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A Systematic Review of the Socio-Economic Impacts of Climate Change: Gender Perspectives and Adaptation Strategies

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Abstract - **This study systematically reviews the socio-economic impacts of climate change from a gender perspective, analyzing 99 papers sourced from the Scopus database using bibliometric methods. The research shows a significant increase in publications on gender and climate change, with the number of articles rising from one in 2011 to an expected 27 by 2025, highlighting the growing academic interest in this area. Citation trends reveal a peak in 2019, with 1,635 citations, indicating the rising influence of gender-focused climate studies. The analysis identifies that women, especially in agriculture and coastal regions, face increased vulnerabilities due to restricted access to resources, decision-making power, and financial support. In contrast, men's adaptation strategies often involve migration or market-based solutions, which can disrupt household resilience. The keyword co-occurrence analysis shows a strong focus on "climate change," "adaptation," and "agriculture," with "adaptation" frequently discussed but poorly integrated into broader socio-economic discourse. This fragmentation suggests that adaptation research is not fully addressing gender-responsive needs. The study also identifies a shift in research from documenting gendered vulnerabilities to understanding the structural mechanisms that create these disparities. The findings underscore the importance of gender-responsive policies, recommending a focus on enhancing women's access to land, financial resources, training, and participation in decision-making. The study concludes with a call for future research to address the needs of marginalized and gender-diverse populations, ensuring that climate adaptation strategies are inclusive and effective in fostering long-term resilience.**

Keywords: **Gender and Climate Change, Climate Adaptation, Socio-Economic Impacts, Gender-Responsive Policies, Agricultural Resilience, Migration and Livelihoods, Vulnerability and Resilience**

I. INTRODUCTION

Climate change in recent years has caused significant changes in gender roles; men are compelled to leave the occupations influenced by climate change, while women have to be at the forefront of almost all household and livelihood related activities (Jena et al., 2025). As a result, in the agriculture sector, men are bound to move to distant areas, and women are forced to take up agriculture-relocated work and manage livestock (Sewando, 2023). Such changes have accentuated gender disparities and threatened the very foundation of the social structures of families.

Despite extensive research in the domain of climate change, substantial gaps persist in existing knowledge, particularly regarding the economic consequences of climate change for both men and women (Ravera et al., 2016). Although several studies have examined the consequences of climate change on agriculture and livelihoods, limited studies have addressed the impacts of the changes in family dynamics, gender roles, division of household labor, and decision-making in scientific and systematic manner (Garutsa, 2021). Most studies have considered the rural population as a homogeneous mass, and often fail to examine gender-based disparities in rural areas with regard to access to facilities, prevailing social and cultural factors, and environmental pressures (Stringer et al., 2020; Boas et al., 2023).

Disaster Risk Theory explains how natural shocks or disasters associated with climate change, often intensify existing vulnerabilities, specifically among disadvantaged sections of the population, such as women engaged in agriculture (Tavenner et al., 2019).

Different parts of India, such as the state of Odisha, are prone to recurrent risks of cyclones, floods, droughts, lightning, and coastal erosion or encroachment (Pradhan et al., 2025). These hazards are greatly affecting the sectors such as agriculture, fishing, tourism, food processing, and crafts. Such events have directly influenced the gender roles and gender minorities with asymmetrical distribution in access to various facilities, control over important assets, and mobility. Such scenarios have also been exacerbated by the livelihood-related losses experienced by men, specifically within the fishing communities, due to damage to boats, while women continue to manage household work, providing food and care for the family.

The problem of climate change has a disproportionate impact on the socio-economic systems of society and livelihoods, especially the vulnerable ones. The study seeks to understand the varying impacts that climate change may have on individuals based on gender through the following research questions.

1. What socio-economic effects does climate change cause for men and women?
2. How do changes that occur within the climate context in the context of gender roles, livelihood options, and family relations influence the adaptive capacity of both genders?
3. What gender-specific difficulties arise from resource access and decision-making during climatic emergencies?

