Women's Leadership and Implications for Climate Resilience: A Conceptual Framework

CGIAR INITIATIVE ON Gender Equality

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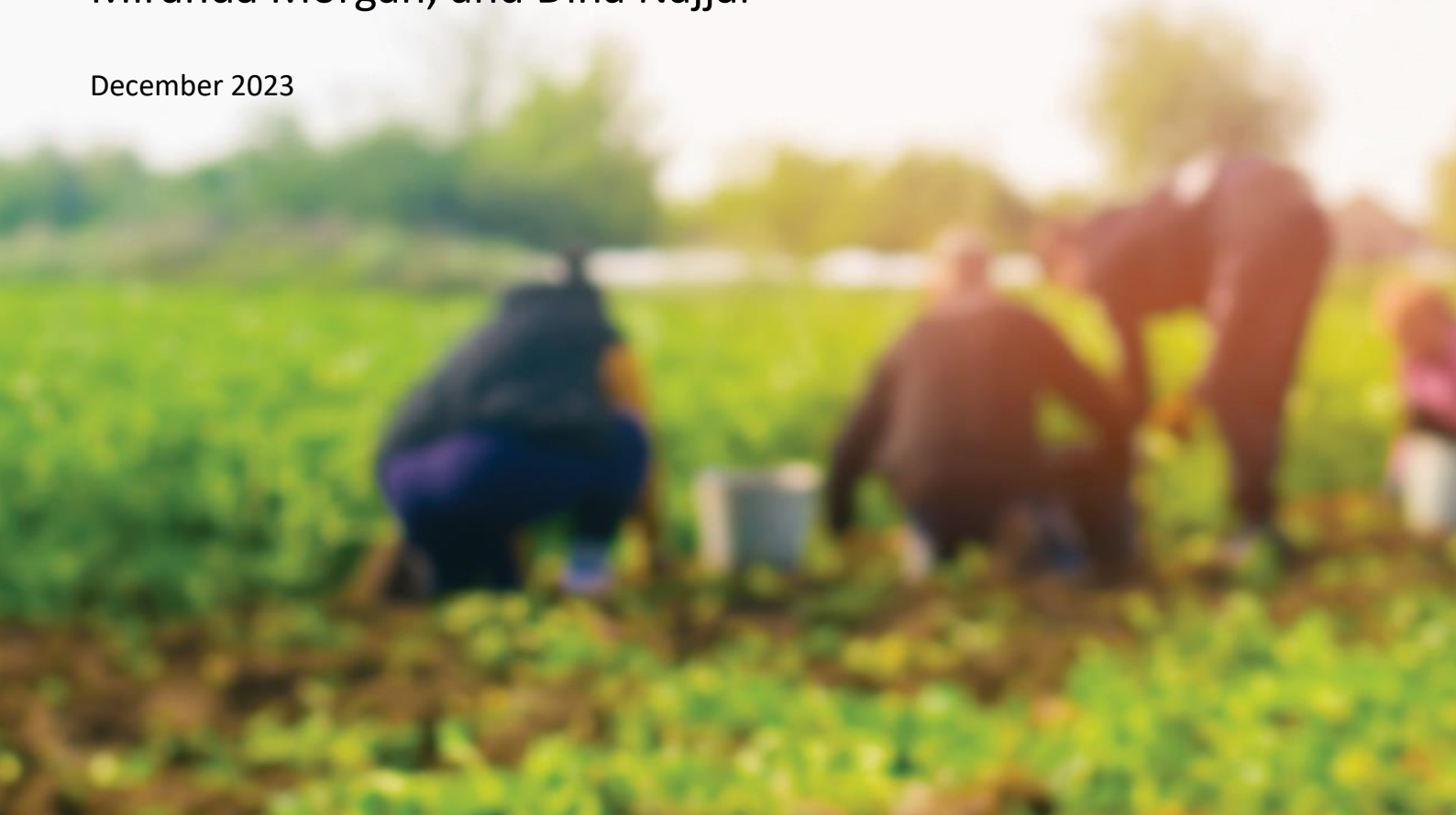

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Overview

Women are underrepresented in leadership and have more limited influence than men over decisions in climate change governance processes at multiple scales. The CGIAR Initiative on Gender Equality (HER+) has explored public and private sector approaches to increase women's agency and leadership in agrifood system governance with the goal of increasing women's climate resilience. However, further research is required to fully explore the mechanisms through which women's leadership influences climate resilience. This project note develops a conceptual framework that draws on key concepts from the literature on climate change and resilience, and the role of women's representation in policy processes to trace the pathways through which women's leadership can support climate resilience. This framework provides insights into key relationships that are deserving of additional focus in the next phase of research.

Introduction

Climate change poses key governance challenges, including requiring collective action and coordination across multiple sectors and actors, all with different mandates, interests, needs, and capacities. Even though women are by some measures the most negatively impacted by climate change (Swinnen and Kosec 2023), their voices and leadership are often missing from governance structures at the various levels where policy solutions are designed, implemented, and evaluated—from local initiatives to national policy processes (Ragasa et al. 2022, Ragasa et al. 2023) and international climate change negotiations (Mohammed et al. 2022). Additionally, adverse climate events (Takeshima, Raghunathan, and Kosec 2022) as well as other shocks, like conflict, that are exacerbated by adverse climate events (Kosec, Kyle, and Takeshima 2023), tend to further erode women's voice and agency.

