



Has the vision of a gender quota rule been realized for community-based water management committees in Kenya?



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ARTICLE INFO

Article history:

Accepted 18 August 2020

Available online 6 September 2020

Keywords:

Gender quotas
Representation
Participation
Environmental governance
Kenya
Africa

ABSTRACT

Persisting gender inequities across political, economic, and public life have motivated global agendas to increase women's leadership at all levels of society. Gender quotas offer one solution to encourage equitable gender representation in public decision-making by specifying a target number of women to serve on publicly-elected bodies. For natural resource governance sectors, can gender quotas promote women's representation and participation in leadership? In 2010, Kenya enacted a new Constitution that included an article mandating that no one gender should make up greater than two-thirds of the composition of public committees. This 'two-thirds gender rule' also applies to community-level governance of water resources through water user resource associations, which were formally recognized in 2002. We present a study of community-based water committee compliance with Kenya's national two-thirds gender rule based on surveys, focus groups, and interviews with water committee members. We show that Kenya's gender quota has been moderately successful in increasing women's representation on water committees. However, men hold more higher-level leadership positions than women, who typically serve as treasurers. Although there were no statistically significant differences between men and women's self-reported participation frequency in various committee activities, men contributed significantly more hours per week to committee activities, facilitated meetings more frequently, and were more willing to lead meetings. Based on this leadership gap, we examine the sufficiency of a gender quota to promote equal leadership opportunities for women. We find that realizing the vision of a gender quota is conditional on how individuals are *represented* on community-based environmental committees as well as how individuals *participate* in committee activities.

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1. Introduction

In accordance with agendas of the United Nations Development Program's Millennium and Sustainable Development Goals, countries across the globe have been promoting women's leadership in the public sphere (Kabeer, 2005; Fukuda-Parr, 2016). These goals support gender mainstreaming, which are formal and informal processes of incorporating representative gender perspectives

into policies and legislation to minimize gender inequalities (Alston, 2014). In principle, gender mainstreaming does not favor one gender over another. However, gender mainstreaming efforts often focus on women, who are typically underrepresented in public policy and decision-making.

To increase the proportion of women representatives serving in publicly elected positions, over 100 countries across the world have instituted gender quota legislation in national parliaments, legislatures, or sub-sector government bodies (Dahlerup et al., 2013). Gender quotas are established numerical targets that specify how many women or what percentage of women should be represented in a candidate list or serving on a publicly-elected body (Krook, 2006, 2010; Dahlerup, 2013). In line with gender mainstreaming goals, these gender quotas aim to advance women's

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political engagement (Zetterberg, 2009) and can assist in promoting women's interests during policy development and implementation (Franceschet, Krook & Piscopo, 2012; Krook, 2008).

While gender quotas are often studied with respect to political elections, few studies have assessed gender quotas in the context of community-based resource management (Resurreccion, 2006; Girard, 2014; Speranza & Bikketi, 2018; Cook, Grillos, & Andersson, 2019). For instance, in Resurreccion (2006)'s review of three community fisheries management groups on Cambodia, only one woman was elected to serve as a committee officer. Although an explicit one-third gender quota system was in place, women were reluctant to serve on committees, because men typically dominated the management of fisheries, and women were generally already engaged in other fishery production activities (Resurreccion, 2006). Men's historical dominance in natural resource leadership and management is a common cultural phenomenon that may directly or incidentally discourage women from engaging in environmental governance (Agarwal, 1997, 2001; Diiro et al., 2018; Grillos, 2018; Meinzen-Dick & Zwarteveen, 1998).

Additionally, in an experimental study of forest user groups in Indonesia, Peru, and Tanzania, Cook, Grillos, & Andersson (2019) attributed greater forest conservation and equitable distribution of ecosystem services payments to gender quotas. They concluded that the gender composition of the group affected the experimentally assigned climate interventions rather than women serving in executive leadership positions. However, the study did not delve deep into individual-level participation dynamics that could arise when executive leadership positions are composed entirely of men compared to when women share some portion of leadership positions. For example, when more women serve in executive leadership roles, women may be more willing to advocate on behalf of their female constituents (Agarwal, 2010).

In another study, Speranza & Bikketi (2018) reviewed how a national-level gender quota was adopted in water governance committees in the Mt. Kenya region using data from 2011 to 2012. Instituted in 2010, Article 27 of the Kenyan Constitution states that no one gender should make up greater than two-thirds of the composition of individuals serving on public committees (Laws of Kenya, 2010). Colloquially termed the "two-thirds gender rule," this constitutional rule is a targeted effort of the Kenyan government to ensure that women are equitably represented on publicly-elected bodies, including on community-based water governance committees. Speranza & Bikketi (2018) found that 90 percent of the 30 community-based water projects in the study had women representatives on the committee, though it was not clear whether the two-thirds rule was met.

While these prior studies have contributed to the nascent literature about gender quotas in natural resource sectors, a greater understanding is warranted of the processes for how environmental governance committees adopt and comply with an instituted gender quota. To address this topic, we pose the following research questions regarding community-level water governance committees in Kenya as an example of environmental governance.

- 1) Has the vision of Kenya's national gender quota rule been realized for community-based water governance committees in central Kenya?
- 2) What is the interplay between the gender quota rule and women and men's respective roles on the committee relative to their contributions to committee activities?

We address these questions with a multi-method study combining quantitative and qualitative data from surveys, focus groups, and interviews with water governance committees in the Mt. Kenya region of central Kenya. In doing so, we also provide an updated review of Kenya's two-thirds rule from what

Speranza & Bikketi (2018) learned in 2011–2012. We frame our conceptual approach, analysis, results, and discussion with respect to women's representation on water governance committees and their participation in committee activities.

2. Background

2.1. Overview of gender quotas

To study gender quotas for community-based environmental governance, we first review how gender quotas have been studied in the past. Many variations of gender quotas exist. Research on women's representation in politics identifies three types of legislative gender quotas: 1) reserved seats constitutionally or legislatively specify a number or proportion of seats to be allocated to a certain gender, 2) legal candidate quotas constitutionally or legislatively require a certain number of individuals running for office be of a certain gender, and 3) political party quotas refer to the case where political parties voluntarily institute a gender quota for their party during elections (Krook, 2010; Franceschet, Krook & Piscopo, 2012; Dahlerup et al., 2013).

Variations on these gender quota types have been adopted across socialist and democratic countries since the 1930s (Krook, 2006; Inglehart & Norris, 2001). As a result of increased attention to women's representation in a number of international and non-governmental organizations, legislative quotas became more prevalent among developing countries and post-conflict societies in Africa, Latin America, the Middle East, and southeastern Europe by the 1990s (Krook, 2006). The United Nations Economic and Social Council endorsed a one-third target representation in 1990 to advocate for at least one-third women representation in publicly-elected bodies. The same target of one-third representation was reiterated in the Beijing Platform for Action in 1995, and remains a commonly cited goal for countries aiming to increase women's leadership in the public sphere (Krook, 2010).

However, when it comes to environmental governance, most legislation is gender-blind, where laws do not specify which types of individuals have a right to access and govern resources. According to a recent study of legal frameworks on water governance, the Rights and Resources Initiative & Environmental Law Institute (2019) found that only a few countries, such as India, Liberia, and Zambia, have explicit legislation that recognizes women's rights to participate in freshwater governance -- often through the establishment of a gender quota for community-based water governance committees. Few other countries, such as Colombia, Kenya, Mexico, and Nepal, have additional legal frameworks that only imply the legal right of women to govern water resources. Yet, thus far in the literature on environmental governance, *how* gender quotas are adopted in a community-based natural resource management committee remains less clear.

2.2. Representation

Representation is one important consideration to the study of gender quotas. The institutionalization of gender quotas facilitates women's political representation by 'making present' citizens' voices, opinions, and perspectives in the public policymaking process (Dovi, 2018). Political representation can take several forms (Pitkin, 1967; Schwandt-Bayer and Mishler, 2005). Most notably, Pitkin (1967) identified the following four facets of political representation, which often occur together (Schwandt-Bayer and Mishler, 2005):

- 1) *Formal representation* refers to the rules and procedures through which representatives are selected, such as a national law or committee bylaw. These are the written rules stating the processes for guaranteeing that a political body meet a certain gender composition.
- 2) *Descriptive representation* describes the composition of a legislature or committee relative to the various individuals that are represented, usually based on characteristics such as gender, race, age, class, and so forth. Designating one-third of seats in a legislature or a committee for women is an example of descriptive representation. In the context of a gender quota, descriptive representation is the most visible and commonly measured proxy for representation.
- 3) *Substantive representation* denotes how representatives' actions are carried out in the interest of the represented. These actions can include voting on motions, enacting legislation, or implementing policies on behalf of the interested parties. Due to these actions, substantive representation is often considered the most important dimension of representation.
- 4) *Symbolic representation* occurs when citizens perceive that their voice, opinions, and perspectives are being represented. Thus, symbolic representation hinges more on what the represented think of their representatives rather than on what representatives do.

2.3. Participation

These four elements of political representation defined by Pitkin (1967) lack full consideration of the nuanced roles of participation in leadership activities. Participation extends well beyond group membership to include influencing decisions made on behalf of the group (Agarwal, 2001; 2010) and contributing to the overarching governance system (Agarwal, 2000). This process of participation, where individuals are involved in a spectrum of activities, remains as important as the resulting outcomes of participation (Adams et al., 1997; Grillos, 2018).