This paper aims to review the literature on climate change-induced socio-economic challenges with particular emphasis on gender responses. It seeks to establish research gaps within the existing studies in this domain. The study is conducted using the Scopus database, which covers literature in the global context and incorporates a comprehensive set of relevant keywords. The research employs the VOS viewer (version 1.6.20), an open-source bibliometric software, to generate and visualize bibliometric maps. This facilitates systematic interpretation of both the structural and qualitative dimensions of the literature.

The study addresses SDG 5 (Gender Equality), SDG 13 (Climate Action), SDG 1 (No Poverty), and SDG 8 (Decent Work and Economic Growth). It seeks to enhance understanding of the evolving roles and challenges experienced by both genders in the context of climate change-induced risks among vulnerable populations and recommends strengthening gender-responsive climate adaptation strategies and community resilience.

This study makes the following contributions:

- Systematic review of scientific literature concerning gender-specific socio-economic consequences of climate change.
- Study of trends in research on climate change adaptation, with special attention to gender responsive policies.
- Ideas about what gaps exist in contemporary research and where the next research steps should be taken.

The paper is organized as follows. Section II provides a comprehensive review of the literature on the socio-economic impacts of climate change, with a particular emphasis on gender disparities. Section III outlines the methodology used for the systematic bibliometric analysis, detailing the process of paper selection and keyword analysis. Section IV presents the findings from the analysis, focusing on emerging research trends and the gendered dimensions of climate adaptation. Finally, Section V concludes the paper with a summary of the study's key contributions, identifies research gaps, and offers recommendations for future research in the area of gender-responsive climate adaptation strategies.

II. Literature Review

As evident in the current academic literature pertaining to climate change and the gendered socio-economic implications thereof, there has been a marked move from a fragmented approach to vulnerability and adaptation in specific sectors towards an interconnected analysis that considers gender as a determinant of vulnerability (Blaikie et al., 2014). The studies do not present climate change impacts in terms of homogeneity, but rather present evidence of how gender functions as a structural determinant in determining access to resources, adaptive capacity, and livelihoods (Birkmann et al., 2022). For example, whereas the literature on agriculture and livelihoods presents evidence of the burden on women in terms of labour and resource constraints, the literature on migration presents evidence of how adaptation for men entails mobility and occupation changes (Hossain et al., 2018; Chant et al., 2000).

Furthermore, theoretical approaches like Feminist Political Ecology and Disaster Risk Theory complement each other but remain insufficient (Tavenner et al., 2019). As Feminist Political Ecology is able to identify the power imbalances in resource management, Disaster Risk Theory helps understand the interconnection between environmental shocks and existing social inequalities (Cunsolo Willox et al., 2012). However, according to the literature, both theories have been criticized for their limited attention to the dynamic nature and adaptability of the people involved (Ericson, 2020; Sewando, 2023).