While global mechanisms, such as the National Adaptation Plans (NAPs) and the Nationally-Determined Contributions (NDCs), provide some guidance on integrating gender in climate policies, domestic policy processes to structure national planning and commitments relating to climate adaptation and mitigation tend to inadequately address gender dimensions, particularly in budgeting, implementation, and monitoring (Acosta et al. 2019; Ampaire et al. 2020; Huyer et al. 2020). Moreover, women face considerable barriers in assuming leadership over climate change response decisions in their communities. For example, compared to men, women have more limited access to and control over resources, less access to services like information and finance, and they face restrictive social norms, and security and safety concerns, among other constraints (Amoak et al. 2022; Bryan et al. 2024; Kosec et al. 2023). Women are also less likely than men to speak up in community deliberations about appropriate responses to climate change (Clayton et al. 2023).

There are 3 key reasons why it is important to address gender gaps in leadership and voice in climate governance. **First**, women's leadership in climate governance is a matter of gender justice. Women have equal rights to participate and be represented in governing bodies; and institutions have an obligation to address gender-related inequalities (Addaney and Moyo 2018; Tschakert and Machado 2012). Importantly, gender is just one dimension of marginalization in climate governance. Inclusive climate governance should acknowledge the rights and ensure representation of all people, but particularly those who are highly vulnerable to climate change yet largely excluded from decision-making processes.

Second, women are differently affected by climate change and have unique needs and preferences that should be taken into consideration in when climate change policies and interventions are being designed and when investments decisions are being made (Bryan et al. 2024; Kristjanson et al. 2017). When women are not in power or do not vote on par with men, policies are less likely to reflect women's preferences (Chattopadhyay and Duflo, 2004; Clayton and Zetterberg 2018; Clayton et al. 2023). Furthermore, climate actions taken without integrating a gender lens and considering local realities may perpetuate or exacerbate gender inequalities (Bryan et al. 2024; Prakash et al. 2022; Roy et al. 2022). Thus, creating equitable opportunities for women to assume leadership and decision-making roles should be an important goal of any governing body.

Third, growing evidence suggests that women's leadership in policy processes and influence over decisions matter for achieving greater resilience to climate change. Public policies and private sector investments shape the distribution of resources and development of innovations to address climate challenges. In general, there is strong evidence that women's leadership shapes policy decisions in ways that affect resource flows (Clayton 2021). Women's representation is associated with more stringent climate change and energy policies (Andrijevic et al. 2020; Lv and Deng 2019; Mavisakalyan and Tarverdi 2019; McKinney and Fulkerson 2015; Salamon 2023), reduced vulnerability to climate change (Asongu, Messono, and Guttemberg 2022), and greater capacity to respond to the negative impacts of climate change (Ortiz and Ensor 2023).

Conversely, women's absence where climate change decisions are made, as well as gender-blind policymaking itself, carries substantial costs. For example, evidence suggests that women's limited role in governance structures at all levels undermines efforts to transform agrifood systems to achieve food security and nutrition, and to address the worsening impacts of climate change (Amoak et al. 2022; Njuki et al. 2022).

While all 3 reasons for promoting women's leadership in climate governance are important—and arguably the first 2 more so—the third reason is the area of focus of this project note. There is growing evidence that women's leadership and voice in climate governance matters for resilience, but the pathways through which women's leadership increases climate resilience are often unclear. To better illustrate these pathways, this project note develops a conceptual framework that integrates concepts from the literature related to resilience and climate change. In particular, it highlights how approaches to increase women's leadership and agency beyond the household by various actors in the climate change governance landscape may enhance resilience trajectories through an increase in women's resilience capacities, leading to more effective responses to climate change, and ultimately improved well-being (Figure 1).

This project note draws on a series of review papers produced by the CGIAR Initiative on Gender Equality (HER+) that aimed to identify public and private sector strategies to increase women's representation and voice in agrifood system governance (Amoak et al. 2022; Ragasa et al. 2022), including in climate change policy processes (Mohammad et al. 2022) and private sector mechanisms, such as voluntary sustainability standards (Morgan and Zaremba 2023). To explore questions of how women's leadership influences climate resilience, this project note uses a narrative approach, drawing on recent reviews related to gender, resilience, and climate change, and case studies examining the role of women's leadership and

representation in climate governance at multiple scales to demonstrate these pathways. While it does not provide an exhaustive review of the literature on the elements in the framework, it provides a structure and guide for additional research on the effects of women's leadership on climate resilience elements and trajectories.

Gender, women's leadership, and climate resilience

Concepts of resilience originate from the literature on ecology and sustainable livelihoods, where resilience is defined as the ability of a system and its components to bounce back after a disturbance depending on the capacities of the system to respond (Béné et al., 2014; Douxchamps et al. 2017; Schipper and Langston 2015). Building resilience requires strengthening the ability to withstand a shock (coping capacity), and the ability to change, learn, and improve (adaptive and transformative capacities) at multiple scales, including at the national, landscape, community, household, and individual levels (Béné, Frankenberger, and Nelson 2015). Many definitions of resilience include a focus on the ability to improve and sustain well-being outcomes in the face of recurrent shocks and stressors.

Public or private sector interventions aimed at building resilience should acknowledge how individual gender and other intersectional identities determine one's resilience capacities, preferences, and choices, leading to differential outcomes (Bryan, Ringler, and Meinzen-Dick 2023). This conceptual framework highlights approaches to increase women's resilience by increasing their leadership and agency in climate change decisions at multiple scales. It also explores the pathways through which this builds women's resilience capacities, enables effective climate responses (including both adaptation and mitigation actions), and improves well-being.