Participation is the second important consideration to the study of gender quotas, especially for women in natural resource management. Women are more likely to have equitable access to natural resources when they participate in the shared use, access, and control of these resources (Agarwal, 2013). Critical to the process of participation is how women represent women's interests, whether they raise their voices, and whether anyone listens (Cornwall, 2003; Mohanty & Tandon, 2006). Women's participation in management is considered effective when equity, efficiency, empowerment, and environmental sustainability are emphasized in the participatory process (Agarwal, 2001). Effective participation thus requires women's participation in a multitude of management activities, including attending meetings, expressing opinions at meetings, volunteering to take on activities, and holding office (Agarwal, 2010; Kholif & Elfarouk, 2014). This emphasis on women's effective participation, where women are actively engaged and accepted in the decision-making processes and management of resources, echo Pitken's definitions of substantive and symbolic representation. At these important levels of representation, women are both active and acknowledged contributors to environmental management, which can be considered an effective outcome for equitable governance of natural resources.

While several scholars have developed various classifications of participation to detail the ways that individuals engage in decision-making specific to gender-based studies (Pretty, 1995; White, 1996; Prokopy, 2004; Agarwal, 2001, 2010), we draw from Agarwal's most recent typology of participation (Agarwal, 2010). From nominal participation to interactive (empowering) participation in six different levels, this typology allows the classification of

participation from mere membership to decision-making and influence. At a minimum, participation can be nominal, such as belonging to a group. For example, a gender quota's descriptive guideline asserts the requirement of nominal participation from an underrepresented gender. Agarwal (2010) then describes passive participation as being informed of decisions made or listening in on meetings without contributing to discussions. Next, consultative participation is when an individual may be asked to provide opinions with no guarantee of influence. Afterwards, activity-specific participation involves being asked to take on specific tasks, whereas active participation means taking on greater initiatives or expressing opinions. Finally, interactive participation indicates having influence in group decisions, especially in instances of holding formal office in positions that are influential to the group's decision-making process.

An individual's participation in typical community-based water governance activities can align with the participation levels from Agarwal (2010)'s typology (Table 1; Agarwal, 2010). In Table 1, nominal participation is not included, because holding a committee position covers this minimal form of participation. Additionally, some committee activities can arguably be classified in more than one category. Arguably, Agarwal (2010)'s typology does not capture the full extent of participation to include the final decision made by water committee members. That is, the level of interactive participation only encompasses activities that have the potential to influence decision making rather than the decisions that are ultimately made. Nevertheless, the typology provides an organized structure to empirically evaluate a range of participation activities in a community-based water committee setting.

Table 1

Classification of common activities for elected leaders of community-based water governance committees according to Agarwal (2010)'s participation typology.

Water Committee Activities	Definition	Typology of Participation (Agarwal, 2010)
Attending meetings	Meeting presence, no expectation of participation	Passive Participation
Managing documents	Organizing paperwork for any aspect of the committee	Activity-specific participation
Managing finances	Managing committee finances, including financial calculations and facilitating bank deposits	Activity-specific participation
Collecting fees	Collecting fees from group members, requires engagement with community members	Activity-specific participation; interactive participation
Expressing opinions	Sharing opinions openly with other individuals on the committee, especially during committee meetings	Active participation
Meeting with water agency officials	Serving as the committee representative in meetings with key stakeholders, requiring active engagement, negotiation, and interaction during meeting discussions	Consultative; interactive participation
Addressing complaints	Responding to group members' issues as they arise, requiring active approaches to conflict resolution and ability to interact with a number of individuals	Consultative; interactive participation
Leading meetings	Facilitating meetings, requiring an active role in setting agendas, guiding discussions, keeping the committee on track with meeting goals	Interactive participation

2.4. Conceptual model

To guide our inquiry of gender quotas for community-based water governance, we present a conceptual model detailing the convergence of representation and participation concepts based on Pitkin (1967)'s theory of representation and Agarwal (2010)'s typology of participation in Fig. 1. While we do not develop hypotheses of proposed relationships in the model, our conceptual model presents how the nuanced concepts of representation and participation interface with each other in the context of a gender quota. Namely, the visionary goals of a gender quota are to ensure that women's perspectives are substantially represented on a publicly-elected body (substantive representation) and that constituents believe that they are effectively represented (symbolic representation). Despite these goals, the implementation of gender quotas often focuses on increasing representation of a given constituent group, without promoting meaningful and effective participation when serving on a publicly elected body. We contend that the process of participation warrants further attention in both the study and implementation of gender quotas for environmental governance sectors, which leads us to investigate this topic in our analysis.

Greater representation and participation of women on natural resource-focused management committees would promote effective environmental governance, sustainability and equitable access to resources. For instance, Norgaard & York (2005) found an association between greater gender diversity in legislatures and environmental treaty ratification. Though, the more explicit link between proportional women's representation and simulated equitable environmental outcomes has been empirically demonstrated in experimental field settings by Cook, Grillos, & Andersson (2019) at the community-based forestry management scales. At the scale of national-level parliaments, Mavisakalyan & Tarverdi (2019) found a causal relationship between higher female political representation, climate policy adoption, and lower carbon dioxide emissions. Although included in our model as a gender

quota goal, the association between greater women's representation and positive environmental outcomes is not guaranteed. For example, Mwangi, Meinzen-Dick, & Sun (2011) found that higher proportions of women in forest user groups across East Africa and Latin America were less likely to adopt forest enhancing practices in comparison to mixed forest groups and male dominated groups.

The first step in establishing inclusive participation among all gender groups is to set up formal institutions that require a percentage of a specified gender to serve on a public body, which include Pitken's theoretical constructs of formal and descriptive representation (Fig. 1). Yet, realizing the vision of a gender quota requires additional efforts beyond the formal institutionalization of descriptive compositions that publicly elected bodies should follow, including active participation. Women's genuine engagement at all levels of committee activities are required to ensure women in leadership roles are both substantially and symbolically representing their constituents. When women are effectively participating in management activities by taking initiatives and influencing decisions (i.e., active and interactive participation), they are then able to substantially and symbolically represent their constituents to meet the visionary goals of a gender quota (Fig. 1). At the same time, women's broader participation on a publicly elected committee is also embedded in and constrained by a suite of social, organizational, and individual contexts that inform the degree to which women can effectively participate and feel comfortable in their leadership participation (Nkomo & Ngambi, 2009).

3. Research methodology and context

3.1. Kenya case study

We study water committees, called Community Water Projects (CWP), in the Mount. Kenya region of central Kenya. CWPs provide smallholder households along a single river network access

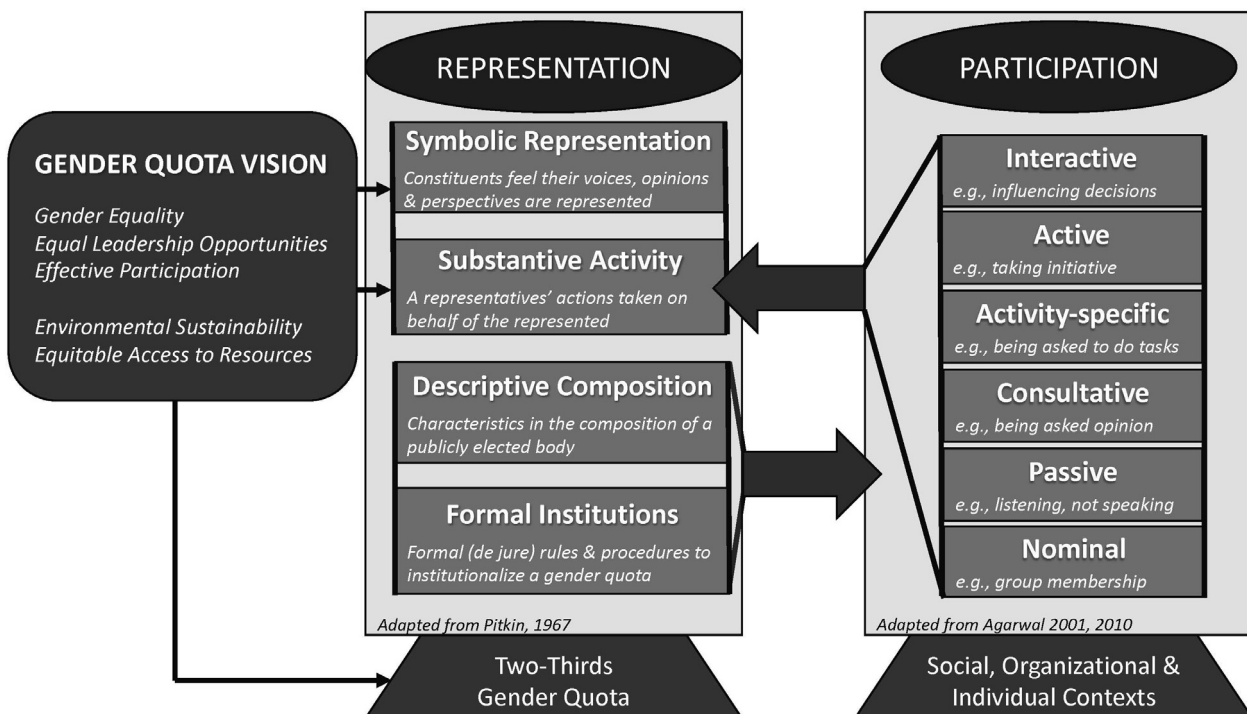


Fig. 1. Conceptual model of representation and participation in support of the vision of a gender quota for environmental governance. Adapted from Pitkin (1967) and (Agarwal, 2001, 2010).

to water for both irrigation and domestic use (Dell'Angelo et al., 2016). Following Kenya's independence from British colonial rule in 1964, dramatic changes in land use occurred as the Government of Kenya subdivided large colonial ranches and farms into small plots in the Mt. Kenya region. These plots were sold to small-scale farmers which triggered an immigration of small-scale farmers into the Laikipia District (present day Laikipia County) (Wiesmann, 1998).