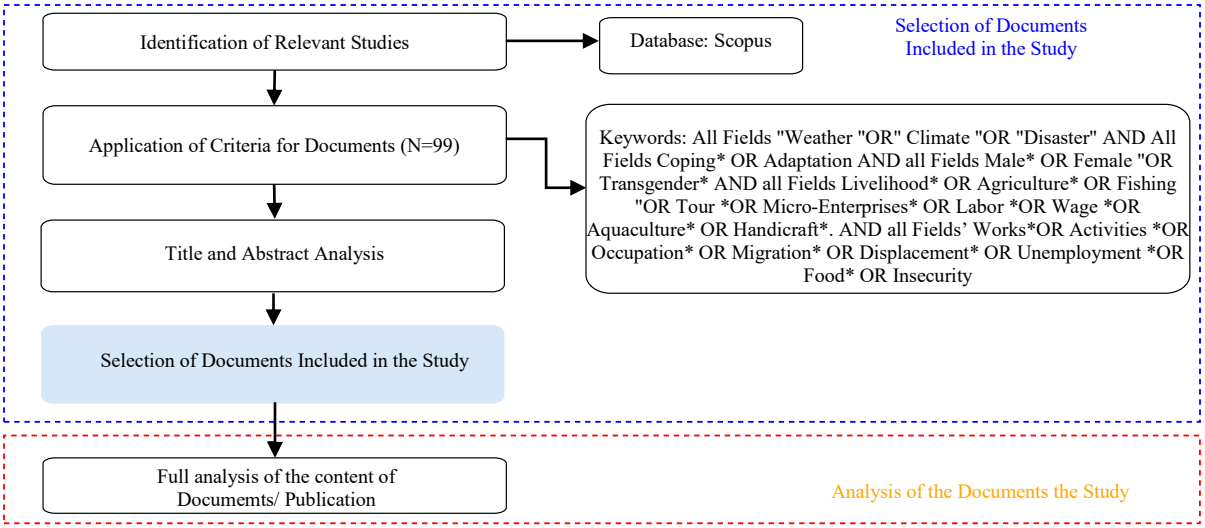

Fig. 1 The Methodology Employed in Selecting the Documents/Publications Examined Within this Research

Studies about masculinities go one step further, identifying the heterogeneity of males as vulnerable individuals whose situation is shaped not only by occupations but also by socio-cultural factors (Ericson, 2021). Cross-studies analysis shows the presence of thematic intersection regarding adaptation mechanisms; however, there is a considerable difference in access and implementation (Tavenner et al., 2019). Thus, women resort to less formal and economical adaptations associated with subsistence, while men focus on income-related activities requiring substantial resources (Singh et al., 2017). Such a difference shows an obvious lack in institutional support policies, which fail to provide equal solutions to gender-sensitive issues. Furthermore, recent literature has been shifting from a traditional vulnerability paradigm towards resilience approach, using complex analysis tools (Rather & Mahalik, 2025).

In summary, the synthesis suggests that a single-perspective approach is inadequate in comprehending the effects of climate change (Ericson, 2021). An intersectional approach is therefore necessary to understand the interactions between gender, socio-economic factors, and environmental challenges. The process will facilitate the development of relevant policies that consider multiple dimensions rather than mere descriptions.

Literature has revealed that the effects of climate change are influenced by the gender structure of the socio-economic system, there is gender-specific constraints on women related to resources and decision-making processes, whereas risks associated with climate change are related to migration and livelihood insecurity for men. However, research remains scattered and requires an overall understanding of the issue.

III. Material and Methods

Scientific literature was collected using the Scopus database to obtain pertinent references on economic pressures caused by climate change from a gendered point of view. Through quantitative bibliometrics, a systematic study of the trends and directions of future research from published literature was established, followed by an algorithmic process of including or excluding the literature. (Fig. 1).

Inclusion and Exclusion Criteria

Inclusion and exclusion criteria were established in a systematic manner to guarantee the appropriateness and consistency of the studies chosen.

Inclusion Criteria:

Studies that met at least one of the following criteria were included: (i) had a direct investigation of the link between climate change and socio-economic outcomes, especially from a gender perspective; (ii) discussed topics related to livelihood, adaptation, migration, food security, or economic pressure; (iii) were published in academic journals, conferences, or reviews; and (iv) were written in English. Empirical and theoretical papers were both included to ensure that all perspectives on the issue were covered. Moreover, only studies with full bibliographic information were chosen for bibliometric and network analysis.

Exclusion Criteria:

Criteria for exclusion included papers that were (i) purely based on the environmental and technological factors associated with climate change without considering its socioeconomic or gender dimensions, (ii) had insufficient relevance to the research question, (iii) were unrefereed publications such as editorials, newspapers, or reports, (iv) duplicate papers or had missing information on their citation details, and (v) not written in English. In addition, those without adequate methodology or insight into the analysis process were also excluded at the full-text screening phase.