Women's agency beyond the household is an important resilience capacity with transformative potential if it leads to other changes in food systems towards greater sustainability and equity (Bryan, Ringler and Meinzen-Dick 2023). That is, women's leadership and influence in climate governance may create opportunities for other women to empower themselves while also shaping the ways that governments, communities, and other institutional actors respond to climate change. Indeed, when women are better represented in bodies deliberating over the best policies to combat climate change, they are more influential and more likely to bring about policies that women prefer (Clayton et al. 2023).

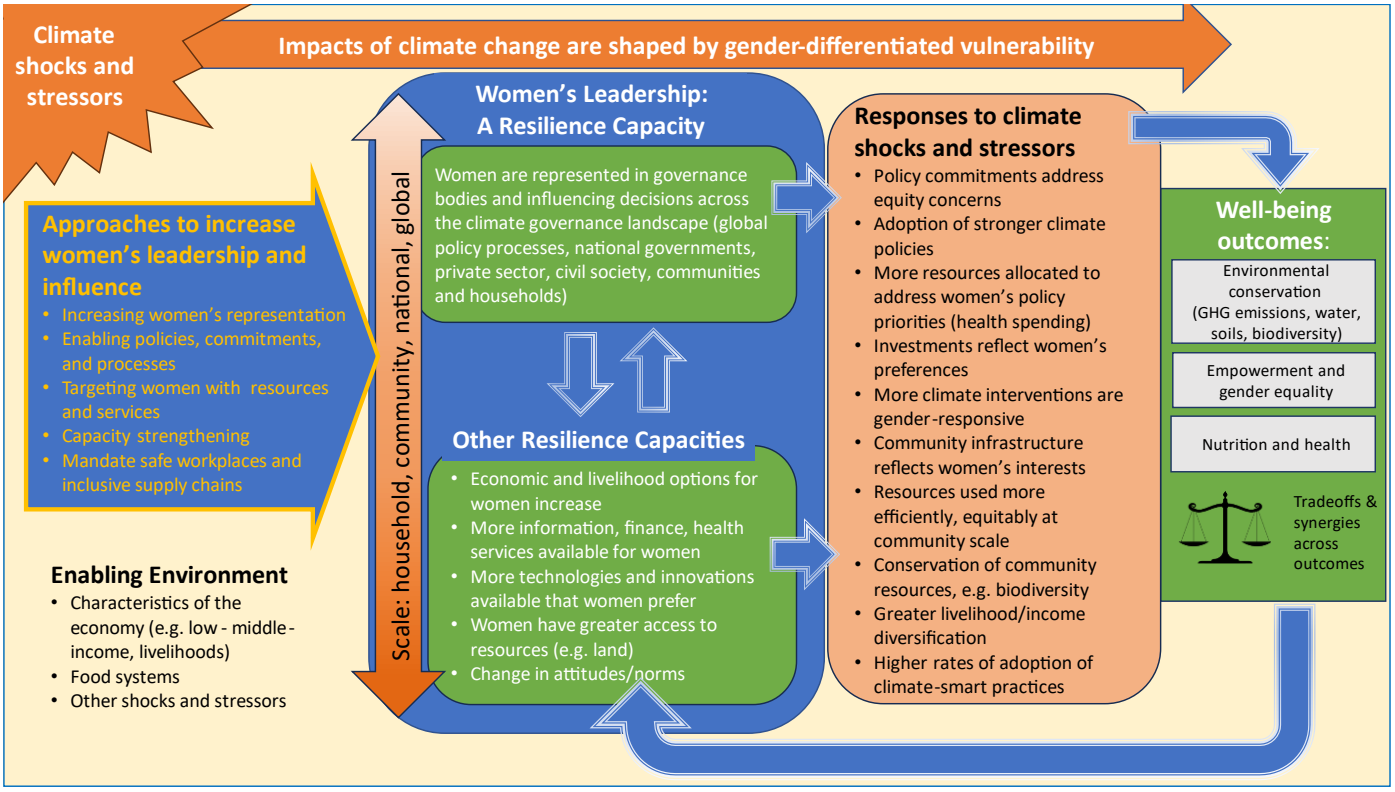
The process of women's empowerment may, thus, support resilience trajectories, whereby women utilize their agency to access resources needed to respond more effectively to climate change, leading to improved welfare outcomes for themselves and others under reoccurring and intensifying climate shocks and stressors (Takeshima, Raghunathan, and Kosec 2022). Increasing women's leadership in climate governance may also be considered an important well-being outcome. Notably Sustainable Development Goal 5.5 "seeks to ensure women's full and effective participation and equal opportunities, defined as meaningful involvement and exertion of influence, for leadership at all levels of decision-making in political, economic and public life."

Climate shocks and stressors and gender-differentiated vulnerability

The first component in the framework (Figure 1) focuses on the nature of the climate disturbance; that is, the types and characteristics of the climate shocks and stressors to which people in a given context are exposed. Climate change involves both climate extreme events or shocks, such as droughts, floods, and storms; and slow onset changes, such as long-term changes in rainfall patterns, temperature, an increase in the frequency and intensity of extreme events, and sea level rise. Both types of changes have serious negative implications for human well-being.