Increased water demand from agricultural intensification and migration to the region, as well as deteriorating irrigation conditions, led to conflict between upstream and downstream users in Mount Kenya's Ewaso Ng'iro River Basin during drought years in the 1980s and 1990s. In response to these conflicts between users, Kenya's government developed Water Resource Users' Associations (WRUAs) and CWP within the national Water Resource Management Agency (WRMA) (Baldwin et al., 2016). A WRUA operates at the river basin-level to coordinate the management of water resources across several CWPs, including rotation and rationing schedules. CWPs manage water resources within a given geographic subset of a WRUA and report issues to their respective WRUA.

In 2002, Kenya revised its Water Act to decentralize water governance, which was a reform inspired by the formation of WRUAs to address upstream-downstream conflicts in the Likii River sub-catchment of the Mount Kenya region (Baldwin et al., 2016). The reform favored community-based governance which gave autonomy to local groups of water users via CWPs. CWPs, WRUAs, and the WRMA now serve as complementary and polycentric governance approaches to water resource governance in Kenya (Government of Kenya, 2002; Baldwin et al., 2016). Additional modifications to the Kenya Water Act in 2016 changed the name of the WRMA to the Water Resource Authority (WRA), further reinforced the governance roles of WRUAs, and provided opportunities to apply for funding to support WRUA activities (Government of Kenya, 2016; Baldwin et al., 2018).

Even before Kenya's two-thirds gender rule was enacted nationally, gender mainstreaming had been promoted in Kenya's water resource sector since 2007. According to the Water Resources Management Rules, for a WRUA to be legally registered and therefore recognized by the government, it must include gender mainstreaming as part of its constitution, alongside elements of public participation, conflict mitigation, and environmental sustainability (Government of Kenya, 2007). The two-thirds gender quota was later written into Kenya's 2010 Constitution to further reinforce gender mainstreaming in Kenya's water resource sector. Following suit with WRUAs, CWPs should also adhere to the two-thirds gender rule and incorporate gender mainstreaming into their management process.

While WRUAs exist throughout Kenya and other African countries, the Mt. Kenya region is both a representative and interesting location to study how a national gender quota law has been incorporated into a community-based water governance system. The Mt. Kenya region is a water tower for Kenya's largest catchments--the Athi, Ewaso Ng'iro, and Tana basins--and our investigation of CWPs in this region allows us to study the role of gender quotas in governance structures tasked with distributing shared water resources equitably. Due to the region's unique history in negotiating water sharing between upstream and downstream users, which led to the development of WRUAs, CWPs in central Kenya offer a learning template for other regions in Kenya and developing countries to adopt forms of decentralized water governance approaches. Information gained from studying gender-based representation and participation in the context of CWPs in our study site can help inform how future gender quotas could be pursued in similar settings.

3.2. Data collection

In January-March 2019, we collected data in our Mt. Kenya study site at the levels of the CWP committee and individuals on those committees. Although a number of studies have examined the participation of women in environmental governance organizations, analyses are often conducted at the household level (Meinzen-Dick & Zwarteveen, 1998; Resurreccion, 2006; Were, Roy, & Swallow, 2008; Alkire et al., 2013; Coleman and Mwangi, 2013; Girard, 2014; Coulter et al., 2018; Grillos, 2018). Coleman & Mwangi (2013), for example, compared the levels of water governance engagement in Kenya between men and women among households by measuring each gender's use of water resources and attendance at CWP meetings (2013). While a household-level approach differentiates the levels of engagement by gender of a community in water governance processes, an individual's direct contribution to leadership and decision-making on a committee is not captured. Thus, we direct the focus of our analysis to individuals serving on a CWP committee.

For all CWPs, the CWP membership elects the CWP committee to lead the management activities of the CWP and serve as a liaison between CWP water users and the WRA (Baldwin et al., 2016, 2018). CWP committees are typically composed of seven or nine committee members. Executive CWP committee positions include the chair, vice chair, secretary, vice secretary, and treasurer. The remaining committee is composed of non-executive CWP committee members. There are few exceptions to this standardized CWP committee structure. Some CWP committees have as few as five and as many as thirteen members, and some executive committees also include additional roles, such as a "vice treasurer," who serves as an assistant to the treasurer, or a 'cluster chair,' who serves as a chair for a specified region of the CWP. We assume that women and men serving the committees are elected by members of the community water projects. In some cases, women and men are often elected to these positions as external residents of the village (i.e., a teacher) or relations of other village leaders, however we did not collect this specific data so as to ensure respondent anonymity in accordance with human subjects-based protocols.

We employed a multi-method data collection approach to our data collection and analysis, which includes triangulation and synthesis of information from various types of data sources (Creswell & Creswell, 2017; Poteete, Janssen, & Ostrom, 2010). This multi-method approach also affords a better opportunity to account for the nuanced opinions and perspectives from diversity of individuals and in both individual and group settings. The three main sources of data came from 1) CWP manager surveys, 2) focus group discussions with CWP committee members, and 3) individual-level interviews with a subset of CWP committee members that participated in focus group discussions (Table 2).

First, we conducted CWP manager surveys with 45 CWP chairs regarding CWP governance, such as the management and operations of the irrigation system and committee-level decision-making processes. The sample of 45 CWPs, across seven WRUAs, was selected in conjunction with a larger research project about farmer-level adaptation strategies and agronomic decision making in response to changing climate conditions (McCord et al., 2017, 2018). This larger project's initial research design focused data collection on a set of 25 CWPs, located in five WRUAs, situated on the leeward side of Mt. Kenya; CWPs were systematically selected to participate in the research based on their location along social, climatic, and hydrological gradients, which allow for the development and testing of hypotheses relevant to the study of social-ecological systems (McCord et al., 2017, 2018; Baldwin et al., 2018).

Our sampling approach for CWP manager surveys targeted the initial set of 25 CWP as part of the project's goal to build a longitu-

Table 2
Total number of research participants for each data collection protocol with check marks indicating the types of CWP committee members involved in each research activity.

Data Source	Number of CWPs	Women	Men	Total Number of CWP Committee Member Participants	Chair	Executive Committee	Non-Executive Committee Members
Focus group discussions with CWP committees, including a demographics survey	27	67	143	210	✓	✓	✓
Individual-level interviews with CWP committee members	27	51	54	105		✓	✓
CWP manager survey	45	2	43	45	✓		

dinal data set of CWP management information since 2013. An additional 20 CWP managers were invited to participate in the manager survey in conjunction with 605 households' surveys that were collected during the 2018 field season. With the goal of expanding our datasets to couple CWP-level data with household-level data for future analyses beyond this paper, we included additional CWP managers for CWP locations in which our research team surveyed at least five household locations during the 2018 field season.

Second, we led focus group discussions with committee members in 27 CWPs (Fig. 2). Of the 45 CWPs with which we conducted CWP manager surveys, we sampled 30 CWPs to seek committee-level participation in focus groups. Twenty five of these 30 CWPs were included in prior research activities within the study area for the purpose of documenting changes in committee rules over time. Five additional CWP committees were invited to participate in focus groups in anticipation of the event that these original 25 CWP committees chose not to participate in focus group sessions. In the end, 27 CWP committees agreed to participate in focus groups. Conversations in the focus groups consisted of topics pertaining to the management of the CWP, including how the two-thirds gender rule applied to CWP committee election protocols and how women typically contributed to the CWP committee. Coupled with the focus group discussion, we asked participants to provide some individual-level background information in a brief demographic survey.

Finally, we conducted individual-level interviews with two men and two women sampled from each of the 27 CWP committees

that participated in the focus groups (Fig. 2). The two men and two women were purposely sampled from each CWP to capture the perspectives of both executive and non-executive CWP committee members and both men and women. Topics covered in the individual-level interviews revisited content discussed in the focus group session, while also providing an opportunity for CWP committee members to share information individually that they may not have shared in a focus group setting. Table 2 provides a summary of all samples in the study reported here.

3.3. Data

In Table 3, we present the descriptive statistics from the focus group demographic surveys for research participants' ages, total number of years with a CWP membership, and the total number of years of service on the CWP committee. These demographic surveys also showed that ninety-two percent of respondents reported farming as their source of income, with an additional 4% employed elsewhere (i.e., as a teacher or civil servant), and 4% involved in other income-generating activities such as owning a business. Data from individual-level interviews show that men (61%) and women (57%) had similar instances of prior leadership or management training. Respondents were also active in other community groups, with more women (94%) belonging to other groups besides the CWP than men (83%).