Dataset Selection

For this research, the data set used was sourced from the Scopus database since it was known for providing a wide

range of peer-reviewed and interdisciplinary articles on climate change, gender, and socio-economics. The data set included articles that were selected by developing an advanced search algorithm through Boolean operators. These operators were used to integrate five keyword groups: (i) climate-related keywords ("climate," "weather," "disaster"); (ii) adaptation keywords ("coping," "adaptation"); (iii) gender keywords ("male," "female," "transgender"); (iv) livelihood keywords ("agriculture," "fishing," "labour," "migration," "micro-enterprises"); and (v) economic pressure keywords ("employment," "displacement," "food insecurity").

Filtering Process

A series of filters was used in order to assure that the quality and pertinence of the data were preserved. Initially, duplicates were eliminated from the data set, along with irrelevant content, as in the literature not related to academic research. Second, the titles and abstracts were assessed to filter out studies that did not cover the link between climate change and either gender or socio-economic issues. Third, the full texts were evaluated in order to check their pertinence conceptually and empirically. Other filters were also applied in order to limit the database only to peer-reviewed English articles, such as journals, reviews, conferences, and books. Data that lacked proper metadata or whose methodological contribution was unclear were also eliminated. As a result, the data set comprised 99 articles.

Dataset Characteristics

The resulting dataset comprises a total of 99 documents, which encompass research papers, review papers, conference proceedings, and book chapters, thus guaranteeing both empirical and theoretical representation. Some of the features that were selected from the dataset include the publication year, type of document, number of citations, authors' data, and keywords. These features were utilised in conducting the bibliometric analysis, which involved the creation of co-occurrence maps of the keywords and themes.

Time Coverage

This data set covers the period from 1965 to 2025, thereby providing sufficient scope for analysis of the development trajectory of research conducted within this field of study. Initially, researchers were mostly concerned about environmental threats and vulnerability; however, from 2000 to 2015, more attention was paid to gender issues and livelihoods. The current research conducted within the period of 2016 to 2025 shows that there is a new trend toward resilience-based approaches, an intersectional approach, and sophisticated analysis.

The keywords used for the search were organized as follows.

1. Climate Change: Three keywords related to this topic were included: “Weather” OR “Climate” OR “Disaster.”
2. Adaptation Mechanisms: Two keywords were used: “Coping*” OR “Adaptation*.”
3. Gender: Three keywords were entered: “Male*” OR “Female*” OR “Transgender*.”
4. Livelihoods: Nine keywords were incorporated: “Livelihood*” OR “Agriculture*” OR “Fishing*” OR “Tour*” OR “Micro-enterprises*” OR “Labor*” OR “Wage*” OR “Aquaculture*” OR “Handicraft*.”
5. Economic Pressures: Eight keywords were used: “Works*” OR “Activities*” OR “Occupation*” OR “Migration*” OR “Displacement*” OR “Unemployment*” OR “Food*” OR “Insecurity*.”

Analytical Configuration and Parameters

Bibliometric analysis was conducted using VOSviewer (version 1.6.20). The approach used in this study was keyword co-occurrence analysis. Author keywords and index keywords were selected, with a minimum occurrence threshold of 2, resulting in the selection of 43 keywords. The full counting method with association strength normalization was used to create the network. Keywords were classified into nine clusters through VOSviewer cluster analysis. Density visualization and overlay visualization techniques were employed to analyze the themes in this study.

A total of 99 diverse documents were found, with research articles making up the largest proportion, representing 72.23%, as shown in table I.

Table I reveals that the predominant category of literature is research articles, accounting for a total of 72.73% of the whole dataset, thereby showing an extensive use of empirical literature in the study area related to the topic of climate change and socio-economic issues based on gender considerations.

TABLE I TYPES OF RESEARCH ARTICLES EXTRACTED FROM THE SCOPUS DATABASE

Type of document	Number	%
Article	72	72.73
Book chapter	8	8.08
Conference paper	4	4.04
Review	15	15.15
Total	99	100

The percentage of review articles is 15.15%. This shows the existence of synthetic literature in the field of study. A small percentage of book chapters and conference papers can be observed in the dataset.

After analysing the results, the following trends were observed:

There has been a significant increase in the number of publications and citations in recent years, indicating a steady and near-exponential growth pattern- from one publication in 2011 to 27 in 2025 (Fig. 2).

