men; recently, however, women have become involved in canal maintenance and have come to view it in different ways, depending on their local situation and preferences. In Janakalyan, the contract system for maintenance allowed women to pay cash in proportion to landholding or to hire labourers instead of providing their own labour; as women from that community viewed even emergency canal maintenance as additional and burdensome labour, these alternatives offered a solution. This monetisation and contracting of WUA members' contributions for irrigation systems maintenance has been widely resorted to as a response to male outmigration in Nepal (Meinzen-Dick et al., 2022). In Janakalyan, as women could rely on hired labourers and could use remittance cash to cover the additional labour costs, and as they had access to reliable and sufficient irrigation water supply, they were able to opt out of direct involvement in canal maintenance activities and to rely on their informal connections with WUA executive committee members to influence the organisation's decisions. In this case, women's choice to not get physically involved in canal maintenance has not resulted in conflict or power struggles within the WUA. In

Kalleritar, however, women had fewer options to hire labour, and because water was scarcer, proper functioning of the irrigation system was more important. Encouraged by their experience with a successful women's cooperative, women began to play a larger role in WUA decision-making; they also proposed that women should be able to conduct physical canal maintenance work in areas that are accessible to them. These changes resulted in a flow of water that ensured agriculture productivity and sustained household incomes. We can see from this case how women were able to (re)shape the process of institutional bricolage to represent their needs and views through orchestrating adjustments of canal maintenance and organisational rules within the WUA. Women's agency is thus at least partly derived from their ability to gain knowledge and capability elsewhere and apply them within the context of irrigation systems management.

CONCLUSION

Women's view of labour constraints and how they address and cope with the problem is key to (re)shaping their decision to participate and be involved in WUA organisational activities. We argue here that while male outmigration can be associated with positive development in terms of women's empowerment, the latter can only happen when women are able to find viable solutions for coping with labour shortages and additional workloads in relation to their overall farming strategies (Gartaula et al., 2010). Nonetheless, while our Janakalyan case study illustrates how women were able to rely on their informal networks, including to arrange for additional labourers from outside the village, this does not automatically result in women taking a greater role in WUA organisational activities. For women to meaningfully participate in WUAs as they did in Kalleritar, they need also to see how such participation and involvement will benefit them and their households' farming practices.

Different groups of women (re)shape their responses in various ways to cope with male outmigration; this can include becoming involved in WUAs through processes of institutional bricolage that manifest in different types of agencies. In the case of Janakalyan, for example, women managed to address the issue of labour shortages caused by male outmigration through hiring labourers and contributing cash for the contracting out of annual canal maintenance work. While not all women agree on the idea of monetisation of canal maintenance, it in fact earned women new status as they became equal to male members in terms of their contribution. In Kalleritar, women were able to change the WUA's organisational rules pertaining to provision of labour for canal maintenance. While women's strategies differ, both cases show women's agency and their ability to cope with male outmigration while pushing forward their various strategies for accomplishing their farming tasks.

Our case studies highlight: (1) the centrality of WUAs' organisational rules to irrigation systems management; (2) how these rules are manifested in the formal functioning of WUAs; and (3) how the WUA rules influence the (re)shaping of the views of women from migrant households and their decisions as to whether or not to get involved. Put differently, women from households whose men have migrated for work decide about their WUA involvement on the basis of how they view its organisational importance to canal maintenance and water distribution practices. From a policy perspective, WUAs' organisational evolution is key to ensuring that increased women's participation and involvement translates into greater representation of women's needs and their broader decision-making roles in the WUA. The paper highlights the importance of a gendered understanding of institutional dynamics; it emphasises how key such an understanding is to meaningful women's involvement in WUA organisational activities and functioning and to the organisation's inclusive evolution. In concrete terms, this means pursuing the government's national irrigation policy beyond simply increasing women's participation in WUAs, such that it also includes the opening up of discussion on adjusting WUAs' organisational rules and procedures. Potential entry points for promoting such discussions include designing participatory WUA training programmes to increase women's technical capacity in water

distribution practices such as water measurement (Pulley et al., 2004). In this way, a more equal playing field can be created between women and men WUA members.

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