In Fig. 3, we present the educational background and ages of CWP committee members that were collected from the focus group demographics survey. These descriptive data show that

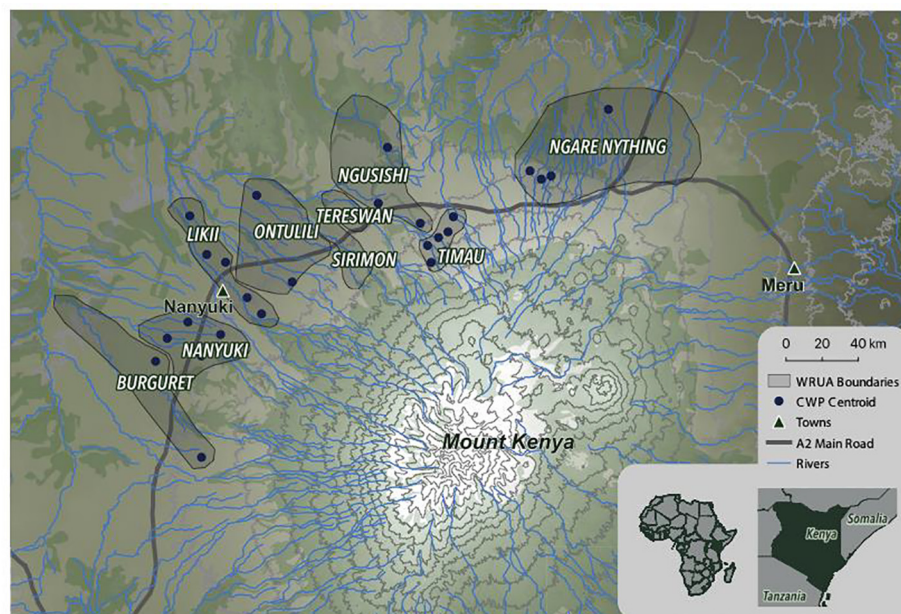


Fig. 2. Mt. Kenya study site with CWP centroids indicating locations of the 27 CWPs that participated in focus group discussions and individual-level interviews. WRUA boundaries and CWP centroids are presented in their approximate locations to illustrate the study site's extent.

Table 3

Respondent demographics from focus group discussions, which contain the most comprehensive and complete information about CWP committee member respondents. Source: Focus group demographics survey (n = 210 CWP committee members from 27 focus groups; 142 men, 66 women).

All respondents (n = 210)	Min	Max	Mean	Median	Std. Dev.	Missing Data
Age	23	78	52	52	11	2
Years of CWP membership	1	35	16	14	10	0
Years of service on CWP	1	27	16	18	8	0
Male respondents (n = 142)	Min	Max	Mean	Median	Std. Dev.	Missing Data
Age	24	78	53	54	11	1
Years of CWP membership	3	35	16	14	9	0
Years of service on CWP	1	27	16	18	8	0
Female respondents (n = 66)	Min	Max	Mean	Median	Std. Dev.	Missing Data
Age	23	75	49	49	10	1
Years of CWP membership	2	34	25	12	10	0
Years of service on CWP	1	27	16	18	9	0

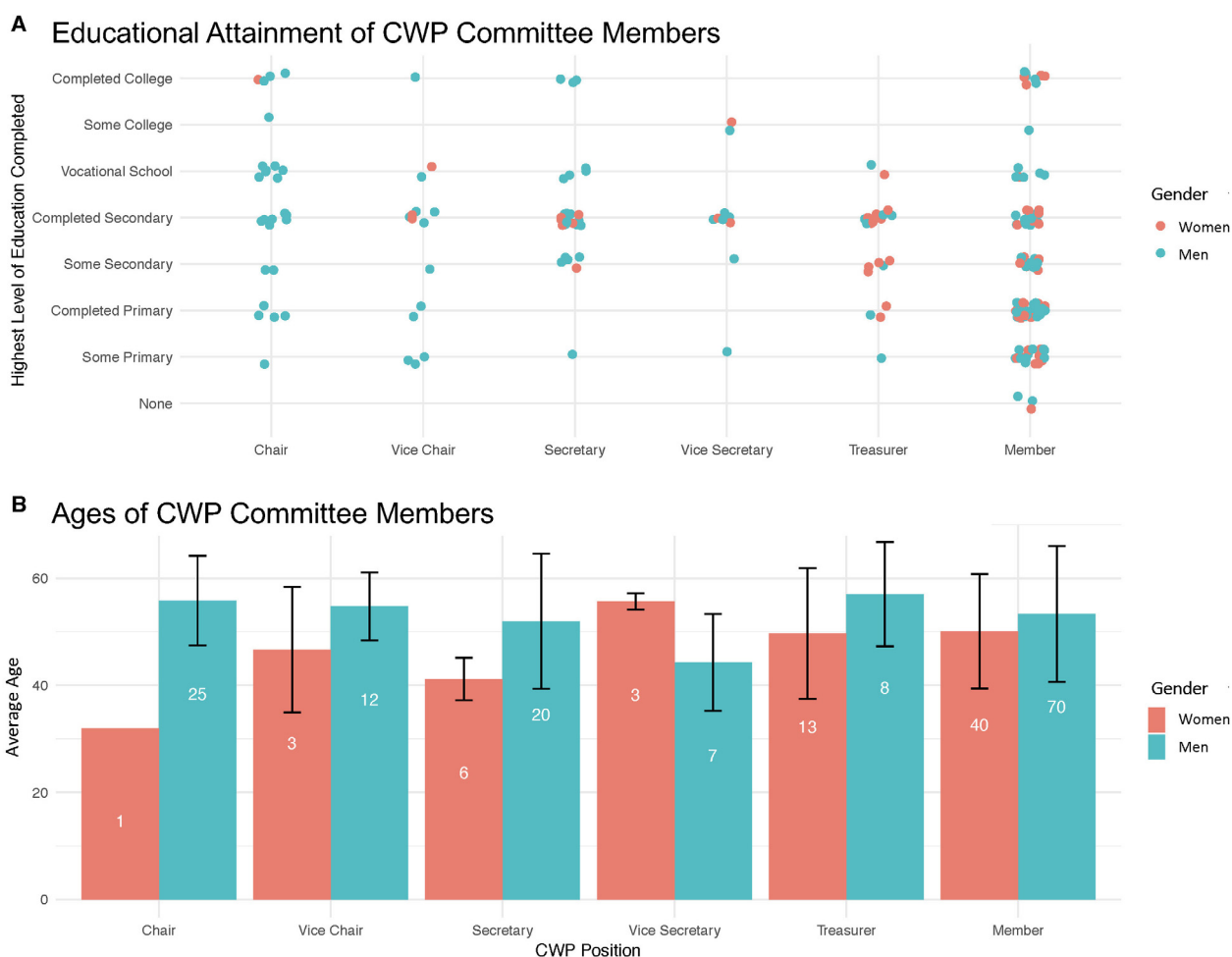


Fig. 3. Educational background and ages of CWP committee members by gender and CWP committee position (n = 210 CWP committee members from 27 focus groups; 142 men, 66 women). To avoid point overlap, data points in Fig. 3-A are randomly positioned according to their respective categories of education and CWP position. Numbers within each bar in Fig. 3-B refer to the number of individuals in a given CWP position category and error bars illustrate the distribution of according to each gender with each CWP position category.

women that have completed secondary school were more likely to serve in roles other than as CWP treasurer or member. Women were younger than men across all CWP positions except the vice secretary. Younger, educated women that have completed secondary school were also found in higher leadership positions compared to older women with lower levels of education.

Across these data collection protocols, we recognize possible issues of social desirability response bias, where individuals tend

to present themselves in accordance with favored norms and standards and deny less favorable opinions (Roberts Caroline, 2007). Respondents in our study may have presented their ideas in support of gender mainstreaming to reflect our research team’s favorable view of women’s equitable representation in water governance. As publicly-elected leaders of their community, who commonly interface with governmental officials, our respondents may have also provided opinions in support of the goals of Kenya’s

two-thirds gender rule. We attempted to account for this social desirability bias by collecting data from multiple sources, including with a foreigner in the room during focus groups and without a foreigner in individual settings. We also met with men and women conversing together in focus groups, as well as independently, which allowed for a variety of contexts to share opinions. Finally, members of our larger research team have conducted face-to-face interviews in this part of Kenya a number of times over at least seven years prior to our field work in 2019, which included returning regularly to share research findings. We have built rapport with respondents and with CWP managers over the years, and we expect that this helps to mitigate social desirability bias (Holbrook et al., 2003).

4. Analysis & results

4.1. Overview

We present our analyses and results according to the theoretical constructs of representation and participation presented in Fig. 1. We used a combination of descriptive statistics, difference tests, and regression analysis to analyze how individuals are represented on CWP committees and how they participated in CWP activities. We also incorporated qualitative information from focus groups and semi-structured interviews to corroborate our quantitative findings and inform the underlying narrative for how and why CWPs in our study site comply with Kenya's two-thirds gender rule. Table 4 summarizes how we measured and analyzed representation on CWP committees and levels of participation in CWP management.

4.2. Formal & descriptive representation on community water project committees

First, we consider women's formal representation, which refers to the institutional rules and procedures that allow for representatives to be elected to a public body. Since all CWPs in our study area have at least one woman serving on a CWP committee, we can conclude that women are at least nominally represented on CWP committees according to Agarwal (2010)'s typology. Information shared in focus group discussions reveal a number of institutional rules and procedures for encouraging women's representation in elected CWP committees. For instance, 19 CWPs indicated that they have instituted formal procedures to ensure a two-thirds representative majority on the committee by passing a CWP by-law that reflects the language of Article 27 of the Kenyan Constitution. Other CWPs require one man and one woman from a regional subsection of the CWP to serve on the CWP to ensure equitable gender representation and that both men's and women's interests could be addressed at the CWP level.

