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Critical Need for Gender-Sensitive Climate-smart Agricultural Policies: A Comprehensive Review

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ABSTRACT

Climate change is one of the most pressing global issues, resulting from changes in an area's climate caused by anthropogenic and natural factors such as increased greenhouse gas emissions and ozone layer depletion. Climate change impacts differ by gender, as men and women's social conditions in different places influence their ability to increase resilience to extreme weather and climate events. Despite the fact that women are primarily involved in agricultural operations, they are often overlooked by information and service providers, unless their unique needs, access to and control over resources are taken into account during the policy and project design stages. This demonstrates the importance of incorporating gender considerations into various policies and research to ensure the effective implementation of climate change adaptation interventions in agriculture. Instead of focusing on each issue separately, it is critical to consider how gender, agriculture and climate change are interconnected in order to achieve this. As a result, this review paper identifies policy gaps and makes a number of recommendations for improving gender responsiveness at the policy level in agriculture, emphasizing the importance of developing climate smart projects with gender in mind by learning about cutting-edge gender-transformative interventions accountable for serving both gender.

Key words: Climate smart agriculture, Gender, Policies.

Climate change is one of the most emerging issues at the global level, which is caused by changes in the climate of an area as a result of anthropogenic and natural disorders such as the rise in greenhouse gas emissions and the depletion of the ozone layer (Kabir *et al.,* 2023; Ahmad *et al.,* 2022; Awan, 2022; Ebadi *et al.,* 2020). Climate change impacts differ by gender, as the social conditions of men and women in different places influence their resilience to increase in extreme weather and climate events (Gomes *et al.,* 2022; Hossen *et al.,* 2021; Khalil *et al.,* 2020; Akinsemolu and Olukoya, 2020). Fluctuating temperature and rainfall patterns will undoubtedly have an impact on agriculture, which is dependent on land and weather (Manjeet *et al.,* 2023: Samanta *et al.,* 2024; Yila *et al.,* 2022; Alie *et al.,* 2024; Myeya and Mulungu, 2021; Singh and Malik, 2018). In developing countries, the agricultural sector is critical to job creation. Extreme weather events, increased frequency of droughts and floods, variability in rainfall patterns and degradation of marginal lands are likely to impact the agricultural sector and its workers (Shukla *et al.,* 2023; Furtak and Woliñska, 2023; Qiao *et al.,* 2022; Kumar and Upadhay, 2019; Terefe, 2023). According to FAO (2019), the agricultural sector employed a quarter of the global workforce, second only to the services sector, with approximately 200 million people employed in two major countries: China and India. Agriculture employs about 80 per cent of rural women in India (Patel and Sethi, 2021). Women farmers engage in diverse agricultural tasks, from planting and harvesting crops to managing livestock and processing food which also determine the nature and severity of climate change impacts they faced (Mahato, 2023; Antriyandarti *et al.,* 2024; Anugwa *et al.,* 2023).

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Climate change impacts, such as decreasing supply of crop residues and biomass for energy and livestock feed, increasing weed severity, crop re-sowing/transplanting requirements and crop yield loss, are likely to affect women more, given their involvement in related activities (Nelson *et al.,* 2008). Despite the fact that women are primarily involved in agricultural operations, they are often overlooked by information and service providers unless their unique needs, access to and control over resources are taken into account during the policy and project design stages. As a result, this review paper identifies policy gaps and makes a number of recommendations for improving gender

responsiveness at the policy level in agriculture, emphasizing the importance of developing climate smart projects with gender in mind by learning about cutting-edge gender-transformative interventions accountable for serving both gender.

The study was planned and executed in ICAR-National Dairy Research Institute, Karnal in the year 2024. The literature for this review was meticulously gathered from a variety of reputable online databases, including Google Scholar, Research Gate, Science direct and other scholarly platforms. Relevant research articles, review papers and reports were identified using targeted keywords and phrases related to the topic. The selected studies were critically analyzed and synthesized to ensure a comprehensive understanding of the subject matter. The collected literature was categorized based on thematic relevance, allowing for a systematic presentation of findings. This approach ensured a coherent flow of information, highlighting key insights, identifying research gaps and discussing emerging trends in the field. The integrated review aims to provide a holistic perspective while maintaining academic rigor.

The intersection of gender and climate change

Gender exposure and adaptive capacity in agriculture to the impact of climate change differ significantly. Several studies have shown that men and women farmers frequently have different abilities to adapt to climate change, variability and weather-related shocks, with women in many cases being affected more than men by climate-related shocks and stresses (Nchanji *et al.,* 2022; Chibowa *et al.,* 2020; Chitakira and Ngcobo, 2021; Quisumbing *et al.,* 2017). Women are underrepresented in agricultural research and development when it comes to shaping research agendas, setting priorities, making decisions and taking on leadership roles.