Climate change does not affect everyone, everywhere in the same ways. Inequalities related to gender, income, race/ethnicity, and age and other intersecting identities exacerbate vulnerability to climate change and limit climate resilient development for all (Schipper et al. 2022). The nature of people's exposure and sensitivity to climate change is also dependent on the types of shocks and stressors that they experience, as well as their access to livelihood systems and assets on which resilience depends (ibid). Even within the same communities, sensitivity to climate change varies by gender, socioeconomic status, age, and other factors.

Figure 1



A growing body of literature documents the different ways in which men and women experience climate change, pointing to women's greater vulnerability—largely attributed to their more limited resilience capacities (Bryan et al. 2024). As climate change intensifies, gender inequalities are likely to increase if measures are not taken to address the root causes of inequality (Lecoutere et al. 2024). Such measures include ensuring that women have greater roles in climate change decisions at multiple scales, so that policies, investments, and interventions reflect their specific needs and preferences, and are more likely to benefit women and create opportunities for their empowerment (Bryan et al. 2024).

Approaches to increase women's leadership and influence in climate change governance

A focal area of research for the HER+ Initiative has been on identifying public and private sector mechanisms to increase women's agency and leadership in climate governance (shown on the left side of Figure 1). There are multiple actors involved in climate change governance. These include public institutions, ministries and other entities that represent the national government, regional ministries, cities, and local governments, as well as non-state actors, such as the private sector and civil society, and public-private partnerships. Yet, coordination among these actors is limited (Hsu and Rauber, 2021). State actors set the legal frameworks and policy landscapes that can promote gender equality in climate responses, and actions taken by non-state actors to promote gender equality in climate responses can also have implications for other institutional actors operating at different scales within the agrifood system.

The literature highlights several approaches that are often adopted by government and private actors (business and civil society) to increase women's leadership and decision-making roles in climate governance at multiple scales. These include approaches to increase women's representation in policy processes as well as efforts by the private sector to support gender equality through their supply chains. There is considerable overlap and complementarities across public and private sector efforts, and many can be applied at multiple scales. These approaches are grouped by type below with some examples from both public and private sector applications.

Increasing women's representation in policy processes

- **Quotas to increase women's participation** in policy and programs. Quotas are used in a number of countries to increase representation of women in decision-making and managerial positions. When women are more represented in bodies making decisions about climate-related policy, they have greater influence. Quotas can matter in multiple ways, including by making governing bodies seem more open and representative to female citizens, by establishing female role models, which may encourage individual women to participate in public life (Campbell and Wolbrecht 2006; Brown et al., 2022; Kosec, Kyle, and Takeshima 2023), and by improving the representation of women's interests in policies (Clayton and Zetterberg, 2018). Yet, quotas can generate backlash if they are seen to violate existing gender norms (Liu 2018). They can also be seen as an unfair electoral rule and not merit-based (Clayton 2015), and may fail to represent women in all their diversity (Hughes 2011; Mohammed et al 2022).
- In addition to mandates and quotas, private sector **incentive structures** are used to increase gender equality and representation. These include providing equity certificates (for local government) or certification (private) to encourage women's increased participation in climate-smart agri-food supply chains. For instance, Uganda's Climate Smart Agriculture Programme used equity certificates as a means to motivate local governments to integrate gender in local development plans and increase women's involvement and representation (Mohammed et al. 2022). Voluntary sustainability standards (VSS) are an example of market-based mechanisms that address social and environmental challenges by setting standards and measuring performance of value chain actors against these standards, often providing labels or certification that indicate adherence to the standard (Morgan and Zaremba 2023). Approaches employed by VSS to increase women's participation and leadership include allowing more flexible membership requirements in producer organizations, forming women only committees or initiatives, adopting quotas to increase women's representation, and establishing dedicated women's enterprises (ibid). Despite these efforts, evidence suggests that women rarely obtain meaningful participation in decision-making or equal opportunities for leadership, given deeply rooted gender inequalities that are not addressed by VSS (ibid).
- Within key ministries and organizations implementing climate change responses, **strategies to recruit, hire, and maintain female staff** are important means for ensuring that women are not only at the table in the governing bodies designing policy solutions but are also active participants in implementing those solutions (Ragasa et al. 2023; Ragasa 2014).

Enabling policies, commitments, and processes

- Countries are increasingly making **commitments to gender equality in climate policy** documents such as in their National Adaptation Plans (NAPs), Nationally Determined Contributions (NDCs), and national development plans. While climate policies are increasingly recognizing women as particularly vulnerable to the negative impacts of climate change, few policies recognize and are designed to support women as agents of change in climate responses and to monitor progress in this area (Huyer and Partey 2020; Ampaire et al. 2020; Singh et al. 2021). Many climate policies at the national level only superficially integrate gender; and often fail to translate policy goals into effective action plans, to adequately budget for gender-related activities, and to incorporate gender-related indicators and targets into monitoring frameworks (Acosta et al. 2019; Ampaire et al. 2020).
- While gender quotas may increase women's formal participation, including in leadership positions, in the public sphere, a narrow focus on the share of women in a single governing group can miss **women's empowerment within national policymaking processes** (Ragasa et al. 2023). Women could play a role in decision-making in designing climate solutions in a variety of ways, including by advocating for policy solutions from within civil society organizations, leading policy implementation from within line ministries, and participating in consultations during policy development (ibid.). Additionally, whether national policies set gender targets and then ministries proceed to fund, monitor, and track those targets using sex-disaggregated data is an essential dimension (Kyle and Ragasa 2023).
- As part of **inclusive stakeholder engagement**, adopting standards for engaging women's grassroots organizations is an important part of ensuring policy processes are designed and implemented in ways that reach, benefit, and empower diverse women in their local contexts. Including gender experts and gender equality champions in the design, implementation, and M&E of programs is needed to ensure these meet women's needs and preferences and that they reach, benefit, and empower women and potentially transform harmful norms. Gender experts must also have access to **sex-disaggregated data** to effectively design programs.
- **Enabling policies,** and the removal of legal barriers that hinder women's responses to climate change, are also essential. For example, women often have limited land rights, which significantly hinders their ability to respond to climate change, particularly in communities dependent on agriculture and other natural resource-based livelihoods. Thus, one key legal intervention is the expansion of women's formal land rights, such as through joint land registration programs. Policy action needs to be complemented with awareness campaigns to increase social acceptability and external enforcement to effectively address gender gaps in land access and ownership (Mohammed at al. 2022, Morgan et al. 2023).