We also learned from focus group discussions that external review and government oversight serve as additional supportive enforcement mechanisms to promote women's formal representation on CWP committees. For example, the Ministry of Public Service, Youth, and Gender Affairs of Kenya reviews the composition of elected committees. The CWP can consult with the Social Service Department if they struggle to fill women's roles on the committee. Also, in the event that a CWP cannot meet the two-thirds rule or has not made a concerted effort to do so, the Social Services may intervene. Across several focus groups, CWP committee members indicated that government officials have attended CWP elections,

Table 4
Summary of measurements and analyses for representation and participation concepts based on a mixed methods approach from focus groups with CWP committees, CWP manager surveys, and individual-level interviews with CWP committee members.

Concept	Theoretical Construct	Measurement	Analysis	Data source
Representation <i>Adapted from Pitkin (1967)</i>	Formal Institutions	"How has your CWP made sure the national two-thirds gender rule is met?"	Descriptive information (Qualitative)	CWP focus group discussions (n = 27)
	Descriptive Composition	"Please indicate the composition of the CWP committee, including how many men and how many women serve in each position." Demographic characteristics associated with each CWP committee member category	Descriptive statistics (Quantitative) Logistic regression (Quantitative)	CWP manager surveys (n = 45) CWP focus group demographics survey (n = 210)
	Substantive Activity & Symbolic Representation	"Are you content with the current levels of women's participation in CWP activities? Why or why not?" "Has the 2/3 gender rule made the activities more effective?"	Descriptive information (Qualitative) Coding for themes of perceived contributions of women to the CWP (Qualitative)	Individual-level interviews with CWP committee members (n = 105) CWP focus group discussions (n = 27)
Participation <i>Adapted from Agarwal (2010)</i>	Passive	"Since the beginning of the year, how often have you been involved in CWP activities as they relate specifically to your service on the CWP?"	Participation Frequency Index with a Wilcoxon Rank Sum Test (Quantitative)	CWP focus group demographics survey (n = 210)
	Activity-specific Managing documents Managing finances Collecting fees Consultative	"How willing are you to contribute with CWP activities as they relate to your service on the CWP committee?"	Participation Willingness Index with a Wilcoxon Rank Sum Test (Quantitative)	Individual-level interviews with CWP committee members (n = 105)
	Addressing complaints Meeting with water agency officials Active Expressing opinions Interactive Collecting fees Addressing complaints Leading meetings Meeting with water agency officials	"Since the beginning of the year, how many hours per week have you contributed to CWP activities?" Demographic characteristics associated with the self-reported Participation Frequency Index	Test of differences between hourly contributions with a Welch's Two-Sample T-test (Quantitative) Multiple linear regression (Quantitative)	CWP focus group demographics survey (n = 210)

which provides additional pressure to follow Article 27 of Kenya's Constitution.

Then, in terms of descriptive representation, the majority of CWP in our Mt. Kenya study site complied with Kenya's two-thirds gender rule. According to data from the CWP manager survey, all CWPs had one or more female representatives serving on the CWP committee, and 31 of 45 CWPs (69 percent) met the two-thirds gender rule. Men usually served as chair, whereas women typically served in the treasurer position.

Finally, we identified which individual-level characteristics of CWP committee members were most associated with the representation of different CWP positions held on the CWP committee using logistic regression. We developed one logistic regression model for each CWP committee position, resulting in six regression models. The dependent variable was in a binary format with one indicating the CWP position of interest (e.g., chair = 1) and zero representing all other positions (e.g., non-chair committee members = 0). For our explanatory variables, we used descriptive statistics derived from the focus group demographic survey for gender, age, educational background, position on committee, years of CWP membership, and years served on the CWP committee. We obtained these individual-level data from the focus group demographics survey, which included the 210 CWP committee members that participated in focus group discussions across 27 CWPs.

We also included control variables at the CWP-level, which came from the CWP manager survey, to account for how CWP-level characteristics would influence a CWP member to participate more or less on a committee. These control variables include a diversity score for the CWP committee, the average age of the members of the CWP committee, the year of CWP formation, and the number of CWP members. The diversity score was calculated using Blau's Index, which is a measure of diversity within a group based on the categories of individuals in the group (Harrison & Klein, 2007; Solanas et al., 2012).

In our model results, we found that gender was a statistically significant predictor of individuals serving in the chair and trea-

surer positions, where men were more likely to hold a chair position and women are more likely to serve as a treasurer (Table 5). Educational attainment was also a positive predictor for holding the key decision-making positions of chair and secretary. However, educational attainment was a negative predictor of serving as a non-executive committee member, suggesting that having lower educational attainment levels was associated with serving in the role of a non-executive committee member.

4.3. Substantive & symbolic representation on community water project committees

Here, we present descriptive information pertaining to the substantive and symbolic representation of women on CWP committees. We present these two theoretical constructs of representation together based on exploratory qualitative data collection approach, especially since these theoretical constructs have not been explored in depth in prior research at a community-based natural resource management level. Three separate coders independently identified themes and then compared their coding of major themes together over several iterations to arrive at the themes presented in Table 5. This iterative process of identifying the perceived contributions of women to committee activities relied on an inductive approach to coding qualitative data (Bernard, 2017; Saldaña, 2015). We did not calculate an inter-coder reliability score across the three coders since the purpose of the coding process was to simply provide descriptive context for how women are perceived on CWP committees rather than to test theory.

Based on commentaries solely from focus group discussions, perceived contributions of women to the CWP were generally positive. Themes in Table 6 describe how CWP committee members perceived women's contributions to the CWP committee. Additionally, from individual-level interviews of 105 respondents, 79 percent indicated that they were content, 20 percent said they were

Table 5

Logistic regression results. Source: Focus group demographics survey (n = 210 CWP committee members from 27 focus groups) and CWP manager survey (n = 27 CWP managers from the 27 CWP committees that participated in focus groups).

	Dependent variable					
	Chair (1)	Vice Chair (2)	Secretary (3)	Vice Secretary (4)	Treasurer (5)	Non-Executive Committee Member (6)
Gender	2.395** (1.050)	0.523 (0.704)	0.269 (0.536)	0.185 (0.756)	-1.800*** (0.570)	-0.217 (0.348)
Age	0.025 (0.027)	0.036 (0.031)	-0.040 (0.029)	-0.083* (0.047)	-0.010 (0.034)	0.008 (0.018)
Educational Attainment	0.450*** (0.162)	0.105 (0.182)	0.416** (0.162)	0.211 (0.236)	0.134 (0.178)	-0.503*** (0.112)
Years - CWP Membership	0.011 (0.031)	-0.019 (0.039)	0.034 (0.033)	0.030 (0.043)	0.025 (0.036)	-0.026 (0.021)
Years - CWP Committee	0.010 (0.040)	0.017 (0.052)	0.059 (0.043)	0.026 (0.074)	0.058 (0.052)	-0.066** (0.033)
Diversity - Blau's Index	2.496 (3.492)	4.595 (5.396)	-1.540 (3.221)	1.656 (5.316)	-2.465 (3.649)	-1.265 (2.313)
Year - CWP Formed	-0.002 (0.030)	-0.002 (0.037)	0.013 (0.029)	-0.038 (0.039)	-0.016 (0.032)	0.006 (0.019)
CWP Member Size	-0.0003 (0.001)	0.001 (0.001)	0.0001 (0.001)	-0.0001 (0.001)	-0.001 (0.001)	0.00005 (0.001)
Average Age - CWP Committee	-0.020 (0.045)	-0.089 (0.060)	-0.006 (0.047)	0.081 (0.074)	0.006 (0.055)	0.026 (0.033)
Constant	-3.829 (60.017)	2.027 (73.410)	-27.083 (58.037)	71.003 (77.624)	31.288 (62.471)	-9.848 (38.376)
Observations	201	201	201	201	201	201
Log Likelihood	-65.247	-50.720	-68.920	-36.654	-55.837	-122.439
Akaike Inf. Crit.	150.493	121.440	157.840	93.308	131.673	264.877
Note:	*p < 0.1; **p < 0.05; ***p < 0.01					

Table 6

Total number of CWPs that characterize women's contributions to CWP committees from focus group discussions with CWP committee members.

Number of CWPs	Themes	Example Quotes
10	Peacemakers/Mediators	"Women solve issues and have a cooling effect – they help lead to a consensus among the committee"
9	Works with others (i.e., CWP committee, CWP members, water agency officials)	"Women motivate other CWP members, like single-headed households, to be active in the CWP" "Women are better at office reception and visiting other offices"
8	Water knowledge	"Women use a lot of water, so they understand the issues better"
8	Problem-solvers	"When members bring misunderstandings, women will address them"
6	Financial Accountability/ Transparency	"Women are better at handling finances (transparency)"
5	Water equity	"Women also help regulate and watch out water usage in the area"
3	Caretakers/Caregivers	"Women are caretakers, able to safeguard the committees and CWP assets and processes well"
3	Not selfish	"Women are not arrogant and can address concerns"
2	Multitasking	"Women ensure that all activities are carried out accordingly" "The ladies are considerate when it comes to budgeting and resource mobilization"

not content, and 1 percent did not know. Committee members that were content reflected similar commentary expressed during focus group discussions (Table 6), such as that women have a good understanding of water issues and that they play an important role as peacemakers and mediators because of their good nature.