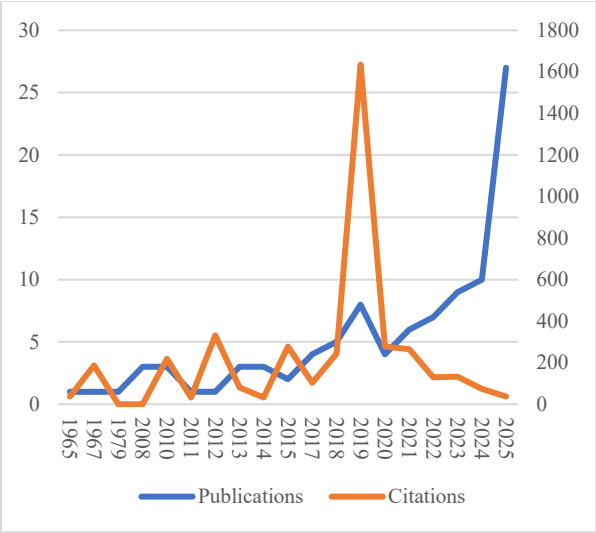

Fig. 2 Publication Trends and Sum of Citations From 1965 To 2025 (Data Extracted from the "Scopus" Database)

Fig. 2 shows clearly that there is an evident tendency towards increasing publications over time, especially from 2015 onwards, reflecting the increased attention paid to the study of climate change, along with its social, economic, and gender impact. There is a clear increase towards 2025, which shows the importance of the chosen topic in today's world. On the other hand, the citation trend shows that there are some irregularities associated with a sudden increase in citations at the beginning of 2019. This means that there were some popular studies conducted during that period of time.

The analysis further highlights two dominant theoretical frameworks- Feminist Political Ecology and Disaster Risk Theory, along with perspectives on men and masculinities, which are commonly employed to explain the gendered influence of climate change. These are outlined as follows:

Feminist Political Ecology (FPE)

The approach provides a framework for investigating the multifaceted interactions among gender, environment, and socio-economic structures. Since its emergence, this framework has been extensively applied to analyse the gendered dimensions of environmental transformation, particularly in rural contexts. Several recent studies have been conducted in Sub-Saharan Africa. Manzungu & Makanha, (2026) applied the FPE framework to examine the impact of climate adaptation policies on women's agricultural activities and their autonomy in Zimbabwe.

The central assumption in this approach is that gendered power structures govern access to and control over resources. Moreover, if left unchallenged, social inequalities associated with environmental degradation may intensify, disproportionately affecting women. At the same time, the framework acknowledges that gender norms also influence men's roles in resource governance and environmental decision-making. A major strength of the FPE approach lies in its emphasis on contextual and intersectional factors, which enable a deeper understanding of the relationships between gender, environment, class, and ethnic identity.

Disaster Risk Theory

A complementary theoretical perspective, this framework examines how natural hazards such as drought and floods due to climate change intersect with existing social and economic factors that increase vulnerability and produce differentiated impacts. The theory is grounded in foundational works that have evolved over time and have been particularly influential in climate risk analysis studies, especially within East Africa.

Climate change-related hazards, such as unpredictable rainfall patterns and prolonged droughts, intensify women's insecurity in agro-pastoral settings where their access to land, education, and economic resources is restricted, thereby increasing their vulnerability. The core strength of the framework relative to this analysis is its ability to define the linkage between social vulnerability and physical natural hazards. However, a notable limitation within its framework is its predominant focus on natural hazards, which may overlook the proactive roles and adaptive resilience strategies adopted by communities, particularly women, even within structurally restrictive environment.

Men and Masculinity

Although the aspects of FPE and DRT have considerably examined women's experiences and vulnerabilities within the realms of climate change-induced disasters, the emerging literature on men and masculinities highlights the importance of also incorporating men's experiences and vulnerabilities. The study conducted those excluding men from gender and development discourse reduces the effectiveness of policies, while Enarson, (2016) emphasizes out the need for understanding the men's responses to disasters and their implications for women's livelihoods. Similarly, argue that men are not a homogeneous social group, but exhibit diverse experiences shaped by geographical, social, and economic contexts.