Targeting women to close gender gaps in access to resources and services, including finance

- While not directly aimed at promoting women's leadership, resources are essential for empowerment. Thus, closing resource gaps may increase women's ability to take on leadership positions and have greater agency in decisions both within and beyond the household (Ragasa et al. 2022).
- To address gender inequalities in climate change resilience capacities and outcomes, more resources need to be directed at women through **gender responsive budgeting or financing mechanisms**. At the global level, prominent public multilateral financing mechanisms only recently began to integrate a gender lens (Schalatek 2021). However, financing for gender-responsive climate change adaptation programs remains relatively small (Elwell et al. 2023). The same is true within governments and other institutions. Although internal strategies or policies may mention gender equality as a goal, gender-responsive climate change programming is inadequately funded, and climate policy goals related to gender equality tend not to be implemented (Elwell et al. 2023; Acosta et al. 2019). More transformative change requires prioritizing climate investments that disproportionally benefit women, investing in interventions that challenge underlying structural inequalities, and monitoring and evaluating gender equality results (Schalatek 2022; Acosta et al. 2019; Ampaire et al. 2020).
- Interventions must also be designed to **target technical resources and services as well as information to women** where there are considerable gender-related gaps. This includes ensuring that women have access to technologies that meet their needs and other inputs to their livelihood activities. Having access to climate information and extension services is also essential to enable effective adaptation. Studies have shown that when women have access to information they are as likely if not more likely in some instances to adopt climate smart practices (Bryan, Kato, and Bernier 2021). Participatory crop and livestock breeding programs could also be made more inclusive by targeting resources to women as lead farmers (Amoak et al. 2022). VSS also sometimes target resources to women, for example, by transferring household assets or land shares to women and investing in women's businesses (Morgan and Zaremba 2023).

Capacity strengthening

- Investing in **women's education, literacy training, and leadership programs** are essential for women to be able to participate effectively in climate change decisions at multiple levels and serve as successful leaders. Some governments and non-government organizations support women's capacity to participate in climate governance by providing training, mentorship, and networking opportunities (Mohammed et al. 2022). A number of NGOs work directly with women, and in some cases also with their husbands or other members of their social networks, to train women on how to participate effectively in community decision-making, and train husbands on why and how to support them in doing so (Adida et al. 2023; Karachiwalla et al. 2023). Additionally, some VSS include leadership and skills training as well as gender awareness trainings with couples (Morgan and Zaremba 2023).
- **Investing in women's grassroots organizations and self-help groups** is another strategy with demonstrated positive effects on women's leadership. Women who are involved in self-help groups often go on to become more politically active and take advantage of public entitlements (Amoak et al. 2022). Further, women's civil society organizations more broadly represent a source of substantial social capital that can enable resilience-building investments and increase the influence of members over leaders at all levels of government (Bleck et al. 2021).

Mandating safe workplaces and inclusive supply chains

- Women may be reluctant to take on leadership and managerial positions if their workplaces are not safe and supportive and incentive structures are not aligned with their advancement. Particularly in agrifood systems, women's roles are marginalized, and they face challenging work conditions that make their livelihoods more vulnerable compared to men (FAO 2023).
- The private and public sectors both have roles to play in ensuring that women receive **decent wages and equal pay** and that there are **equal opportunities for women's advancement**. Within the private sector, corporate social responsibility programs are being adopted to promote women's empowerment and set standards for gender equality in both operations and supply chains.
- Adopting **safeguarding standards and whistleblowing policies** can protect women from workplace harassment and other challenges that may limit their leadership ambitions. However, grievance mechanisms are not always safe from the risk of retaliation and workers may not always trust in their effectiveness to resolve issues.

The relative effectiveness of the above approaches to increasing women's effective participation and leadership in climate governance is not fully explored in the literature. However, evidence suggests the effectiveness of any of the above measures depends on the way the approaches are applied, the context, and other factors. More research is needed on the conditions under which the above approaches are effective at promoting women's empowerment within and beyond the household.

The above approaches are limited in their ability to address underlying structural gender-related inequalities including gender norms, attitudes, and behaviors that tend to hinder women's participation in decision-making and leadership opportunities. Such constraints may also discourage many women from taking leadership positions, given the personal sacrifices and tensions that may arise within their households and communities (Morgan and Zaremba 2023). Albeit limited, some policies do target these norms. For example, the Nigerian Action Plan on Gender and Climate Change acknowledges women's roles in climate resilience and aspires to tackle sexism and enhance women's climate change resilience, however, it contains no clear guidelines or budgetary allocation for implementing such policy actions.