Their significant participation emphasizes the need to address the gender gap in terms of access to resources, productivity and vulnerability in agriculture in the aftermath of climate change (Nyasimi and Huyer, 2017; Chanana-Nag and Aggarwal, 2018; Jerneck, 2018; Huyer *et al.,* 2021). Reducing gender inequalities in access to productive resources and services could produce an increase in yields on women's farms of between 20 and 30 per cent, raising agricultural output in developing countries by 2.5 to 4% (FAO, 2011). Rural women in particular are reported to be at high risk of negative impacts from climate change. This is because their household responsibilities such as childcare and the collection of firewood and water can make women particularly climate-sensitive; because they are taking on more agricultural work as men migrate for labor; because they have less access to agricultural resources such as land, extension services and inputs with which to adapt to variability and change; and because gendered social norms and roles can inhibit women's adaptive capacity (Assan *et al.,* 2020; FAO, 2011; Jost *et al.,* 2016).

Unveiling climate-smart agriculture

The climate-smart agriculture (CSA) approach is emerging as a new paradigm for agricultural adaptation to changing climate conditions. This approach seeks solutions that increase agricultural productivity, build resilient food production systems and reduce greenhouse gas emissions (Safdar *et al.,* 2024; Kumar and Aishwarya, 2024; Shrivastava, 2023; Dabesa *et al.,* 2022). Climate-smart agriculture includes a variety of technologies and practices that are required to reduce the impact of climate change on agricultural production, such as changing crop cultivation practices to accommodate changing weather patterns in order to increase yields. Integration of gender component in climate-smart agricultural practices so that both men and women can have access to all technological, informational and aspects related to agriculture for higher yields without any gender discrimination because both genders are involved in agriculture activities (Hussein, 2024; Adimassu *et al.,* 2023; Belay *et al.,* 2023; Zerssa *et al.,* 2021; Rajpoot *et al.,* 2024; FAO, 2019; Dayananda *et al.,* 2022).

Need for integrating gender component in climate change adaptation

Integrating a gender component into climate change adaptation strategies is a critical imperative that recognizes the diverse and often unequal ways in which climate impacts affect people. Gender dynamics intersect with climate vulnerabilities, with women frequently bearing a

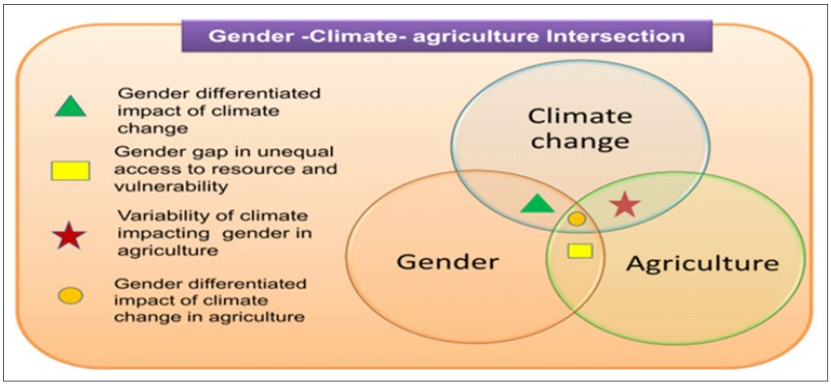


Fig 1: Intersection of gender, climate change and agriculture.

disproportionate burden as caregivers, resource managers and community connectors (Castelo *et al.,* 2024; Han *et al.,* 2022; Shaikh 2022; Huyer *et al.,* 2020; Shrivastava *et al.,* 2023). By incorporating a gender lens into adaptation efforts, these disparities can be addressed, resulting in more inclusive and equitable solutions. Gender-sensitive adaptation acknowledges the unique needs and contributions of men and women. It involves assessing how climate change affects different genders, taking into account their roles, responsibilities and access to resources (Goodrich *et al.,* 2019; Reggers, 2019; UNFCCC, 2015). Integrating gender into policies and initiatives ensures that women's voices are heard in decision-making processes, allowing them to shape solutions that have a direct impact on their lives. Furthermore, this approach taps into women's knowledge of local ecosystems and traditional practices, which improves the effectiveness of adaptation measures (Lwamba *et al.,* 2022; Lafreniere *et al.,* 2019; Squicciarini *et al.,* 2023). Furthermore, incorporating a gender