Comments from the 20 percent of individual-level interviews expressing discontent with women's participation on CWP committees suggested that women were not active, do not contribute, and are not doing enough. Some respondents sought to explain the reasons for the lack of participation, implying that women's household obligations affected their ability to participate. Other respondents noted that women's shyness and self-doubt were also thought to prevent them from participating fully. A lack of capacity or lack of education was also stated as a reason for women's lower levels of engagement on the CWP committee. At the same time, however, other respondents were simply not content with the current representation of women at the one-third level, requesting that even more women serve on CWP committees.

4.4. Participation in community water project governance activities

To compare men and women's levels of participation in CWP activities, we asked the following question of individuals who participated in the focus group discussions ($n = 210$): *Since the beginning of the year (i.e., January 2019), how often have you been involved in the following activities as they relate specifically to your service on the CWP?* The list of activities includes attending meetings, managing documents, managing finances, collecting fees, expressing opinions, meeting with water agency officials, addressing complaints, and leading meetings. Responses were recorded on a 4-point ordinal scale, which included rarely (0–10% of the time),

sometimes (11–50%), often (50–90%), and frequently (90–100%). We also asked individual-level interview participants ($n = 105$) about their willingness to be involved in the same list of CWP activities: *How willing are you to contribute with the following activities as they relate to your service on the CWP committee?* Responses were measured on a 5-point Likert scale from extremely willing to extremely unwilling.

Next, we developed indices for the frequency of participation and willingness to participate in CWP activities, which we have named the *Participation Frequency Index* and *Participation Willingness Index*. Using Cronbach's Alpha, we assessed the internal consistency of each set of participation activities for both frequency of participation in CWP activities ($\alpha = 0.75$) and the willingness to participate in CWP activities ($\alpha = 0.73$). We then aggregated the average of each of the two sets of participation and willingness metrics into a single score for the Participation Frequency and Participation Willingness indices, respectively.

Based on these two indices for participation, we then compared the differences between men and women's self-reported frequency of participation and willingness to participate in a number of activities on CWPs. We used a Wilcoxon Rank Sum Test (De Winter & Dodou, 2010; Fay & Proschan, 2010) for each individual metric of the Participation Frequency Index and Participation Willingness Index as well as the aggregated index values (Tables 7 and 8). We also tested the difference in men and women's time in hours per week contributed to CWP activities using Welch's Two-Sample T-Test.

We found a leadership gap between men and women with the Participation Frequency Index. Women's self-reported frequency of participation in CWP activities was only significantly lower than men's in two examples of interactive participation, which include leading CWP meetings and addressing complaints raised by CWP members (Table 7). With the aggregated *Participation Frequency Index*, there was a statistically significant difference between men and women's self-reported frequency of participation in CWP activities with men self-reporting a higher frequency than women.

With the Participation Willingness Index, we also further evidence of a leadership gap between men and women. Women were significantly less willing than men to lead CWP meetings (Table 8). Contrary to the aggregated results of the Participation Frequency Index, there was no statistically significant difference between men and women's willingness to participate in CWP activities with the aggregated Participation Willingness Index.

We found further evidence for men contributing more time to CWP activities than women, which complement our results from the self-reported frequencies of participation and willingness to participate. Compared to men (Mean = 14.86, Median = 7.5, SD = 17.58), women (Mean = 7.63, Median = 5, SD = 9.36) contributed significantly fewer hours per week to CWP activities; $t(81.75) = 2.6517$, $p = 0.0096$. On average, male committee members also contributed almost twice as much hours per week compared to female committee members.

4.5. Evaluating self-reported participation frequencies in CWP activities

Finally, we developed multiple linear regression models to evaluate how individual-level demographic information was associated with self-reported frequency of participation on the committee as the dependent variable. Using data from focus group demographic surveys, we created two sets of regression models to account for the differences between non-executive and executive committee members, as well as between individuals holding a chair and those holding other committee positions. For the first set of models, we specified a dummy variable for non-executive

Table 7

Men's and women's self-reported frequency of participation in CWP activities (n = 210 from focus group discussion demographic surveys); Wilcoxon Rank Sum Test with an ordinal scale of 1-Rarely, 2-Sometimes, 3-Often, and 4-Frequently.

CWP Committee Activities	P-value	W	Z-score	Women (n = 67)				Men (n = 142, 1 = missing)			
				Mean	Median	Min	Max	Mean	Median	Min	Max
Leading meetings	0.0570*	5154	-1.90	2.09	1.5	1	4	2.45	4	1	4
Addressing complaints	0.0021***	5919	-3.08	2.88	3	1	4	3.32	4	1	4
Meeting with water agency officials	0.1498	5243	-0.44	2.09	2	1	4	2.34	2	1	4
Collecting fees	0.6528	4517.5	-0.45	2.25	2	1	4	2.14	3	1	4
Expressing opinions	0.2017	4882	-1.28	3.30	4	1	4	3.47	4	1	4
Managing finances	0.2554	4907.5	-1.14	2.22	2	1	4	2.45	3	1	4
Managing documents	0.6164	4809	-0.50	2.17	2	1	4	2.25	2	1	4
Attending meetings	0.7250	4481.5	-0.35	3.74	4	1	4	3.74	4	1	4
Participation Frequency Index	0.0698*	5496	-1.81	2.57	2.63	1	3.75	2.75	2.81	1.13	4

Note: *p < 0.1; **p < 0.05; ***p < 0.01

Table 8

Men's and women's self-reported willingness to participate in CWP committee-level activities (n = 105 from individual-level interviews with CWP committee members); Wilcoxon Rank Sum Test with a five-point Likert ordinal scale ranging from 1-Extremely unwilling to 5-Extremely willing.

CWP Committee Activities	P-value	W	Z-score	Women (n = 51)				Men (n = 54)			
				Mean	Median	Min	Max	Mean	Median	Min	Max
Leading meetings	0.0017**	1791	-3.14	3.86	5	1	5	4.46	5	1	5
Addressing complaints	0.1164	1278	-1.57	4.92	5	1	5	4.74	5	1	5
Meeting with water agency officials	0.1574	1534	-1.41	4.59	5	1	5	4.65	5	1	5
Collecting fees	0.9621	1384	-0.05	3.90	5	1	5	3.70	5	1	5
Expressing opinions	0.2833	1433	-1.07	4.92	5	3	5	4.98	5	4	5
Managing finances	0.9513	1386	-0.06	3.65	5	1	5	3.52	5	1	5
Managing documents	0.8493	1401.5	-0.19	4.08	5	1	5	3.96	5	1	5
Attending meetings	0.9112	1384.5	-0.11	4.88	5	2	5	4.94	5	4	5
Willingness to Participate Index	0.5479	1469	-0.60	4.35	4.5	2.38	5	4.37	4.5	2.38	5

Note: *p < 0.1; **p < 0.05; ***p < 0.01

committee members (1 = non-executive, 0 = executive). In the second set, we specified the dummy variable for individuals holding chair positions (1 = chair, 0 = other).

We performed multiple linear regression models with and without CWP-level control variables for women only, men only, and both genders. For all models, key independent variables included gender, age, education, the dummy variable indicating committee position, years of CWP membership, and years served on the CWP committee. We used the same control variables from the logistic regression models to account for the contextual influences of a CWP on individuals' self-reported participation levels. To account for possible within and between-group effects across CWPs, we performed the regressions using fixed effects and random effects for the control variables. Final results for all models are presented with robust standard errors.

The first model, which differentiates between executive and non-executive committee members, indicates that educational attainment, years on the committee, and holding an executive position were statistically significant predictors of self-reported participation frequencies (Table 9). Holding a non-executive committee position was significantly *negatively* associated with self-reported participation frequencies. Thus, non-executive committee members participate less frequently in CWP activities than executive members.

The second model, which differentiates between individuals holding chair positions and other committee members, also indicates that educational attainment and years on the committee, as well as serving in a chair position, were statistically significant predictors of self-reported participation frequencies (Table 10). Unlike the first set of models, holding a chair position was significantly *positively* associated with self-reported participation frequency. Relative to the first set of models, educational attainment and years served on the committee were of greater statistical significance for predicting self-reported participation frequencies.

Based on evidence for a leadership gap elsewhere in our results, we expected that gender would be a significant predictor of self-reported participation frequency. However, gender was *not* a significant predictor of self-reported participation frequency (Tables 9 and 10). To explain this outcome, self-reported participation likely accounts for an individual's reflection of their own participation rather than an objective measure of participation. To reduce endogeneity challenges with self-reported estimates of participation, future research should include additional objective measures of participation (i.e., hours contributed to each specific CWP activities per week) to complement self-reported measures of participation.

5. Discussion

5.1. Challenges to gender quota compliance

Although most CWPs made concerted efforts to elect women to the CWP, they still faced challenges in descriptively meeting the two-thirds gender rule. Based solely on our data, socio-cultural barriers, such as women's lower levels of educational attainment and household responsibilities, were the main reasons for why women were not serving on CWP committees. Respondents also suggested that women in our study site simply do not want to serve on CWP committees. Commentary regarding a lack of willingness to serve was either due to women's household duties or the lack of support for women's opinions on the committees. In only a few instances, a woman's husband explicitly prevented her from serving on the CWP committee.