A combination of approaches at multiple scales is needed to transform climate governance structures to enable more inclusive and equitable power dynamics (Lecoutere et al., 2024). A variety of actors need to engage in promoting gender equality and women's empowerment for more systemic change. This includes engaging men as champions for gender equality to ensure the success of these approaches. Addressing underlying gender inequalities in addition to promoting women's leadership is likely to be more effective at facilitating women's active engagement in climate governance.

Pathways through which women's leadership influences resilience capacities, climate responses, and well-being

While the HER+ Initiative research has focused largely on identifying approaches to increase and measure women's influence in policy processes, the research agenda is beginning to shift towards an exploration of the implications of women's leadership for climate resilience. The IPCC's 6th Assessment Report notes there is high confidence in the potential for inclusive governance arrangements and decision-making processes to address gender and other social inequalities through transformative climate actions (Prakash et al. 2022). There is growing evidence of the impact of women's leadership and influence in climate governance on resilience trajectories.

The conceptual framework shows that women's leadership and influence in climate governance at multiple scales are key resilience capacities, which influence responses to climate change and well-being outcomes. Women's leadership and agency in decisions have implications for the ways in which countries, communities, organizations, and individuals respond to climate shocks and stressors given gender differences in roles, needs, and preferences. These choices include investments in infrastructure and services, how climate innovation systems function, how resources are used, and which livelihood options individuals pursue, and which climate-smart strategies are promoted and taken up. These responses have implications for well-being outcomes, such as environmental conservation, nutrition and health, and gender equality and women's empowerment (Bryan et al. 2017; 2024). Because resilience is a dynamic process, more effective climate responses and improved well-being can further boost resilience capacities, such as increasing resources and services women can utilize to respond to future climate disturbances (Bryan et al. 2017). Gender gaps in resilience capacities are a key aspect of women's relative vulnerability to climate change (Bryan et al. 2017, 2024). Over time, women's leadership may contribute to closing these gender gaps in capacities.

However, the outcomes of women's leadership may not always be positive or there may be important tradeoffs between outcomes (Bryan et al. 2017; Roy et al. 2022). Some studies suggest, for example, that women are not always better stewards of the environment (Doss et al. 2018) and that women's leadership in decisions does not always lead to positive environmental or welfare outcomes, especially when other gender-related constraints remain, such as limited access to information, education gaps, and restrictive gender norms. While gender matters for environmental conservation, attitudes and preferences of men and women regarding sustainability are nuanced, varied, and depend on enabling factors, such as property rights (Meinzen-Dick et al. 2014). Other factors influencing rural women's pro-environmental behaviors include perceived severity of the environmental challenge, self-efficacy and environmental awareness (Bijani, Mohammadi-Mehr, and Shiri 2022).

Below we discuss the evidence that supports the pathways from public and private sector approaches to promote women's agency and leadership in climate governance to well-being outcomes. Specifically, we examine how women's leadership can 1) contribute to more effective climate change responses, 2) influence well-being outcomes, and 3) build resilience capacity. Because policies and interventions take place at multiple scales, from the national to the local level, these dimensions are discussed at each respective scale. However, there are considerable interactions among scales in climate governance within agrifood systems, whereby actions taken at one level can influence actions and outcomes at another. Similarly, actions taken by certain institutions or actors also influence actions of other institutions in the landscape, to different degrees depending on the level of influence of the actor.

Global level

At the global level, women bring specific knowledge, skills, and priorities to influence the climate change agenda and advance commitments. For example, women negotiators were essential in advocating and pushing for the loss and damage fund, which was first introduced at COP26 and adopted during COP28 (Borenstein 2022). Thus, approaches to increase women's leadership and involvement in global policy processes may increase women's influence over the design of climate policies and initiatives, and the flow of financing. Policy commitments aimed at promoting gender equality and inclusive policy processes at the global level provide a framework and establish norms and standards for national governments to follow and adapt to their local context as they design their respective climate policies (Acosta et al. 2019; Huyer et al. 2021) and can lead to more policies and interventions designed and implemented in a gender-responsive manner. Thus, changes in the policy environment at larger scales may create opportunities for women's empowerment and more effective climate action at national and local levels.

However, women's leadership in climate negotiations, participation in scientific assessment reports, and leadership in the IPCC remains low, although the share of women participating in these spaces is growing (Huyer et al. 2021; Liverman et al. 2022). Moreover, despite numerous international commitments to gender mainstreaming since the 1990s, the IPCC only adopted its Gender Policy and Implementation Plan in 2020, quite late to begin the process of integrating gender equality goals in global and national climate policies and actions (ibid). It is unclear whether the growing share of women participating in global climate discourses contributed to the eventual adoption of guidelines for gender integration at the global level.

National level

Cross country studies have highlighted that women's leadership, agency, voice, and economic and political empowerment improve climate responses, well-being outcomes, and resilience capacities. Women's political empowerment and representation is associated with reduced vulnerability to climate change (Asongu, Messono, and Guttemberg 2022), adoption of more stringent climate and energy policies (Mavisakalayan and Tarverdi 2018; Salamon 2023), greater CO_2 emissions reductions (Lv and Deng 2019), and lower environmental footprints (McKinney and Fulkerson 2015). Another study finds that women's status is associated with countries' greater capacity to mitigate and respond to the negative impacts of climate change (Ortiz and Ensor 2023). Similarly, low levels of gender inequality (as measured, for example, using the Gender Inequality Index) are associated with higher levels of climate action (as measured using the Climate Laws, Institutions, and Measures Index) (Andrijevic et al. 2020). More broadly, women's participation in decision-making at the national level is associated with specific resource allocation decisions, including higher spending on health (Mavisakalyan 2014) and education (Clots-Figueras 2012).