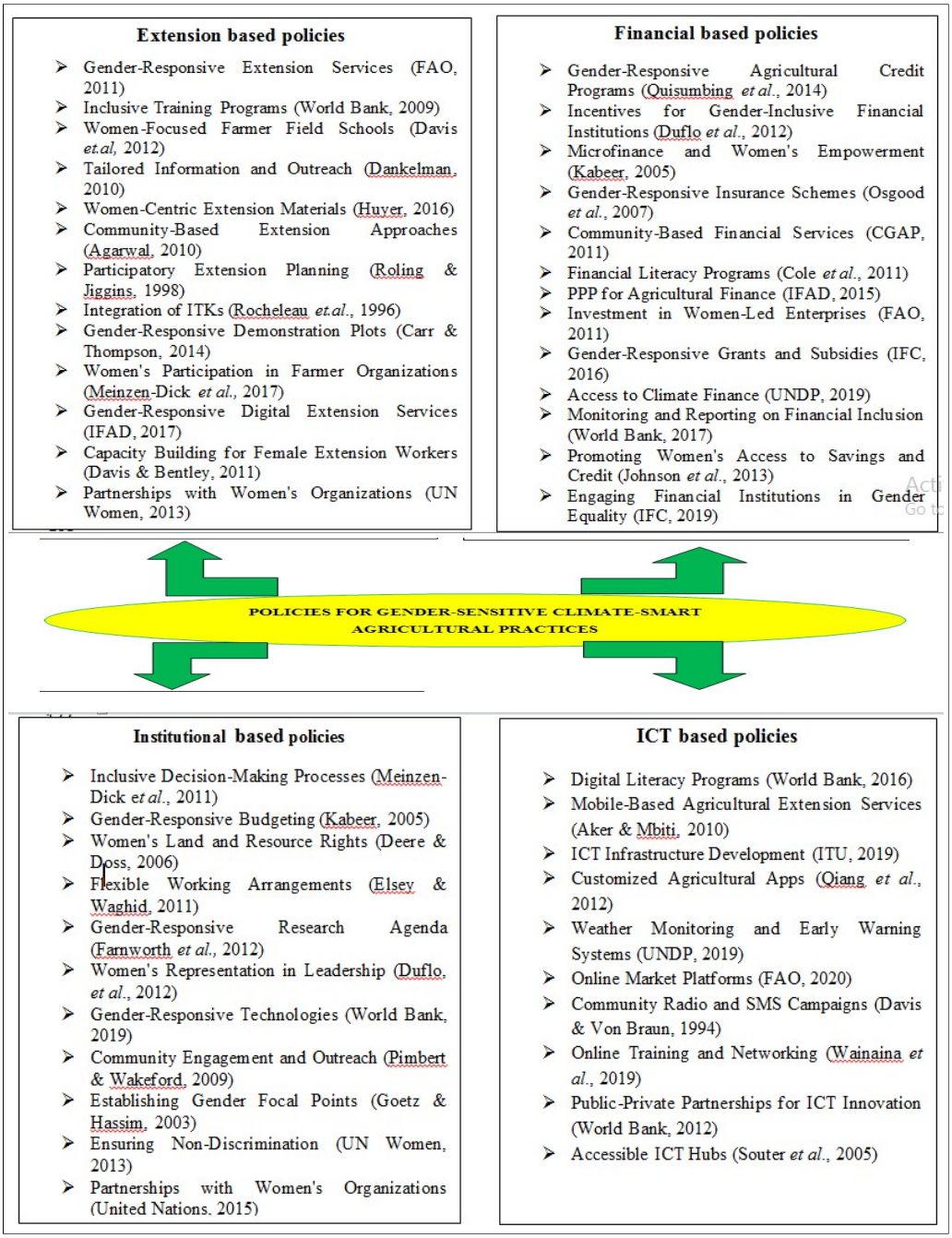


Fig 2: Policies for gender-sensitive climate smart agricultural practices.

component not only addresses gender disparities but also improves the effectiveness of climate adaptation. Considering gender-specific vulnerabilities, capabilities and perspectives makes adaptation strategies more contextually relevant and responsive (Sharma, 2023; Kumar and Saizen, 2023). Finally, gender-sensitive climate change adaptation helps build more resilient, sustainable communities that are better equipped to navigate the challenges of an uncertain climate future (Lee, 2023; Mahato, 2023; Karki *et al.,* 2021).