Combined results from time contributed per week to CWP activities and respondents' frequency of participation and willingness to participate (Tables 6 and 7) suggest a leadership gap between men and women with regard to their service on the

Table 9
Multiple linear regression model results of self-reported participation in CWP activities, differentiate between executive and non-executive committee members. Data source: focus group discussion demographic surveys.

	Dependent variable: Participation Frequency Index Multiple Linear Regression with Robust Standard Errors					
	Excluding controls			Including controls	With fixed effects on controls	With random effects on controls
	Men (1)	Women (2)	Both Genders (3)	Both Genders (4)	Both Genders (5)	Both Genders (6)
Gender <i>1 = Male, 0 = Female</i>			0.060 (0.080)	0.061 (0.080)	0.036 (0.084)	0.050 (0.078)
Age	0.001 (0.004)	0.002 (0.008)	0.002 (0.004)	-0.001 (0.004)	-0.003 (0.004)	-0.001 (0.004)
Education	0.040 (0.028)	0.050 (0.048)	0.044* (0.024)	0.040* (0.023)	0.049* (0.022)	0.044* (0.024)
Non-Exec Committee Member <i>1 = Non-Exec, 0 = Exec</i>	-0.791*** (0.090)	-0.695*** (0.139)	-0.767*** (0.075)	-0.777*** (0.075)	-0.782*** (0.074)	-0.789*** (0.073)
Years – Membership	0.0003 (0.005)	-0.010 (0.008)	-0.001 (0.004)	-0.001 (0.005)	0.007 (0.006)	0.004 (0.005)
Years – Committee	0.009 (0.007)	0.056*** (0.020)	0.016** (0.007)	0.018** (0.007)	0.021** (0.009)	0.016** (0.008)
Diversity – Blau's Index				-0.392 (0.524)		
Year – CWP Formed				-0.002 (0.004)		
CWP Member Size				0.0003* (0.0002)		
Average Age – CWP Committee				0.002 (0.007)		
Constant	2.856*** (0.255)	2.496*** (0.488)	2.701*** (0.214)	6.109 (8.670)		2.775*** (0.229)
Observations	138	63	201	201	201	201
R ²	0.423	0.444	0.422	0.443	0.577	
Adjusted R ²	0.402	0.395	0.405	0.414	0.499	
Residual Std. Error	0.510 (df = 132)	0.527 (df = 57)	0.516 (df = 194)	0.512 (df = 190)	0.473 (df = 169)	
F Statistic	19.392*** (df = 5; 132)	9.108*** (df = 5; 57)	23.654*** (df = 6; 194)	15.128*** (df = 10; 190)	7.428*** (df = 31; 169)	
Log Likelihood						-163.940
Akaike Inf. Crit.						351.881
Bayesian Inf. Crit.						391.521

*p < 0.1; **p < 0.05; ***p < 0.01

CWP committee. Men and women self-reported participation at similar frequencies for CWP activities that require passive, consultative, and activity-specific participation. However, men in both chair and non-chair roles contributed significantly more hours per week to CWP activities than women. Thus, although men and women appear to self-report similar frequencies of participation in similar types of activities, men significantly contributed more time in hours per week to CWP activities. Moreover, for CWP activities that necessitate interactive participation (i.e., leading meetings), there was a clear distinction between men and women in our results where men led meetings more frequently and were more willing to do so. Gendered roles in agrarian-based societies similar to our Kenyan study site may actually prevent women from engaging more substantially in leadership roles than their male counterparts, especially since women are often already in charge of childcare and managing households (Agarwal, 1997; Grillos, 2018). Taking on additional leadership roles on a CWP committee may also present additional labor burdens on women's day-to-day activities, which has been observed in community-based forest groups in Mexico (Delgado-Serrano and Escalante Semerena, 2018).

Additional social norms and perceptions of women that were not captured in our data may underlie the primary barriers to gender quota compliance. For example, the data we presented here that characterizes women's contributions to CWP committees (Table 5) provides rich detail about such norms and perceptions. Further qualitative-based research examining roles, relationships, norms, and barriers would help to better understand underlying

drivers and nuances of participation and representation on committees. However, given the context of gender norms in Kenya, we speculate on some possible reasons for why CWPs have not been able to fully comply with the two-thirds gender rule. For example, Adams et al. (1997) highlighted the purported inferior physical ability of women to maintain community irrigation furrows in Kenya. As a result, women were prevented from contributing physical labor to furrow maintenance and accessing community water. A similar attitude towards women's abilities and opportunities to participate in governance exists in several community-based natural resource governance groups across the globe (Agarwal, 1997, 2001; Delgado-Serrano and Escalante Semerena, 2018). Since men are customarily owners of property, they are more likely to be the decision-makers for natural resource management (Agarwal, 1998). In fact, women are informally and formally excluded from membership criteria, such as owning land, that would allow them the opportunity to hold positions on a governing committee (Meinzen-Dick & Zwarteveen, 1998; Deere and Doss, 2006; Doss et al., 2015). These types of broader social contexts may also apply to our Kenya study site and could further explain why women were specifically precluded from holding executive leadership positions on CWPs.

5.2. Implications of gender quota compliance

Increasing women's representation via gender quotas has important implications for cultural, political and socio-economic contexts. Often there are pragmatic reasons for incorporating

Table 10

Multiple linear regression model results of self-reported participation in CWP activities, which differentiate between the chair position and other committee members. Data source: focus group discussion demographic surveys.

	Dependent variable: Participation Frequency Index Multiple Linear Regression with Robust Standard Errors					
	Excluding controls			Including controls	With fixed effects on controls	With random effects on controls
	Men (1)	Women (2)	Both Genders (3)	Both Genders (4)	Both Genders (5)	Both Genders (6)
Gender <i>1 = Male, 0 = Female</i>			0.004 (0.094)	−0.0001 (0.096)	−0.006 (0.106)	0.008 (0.093)
Age	−0.002 (0.005)	−0.004 (0.009)	−0.002 (0.004)	−0.004 (0.005)	−0.006 (0.004)	−0.004 (0.004)
Education	0.080*** (0.031)	0.121** (0.055)	0.094*** (0.027)	0.092*** (0.025)	0.101*** (0.027)	0.096*** (0.028)
Chair <i>1 = Chair, 0 = Other</i>	0.726*** (0.103)	0.373* (0.209)	0.696*** (0.100)	0.713*** (0.095)	0.691*** (0.100)	0.696*** (0.125)
Years – Membership	0.002 (0.005)	−0.002 (0.010)	0.003 (0.005)	0.002 (0.005)	0.007 (0.007)	0.005 (0.006)
Years – Committee	0.016* (0.008)	0.070*** (0.020)	0.025*** (0.008)	0.028*** (0.008)	0.036*** (0.011)	0.027*** (0.009)
Diversity – Blau's Index				−0.366 (0.664)		
Year – CWP Formed				−0.003 (0.006)		
CWP Member Size				0.0003 (0.0002)		
Average Age – CWP Committee				−0.0004 (0.008)		
Constant	2.230*** (0.288)	1.896*** (0.589)	2.113*** (0.255)	7.287 (10.969)		2.142*** (0.253)
Observations	138	63	201	201	201	201
R ²	0.274	0.251	0.253	0.273	0.412	
Adjusted R ²	0.246	0.185	0.230	0.235	0.304	
Residual Std. Error	0.572 (df = 132)	0.611 (df = 57)	0.587 (df = 194)	0.585 (df = 190)	0.558 (df = 169)	
F Statistic	9.947*** (df = 5; 132)	3.814*** (df = 5; 57)	10.933*** (df = 6; 194)	7.129*** (df = 10; 190)	3.816*** (df = 31; 169)	
Log Likelihood						−193.424
Akaike Inf. Crit.						410.848
Bayesian Inf. Crit.						450.487

Note: *p < 0.1; **p < 0.05; ***p < 0.01

women's opinions and perspectives in governance and decision-making processes, namely greater levels of justice and promotion of women's interests (Celis, Krook, & Meier, 2011) and equitable outcomes (Cook et al., 2019; Norgaard & York, 2005). Gender quotas are theoretically designed to promote women's issues, opinions and perspectives through increased policies that are proposed and passed on behalf of women (substantive representation) and to shift attitudes and perceptions (symbolic representation). However, the perception that rural women's opinions and roles are of secondary importance to men's because of women's reduced technical capacity (i.e., vocational, literacy, numeracy, and management skills) results in gender discrimination and disparities that make it particularly challenging to increase participation and close leadership gaps in local governance (Agarwal, 2001).

Therefore, incorporating women's experiences and perspectives into CWP decision-making processes is crucial for managing water resources. Limited representation on water governance committees in regions where women are the primary users of water may be especially detrimental to local governance of water resources. For example, Coulter et al. (2018) found that women in our Kenyan study site had knowledge of CWP and WRUA activities, but were not aware of the path to become involved with them due to various cultural and practical reasons. Women were also marginalized in a few cases where male members refused to attend meetings of a WRUA with a female chairperson (Coulter et al., 2018).