In addition to promoting women's leadership, many of the above approaches also directly influence other resilience capacities. For example, education and literacy training programs may open economic opportunities for women that enable them to diversity livelihood activities, thereby minimizing climate risks. While quotas may not directly address harmful gender norms, over time, observing more women in leadership positions may change attitudes about women leaders.

However, efforts to increase women's representation and leadership in climate governance may not always lead to better designed, gender-responsive climate policies. A case study of Ethiopia's climate resilient strategy suggests that simply including women representatives in policy discourses is not enough to craft gender-responsive climate policies if these representatives do not have gender expertise and bring a gender agenda to bear (Mersha and van Laerhoven 2019). A case study using the Women's Empowerment in Agrifood Governance (WEAGov) Assessment Framework to measure the extent of women's voice and agency in national policymaking in Nigeria found that even when gender targets were set within National Climate Policy and included some efforts to consult women and women's groups in their development, in practice, the gender targets were not funded, monitored, or tracked (Ragasa et al, 2023).

Women's leadership in climate governance at the national level could lead to more gender-responsive interventions, including efforts to target resources and services to women to close gender-related resource gaps, and direct investments that more closely match the preferences of women (Clayton and Zetterberg 2018). To the extent that women's leadership does result in more gender-responsive interventions, this would give women greater access to and control over resources needed for adaptation at the local level, such as climate smart technologies, natural resources, productive assets, agricultural extension, and climate information services and finance; and may provide opportunities for women in their communities to have greater influence over local decisions and participate meaningfully in local institutions.

Private sector and civil society

Even within private enterprises, research shows that an increase in the share of female managers is associated with reductions in CO_2 emissions and the effects are even stronger when women are well-represented in political institutions and civil society organizations (Altunbas et al. 2021). Having more women managers and leaders in companies also has a positive influence on corporate social responsibility initiatives with gender equality objectives (Larrieta-Rubin de Celis et al. 2014). Having more women in business leadership positions such as managers and members of corporate boards is also associated with adoption of higher environmental, social, and governance standards, better business practices, greater stakeholder engagement and improved reputation and brand (Di Miceli and Donaggio 2018).

Even when businesses adopt higher environmental and social standards, this may not lead to meaningful change in gender equality on the ground, however. For example, evidence is mixed on whether voluntary sustainability standards contribute to greater gender equality in agrifood supply chains (Morgan and Zaremba 2023). Studies of the Fairtrade certification scheme show that in some instances women benefit from higher incomes, improved their status, and enhanced decision-making (Gallagher et al. 2020), while in others they experience higher burdens of work and less control over household decision-making or no changes in gender equality at all (Nelson et al. 2016).

Women entrepreneurs in agrifood systems tend to be marginalized and their working conditions are generally worse than men's (FAO 2023). Women-led micro, small and medium enterprises tend to be informal and lack access to resources, finance, public assistance, training opportunities, among other constraints; thus, they tend to be more vulnerable to climate shocks and stressors. They also face greater barriers to greening their operations and adapting to the negative impacts of climate change, despite greater willingness to go green (Nugyen, Lin, and Vu 2023). At the same time, female-owned MSMEs also play a role in promoting resilience including by allocating returns from MSMEs more efficiently to the most critical household assets, including health, education and food security (Atela, Gannon, and Crick 2018). Thus, while women entrepreneurs face greater challenges to contribute to green economies and building resilience within their own business activities, overcoming these barriers may lead to more resilient outcomes (ibid).

Women's active participation in groups, such as producer groups, self-help groups, and savings groups, strengthens their resilience capacities by increasing women's access to information, shared resources, finance, livelihood opportunities, and social networks (Bryan, Ringler, and Meinzen-Dick 2023; Bryan et al. 2024). Groups also provide a vehicle for women's collective agency and leadership in other spheres, such as greater political engagement (Kumar et al. 2021). Social movements, including women's grassroots movements, have increased public awareness about the urgent need to address the climate crisis in an inclusive manner that focuses on advancing well-being of vulnerable populations and equitable access to climate finance (IPCC 2022). Grassroots movements are also important to ensure the legitimacy and inclusiveness of the decision-making process and the design of socially just adaptation and mitigation actions.

Community level

Women have different preferences, needs, and priorities for how they respond to the climate disturbances that they experience in their communities (Bryan et al. 2024). Yet, unequal power dynamics limit women's ability to negotiate for their preferred responses (ibid). Several studies at the household level suggest that when women have access to information, resources, and influence over climate decisions, they are likely to respond to climate change in different ways than men. For example, gender is a factor in the adoption of climate smart practices (Bryan, Kato and Bernier 2021; Ado et al., 2019). In Bangladesh, women were more likely to adopt practices that related to their livelihood roles, like improved livestock feed management and grain storage practices, when they were aware of such practices (Bryan, Kato and Bernier 2021). Women's involvement in agriculture decisions is also associated with greater crop diversification (De Pinto et al. 2020) and planting more diverse tree species (Gumucio, Twyman, and Clavijo 2017). Further, households where the most informed individuals regarding a decision—whether men or women—decide are the most productive (Bernard et al. 2020).