Importance of gender-sensitive climate-smart policies

Gender-sensitive climate-smart policies are critical for developing effective and equitable responses to climate change challenges. Climate impacts continue to affect communities around the world and it is becoming increasingly clear that these impacts are not gender-neutral. Several key factors, supported by research and international commitments, highlight the significance of including gender considerations in climate-smart strategies (Adeola *et al.,* 2024; Deininger *et al.,* 2023; Awiti, 2022; Okesanya *et al.,* 2024). According to research, women and men experience the effects of climate change differently due to differences in roles, responsibilities and resource access. Women often bear a disproportionate burden because they are frequently responsible for tasks such as water collection, food provision and household management (Chitiga-Mabugu *et al.,* 2023; Goli *et al.,* 2023; Nosheen *et al.,* 2023). The United Nations Development Programme emphasizes that women in many regions are more vulnerable to climate-induced displacement and food insecurity necessitating gender-sensitive policies to address these disparities (UNDP, 2018). Integrating gender perspectives into climate-smart policies does more than just address gender disparities; it improves the overall effectiveness of adaptation and mitigation strategies. Studies by organizations like the International Union for Conservation of Nature show that gender-sensitive policies lead to better-targeted interventions, more inclusive decision-making processes and improved project outcomes (Gupta *et al.,* 2023; Ediae *et al.,* 2024; IUCN, 2018). When women's voices and experiences are included in policy design, implementation and evaluation, the resulting strategies are more contextually relevant and culturally sensitive, increasing the likelihood of success. International commitments like the Paris Agreement and the Sustainable Development Goals emphasize the importance of gender-sensitive climate-smart policies (Deininger *et al.,* 2023; Lau *et al.,* 2021). The Paris Agreement recognizes the importance of gender equality in climate action and the SDGs emphasize the interconnectedness of environmental sustainability and gender empowerment. By prioritizing gender equality within climate policies, nations not only fulfill global obligations but also strengthen their capacity to address the complex challenges of climate change while fostering social equity and sustainable development. A key aspect of gender-sensitive climate-smart policies involves acknowledging the differentiated roles and responsibilities of women and men in relation to climate change. Women frequently possess unique knowledge of natural resources and ecosystems, which can be leveraged for adaptive strategies (Barooah *et al.,* 2023; Boudalia *et al.,* 2024). For example, projects in Nepal and Bangladesh have demonstrated the effectiveness of involving women in community forestry management, increasing both forest cover and women's empowerment (Bocci and Mishra, 2021; Leone, 2019). By recognizing and supporting these roles, policies can capitalize on women's expertise while challenging traditional gender norms that limit participation. Furthermore, gender-sensitive climate policies address women's vulnerabilities, especially in disaster-prone areas. Women are more vulnerable to climate-related disasters because socioeconomic factors and cultural norms limit their mobility and access to resources. Integrating gender considerations into disaster preparedness and response plans can boost women's resilience while decreasing their vulnerability. The "Sendai Framework for Disaster Risk Reduction," adopted by the United Nations, emphasizes the importance of gender-responsive approaches in disaster risk reduction, highlighting the need for policies that consider all individuals' diverse needs (Zaidi and Fordham, 2021; Yadav *et al.,* 2021; UN Women, 2009). Empowering women economically is another critical component of gender-sensitive climate-smart policies. Women have better access to resources such as land, credit and technology, allowing them to cope with the effects of climate change. For example, in India, the National Rural Livelihoods Mission" has assisted women's self-help groups by increasing their access to credit and livelihood opportunities in the face of changing climatic conditions. These efforts not only enhance women's agency, but also contribute to overall community resilience (Deininger *et al.,* 2023).

Conclusion

Policymakers and researchers are increasingly recognizing the importance of effectively incorporating gender into their efforts to address climate change and variability. The primary reason for these gender-inclusive strategies is that investments in research, policy and development actions have not yielded the widespread, beneficial results anticipated. The evidence is growing on the significant cost of ignoring the large 'gender gap' that persists in agricultural productivity and development in most countries. This cost is reflected not only in ongoing inequality, but also in missed opportunities to improve development outcomes. So, in this context of climate change, it is particularly important to understand and analyze how gender mediates opportunities and challenges in increasing agricultural productivity and livelihoods. Gender-aware policies, particularly in climate adaptation, are thus important to address the specific needs of men and women.

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Disclaimers

The views and conclusions expressed in this article are solely those of the authors and do not necessarily represent the views of their affiliated institutions. The authors are responsible for the accuracy and completeness of the information provided, but do not accept any liability for any direct or indirect losses resulting from the use of this content.

Informed consent

All animal procedures for experiments were approved by the Committee of Experimental Animal care and handling techniques were approved by the University of Animal Care Committee.

Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this article. No funding or sponsorship influenced the design of the study, data collection, analysis, decision to publish, or preparation of the manuscript.

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