When men make up the majority of a committee in representation and refuse to allow any level of participation from women, then the vision of a gender quota cannot be attained. For instance, decisions pertaining to fees, payment structures, and water project

investments are especially critical to how water projects function, which ultimately affects the livelihoods of water project members. As women (and other minority groups) are marginalized in the decision making for how fees are to be structured and how finances are to be allocated, then they are also likely to be marginalized in their ability to both afford and access water resources. Further empirical research on the decision making dynamics between men and women on community-based natural resource governance committees is warranted with respect to 1) how these decisions are ultimately made and 2) the implications of such decisions on the wider resource user group.

Our qualitative results provide evidence of improvements in gender representation in water governance compared to Coulter et al. (2018). Our research respondents were positive about women's unique contributions to the CWP and women were often the preferred CWP representatives to attend WRUA meetings because they are seen as more trustworthy in dialogues with authorities. Additionally, CWP committee members especially recognized that "women are better at speaking to their fellow women about water use," and observed an increase in women's involvement in water management activities following the enactment of the two-thirds gender rule. Thus, compliance with the gender quota becomes important for reaching female water users as well as mobilizing women to become involved in water governance.

5.3. Explaining observed gender gaps in committee-level leadership

Women's underrepresentation on CWP committees may be attributed to a gender gap in educational attainment, where men

in the study area tend to be better educated than women. In settings where men's educational attainment exceeds that of women, lack of schooling may prevent women's placement on governing committees because of a perceived gender-based skills gap (Agarwal, 2000). Indeed, interviewees and focus group participants frequently suggested that women's lack of ability to serve on CWP committees was due to their lower educational attainment levels and the perception of a general lack of management capacity. For instance, a CWP chair explained that *"there was a challenge in capacity & knowledge [for women] to serve the roles, such as record keeping, due to a lack of education"*. These reasons were commonly referenced when describing the challenges to women holding key leadership positions, like chair and vice-chair.

Confirming participants' reports that educational attainment is a key determinant of committee membership, committee members are on average significantly better educated than their age mates within the study site's general population. However, education alone cannot explain the leadership gap that exists within CWP executive committees. For instance, treasurer positions are predominantly held by women, and the vice chair and secretary positions are predominantly held by men, but the educational compositions of all three positions are similar (Fig. 3A). Instead, these executive imbalances appear to result from implicit gender biases regarding societal perceptions of women, influencing ideas about who is qualified to hold each executive role. For instance, men and women alike described women as being well-suited for treasurer positions because of their trustworthiness and accountability in managing finances (Table 5). Additionally, while respondents did not explicitly claim that men were uniformly better suited for higher-level leadership positions than women, they frequently cited women's deficiencies in their capacity to effectively participate and lead with authority.

To the extent that education is a predictor of holding an executive position on a committee (Fig. 3A), shifting educational demographics may expand the pool of would-be female leaders in the near future. Educational expansion across Africa has occurred unequally, where boys often gain access to schooling first, but girls' schooling ultimately catches up. Kenya's educational gender gap has fallen substantially in recent decades, from a difference of around 38 percentage points in primary school participation for boys and girls born in the 1940s to a difference of around 5 percentage points for boys and girls born in the 1980s (Lopus and Frye, 2018).

As new cohorts of highly-educated young women age through the population, their greater numeric representation in the community may have a direct compositional effect on governing committees, resulting in a higher share of female representatives in leadership positions. However, the problem of executive representation is not strictly compositional. Even for women who make it into higher-level executive positions, *"Ladies show up, but culturally, morally in the committee and community, their [the women's] views are not taken into account."* Might the regional and national closure of the educational gender gap increase female representation indirectly if, as the share of highly-educated women in the population grows, perceptions weaken regarding the female lack of capacity to lead? Possibly, but persistent gender-based pay gaps and leadership gaps around the world—even in regions with high rates of female educational attainment (Baker & Cangemi, 2016; Ponthieux & Meurs, 2015; Chang & England, 2011)—suggest that educational gender equity does not always precipitate equitable perceptions of women's capabilities.

5.4. Kenya's two-thirds gender rule – A success?

In our conceptual framework (Fig. 1), we emphasized the importance of representation and participation for meeting the

overarching goals and relative success of a gender quota. We found that Kenya's gender quota has successfully placed more women on CWP committees, but has failed in providing them with opportunities to effectively and equally participate in higher-level leadership roles. Limited active and interactive participation from women on these committees may prevent the more nuanced success of the two-thirds gender rule.

However, women's participation on CWP committees may improve over time. When placing our results in the broader temporal context of CWP management in our study site, we see steps being made towards greater female representation on committees. Prior assessments by Speranza & Bikketi (2018) found that in 2012, 90 percent of CWPs had women representatives. In 2019, we found that *all* CWPs in the same research area had at least one woman present on the committee, with many CWPs meeting the two-thirds gender quota. These results indicate a trend of women's inclusion in water governance, though full compliance of the rule may require several more years.

In addition to the two-thirds stipulation, the Kenyan Constitution's Article 27 (Laws of Kenya, 2010) also describes how women and men have "the right to equal opportunities in political, economic, cultural and social spheres" (Clause 3) and how there should be "policies designed to redress any disadvantage suffered by individuals or groups because of past discrimination" (Clause 6). Condensing these ideas into a simple rule dictating the number of women who should be seated on a committee is not sufficient to meet the goals of a gender quota. Specifically, electing women to serve on committees to merely check the box for the 'two-thirds gender rule' does little to promote women's effective and equal participation on CWP committees.

The broader goals of gender quotas could be better attained by proactively promoting women's equal service and participation in leadership positions. For example, CWP committees presented the idea of alternating the gender of the chair with each CWP election. In addition to ensuring that women are holding diverse roles, quotas should also promote the participation of a variety of women, and not only meet gender compliance with relatives of pre-existing or previous committee members (Cook et al., 2019). Gender quota measures could also consider diversifying the types of women and men elected to the CWP committee, inclusive of age, marital status, and educational attainment. Another specific request across our respondents was access to trainings designed to build the confidence, knowledge, and leadership capacities for both women and men on CWP committees in ways that would support more women in CWP leadership roles. These complementary activities to promote gender mainstreaming in conjunction with the institutionalization of Kenya's two-thirds rule may help water governance committees better adhere to the goals of Kenya's 2010 Constitution – to support gender equity and equal opportunities for leadership.

6. Conclusion

Our findings—taken together with data collected six years prior (Speranza & Bikketi, 2018) demonstrate increased representation of women serving on CWP committees over time. While CWP committees did not meet the two-thirds rule in every case, our results reflect a national trend of increased, albeit slowly, representation of women in public service in Kenya (Kivoi, 2014). Enforcement mechanisms, such as CWP bylaws and oversight from Social and Gender Services, help ensure that at least one-third of a CWP committee is composed of women. However, beyond mere proportional representation of women on CWP committees, our study highlights gender differences in women and men's contributions to CWP activities.

Most notably, we identify a leadership gap in CWP, where men most often hold key decision-making leadership roles and participate more than women in those roles. Thus, women are not equally represented at “all levels of society” per the agenda of the Sustainable Development Goals and the vision of Kenya’s two-thirds rule. We also note that this observed leadership gap can be explained by committee members’ educational attainment, gender, and number of years served on committees. At the same time, committee member perceptions and opinions about gender in our Kenyan study site also inform and influence what tasks and positions are more suited to and therefore held by women. As such, women tend to serve as treasurers, whereas men often hold key decision-making roles, including the chair position, because those committee roles reflect gender norms.

Thus, despite progress in increased women’s representation on water governance committees in central Kenya, women do not appear to be participating in committee activities as meaningfully as men, which would adhere to the more visionary gender quota goals of substantive and symbolic representation. With these findings, we assert that individuals’ representation on a committee and their levels of participation are important considerations for a gender quota’s success. Looking to the future, we expect that the vision of the gender quota rule may be achieved with the closing of the gendered education gap, which raises women’s capacities and recognition to lead in their communities. Proactive measures that continue to support women’s election into leadership positions and their effective participation in these positions are also crucial to the gender quota’s success. While the gender quota is convenient from the perspective of enforcement and compliance of women’s proportional representation on committees, realizing the substantive and symbolic vision of a gender quota extends beyond simple metrics of gender representation. To account for the complexity of gender dynamics that can arise on water committees, policymakers should also consider distribution of roles and decision-making authority on committees.

CRedit authorship contribution statement

Corrie Hannah: Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing - original draft, Writing - review & editing, Visualization, Supervision. **Stacey Giroux:** Formal analysis, Writing - review & editing. **Natasha Krell:** Writing - original draft, Writing - review & editing. **Sara Lopus:** Formal analysis, Writing - original draft, Writing - review & editing. **Laura McCann:** Formal analysis, Writing - original draft, Writing - review & editing. **Andrew Zimmer:** Writing - original draft, Writing - review & editing, Visualization. **Kelly Caylor:** Funding acquisition, Project administration. **Tom Evans:** Conceptualization, Methodology, Writing - review & editing, Funding acquisition, Supervision, Project administration.

Declaration of Competing Interest

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

Acknowledgements

The authors express their gratitude to individuals from Mpala Research Centre for their assistance in the field, as well as the research participants who contributed their time to this study. The authors also thank two anonymous reviewers for their comments and suggestions for improving the manuscript. This work was supported by the National Science Foundation (SES-1360463

and BCS-1115009). The Institutional Review Board at the University of Arizona approved the research design (Human Research Protocol #1804499749).

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