There are fewer studies exploring the influence of women's local leadership on climate change response decisions at the community level. However, some experimental evidence shows that women make different choices then do men when they participate in decisions about community policies to combat climate change and wield even more influence when more women are represented in decision spaces (Clayton et al. 2023). Thus, when women take leadership positions or gain influence in local governments or other local institutions, this has implications for the decisions made by those institutions, including the allocation of resources and goods, placement, design, and management of infrastructure. For instance, in India and Nepal, including women in resource management groups led to better resource governance and conservation outcomes (Leisher et al. 2016). Similarly, in India, where a share of leadership positions in village councils is reserved for women, women elected as leaders under this policy invest more in infrastructure that is relevant to their own needs and less in infrastructure relevant for men's interests (Chattopadhyay and Duflo 2004).

An increase in women's voice and agency in some spaces may not mirror changes in others. For example, women leaders in the community may face backlash in their own households. Conversely, increasing women's voice and agency in community spaces may be more difficult than changing dynamics at home. For example, an evaluation of intervention in Kenya that aimed to empower women to participate in drought preparedness decisions at the household and community levels found that, at the community level, women's presence in community decision spaces and political knowledge increased but women still had limited influence over decisions that were made (Grillos 2018). However, at the household level, women reported an increase in drought-preparedness measures (ibid). These findings stress the need to address structural barriers at multiple scales.

There are some case study examples at the local level that suggest women's involvement in climate decisions leads to different outcomes and better governance. Women's influence in local governance can lead to more environmental conservation and promote greater gender equality (Wray et al. 2023). For example, gender quotas applied to forest user groups in Indonesia, Peru, and Tanzania conserved more trees through a payment for ecosystem service scheme and shared the payments more equally among group members (Cook, Grillos, and Andersson 2019). In India, a study found that women's greater participation in district assemblies reduces the negative effects of climate change on various outcomes related to women's voice and agency

beyond the household, such as mobility, decision-making, and intimate partner violence (Takeshima, Raghunathan, and Kosec 2022).

Elias et al. (2021) document several examples of nature-based approaches that elevate women's voices and influence and integrate women's knowledge, perspectives, and priorities in initiative design. Such approaches can simultaneously address climate change, protect biodiversity, and combat land degradation, while also expanding livelihood options for women and achieving more equitable benefit sharing (ibid). However, women's involvement in environmental governance is not enough to achieve equitable decision-making and benefit sharing—complementary efforts to address underlying inequalities in formal and informal institutions are needed to create enabling conditions for gender equality (ibid).

Certain conditions of women's participation may also support greater women's leadership in climate and environmental governance. For example, in Malawi, a study shows that when the share of women that are represented in climate-related deliberations is larger, women have more influence over the topics of deliberation and decisions made (Kosec et al. forthcoming). Training women and men on the value of women's participation in local governance may help women overcome barriers and become more effective leaders in spaces typically dominated by men (Adida et al. 2023).

Discussion and conclusions

Creating conditions for women's leadership and agency beyond the household related to climate change decisions requires a multi-pronged effort across the institutional landscape. However, approaches that promote women's leadership and agency alone are not enough. Women currently in leadership positions related to climate governance also need other support to manage gender biases and constraints until underlying structural inequalities leading to such biases are eliminated. For sustained outcomes, underlying structural inequalities that limit or discourage women from expressing their voice must also be addressed.

This article explores the instrumental value of increasing women's leadership and voice in climate governance for resilience. It develops a conceptual framework to illustrate the pathways through which women's leadership influences resilience trajectories. To be clear, while it is important to understand the relationship between women's leadership and climate resilience, proving that women's leadership leads to improved environmental or other well-being outcomes is not a precondition for encouraging women's leadership. Promoting women's leadership and active involvement in climate governance is a matter of climate justice.

Evidence suggests that women's leadership and agency at multiple scales can increase resilience capacities and influence climate change responses and well-being outcomes, such as greater environmental conservation. Evidence of this relationship is particularly strong at the national level, in local governance, and in private companies. However, in some cases, constraints faced by women leaders limit the outcomes they can achieve. For instance, women entrepreneurs running MSMEs, have fewer opportunities to adapt their practices to reduce climate risks and contribute to green economies, despite their potential willingness. The influence of women's leadership and participation ultimately, depends on many factors, including the gender composition of the governing body or group.

Moreover, most of the well-being outcomes of focus in the literature are related to environmental conservation. There is less evidence that women's meaningful participation in climate governance protects other well-being outcomes, such as better health and nutrition, under climate change. In fact, climate policies are only beginning to consider and address the health and nutrition impacts of climate change (I-CAN 2023).

The extent to which gender integration in national, local, and other policy and intervention designs is driven by women's leadership and agency is unclear. Many factors, besides women's leadership, are important for meaningful integration of gender in climate policy, including availability of data and evidence of how gender inequalities contribute to climate vulnerability, the establishment of gender focal points in relevant agencies, and engaging local actors for more effective implementation of climate policies (Huyer et al. 2021). Women leaders may not have the expertise to design and implement gender-responsive climate policies and interventions. This requires that all leaders and decision-makers appreciate the importance of integrating gender and call on gender experts (whether women or men) to guide the design and implementation of climate policies, strategies, and interventions across the institutional landscape.

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