From an FPE perspective, gendered power relations affect both men and women in regard to resource availability and accessibility and their responses to climate change.

DRT offers a systematic approach to analyze the interaction of natural hazards such as droughts and floods with social risk factors that include men's roles and expectations associated with masculinity. Ericson, (2020) and Ericson, (2021) suggests that men may be at higher risks of accidents and mortality due to their engagement in hazardous occupations and socially constructed masculine roles. While, Ravera et al. (2016) portrays how both men and women adapt under climate change through livelihood diversification.

Theoretical integration of the three theories creates a comprehensive and three-dimensional model. This integrated approach moves beyond a women-centric vulnerability model to examine gender identities, power relations, and

social expectations shape both men's and women's exposure to risk and adaptive capacities (Ericson, 2020). This framework offers a more detailed and complex understanding of the complex interactions among gender, environment, and climate risk, thereby supporting the development of more inclusive and effective climate adaptation policies and strategies.

IV. Results and Discussion

Citation Analysis:

Table II shows that the highly cited studies emphasize the issue of adaptation to climate change, agriculture resilience, and vulnerability of women. This suggests that these issues constitute the basis of current research.

TABLE II TOP TEN ARTICLES WITH HIGH CITATIONS AMONG 99 PUBLICATIONS

S. NO.	Title	Year	Source title	Cited by	Authors
1	Impact of climate change on crops adaptation and strategies to tackle its outcome: A review	2019	Plants	1400	Raza et al., (2019)
2	"From this place and of this place:" Climate change, sense of place, and health in Nunatsiavut, Canada	2012	Social Science and Medicine	331	Cunsolo Willox et al., (2012)
3	Adaptation and development pathways for different types of farmers	2020	Environmental Science and Policy	224	Stringer et al., (2020)
4	Cyclone disaster vulnerability and response experiences in coastal Bangladesh.	2010	Disasters	188	Alam & Collins, (2010)
5	Coping with and adapting to climate change: A gender perspective from smallholder farming in Ghana	2018	Environments - MDPI	96	Assan et al., (2018)
6	Impacts and responses to environmental change in coastal livelihoods of south-west Bangladesh	2018	Science of the Total Environment	95	Hossain et al., (2018)
7	Perceptions of climate variability and livelihood adaptations relating to gender and wealth among the Adi community of the Eastern Indian Himalayas	2017	Applied Geography	76	Singh et al., (2017)
8	Gender dimension of vulnerability to climate change and variability: Empirical evidence of smallholder farming households in Ghana	2019	International Journal of Climate Change Strategies and Management	60	Alhassan et al., (2019)
9	Intensifying Inequality? Gendered Trends in Commercializing and Diversifying Smallholder Farming Systems in East Africa	2019	Frontiers in Sustainable Food Systems	57	Tavenner et al., (2019)
10	When is migration a maladaptive response to climate change?	2019	Regional Environmental Change	57	Jacobson et al., (2019)

The top ten most cited articles were examined in detail, as highly cited articles are considered more influential due to their extensive use and recognition within the scientific community. Among these, six were research articles, while four were review articles. The articles encompassed the link between climate change, food security, and migration; the roles of male and female farmers in climate change adaptation; and experiences related to disaster and hurricane responses in coastal regions.

The selected articles also examined the influence of climate change on place attachment, physical and emotional well-being, and the differential impacts on male-headed and female-headed farming households. Additionally, they explored how the climate change influence crop productivity, emerging breeding methodologies, and biotechnological interventions to combat the issue. These further investigated the impact of coastal ecosystem changes on livelihoods, the role of women in adaptive processes, climate variability in India, and the gender-differentiated effects of climate change on labor, livelihoods, and economic systems.

Keyword Analysis for Researchers:

This analysis aimed to identify key keywords and examine the interconnections among them in order to determine major research hotspots and thematic focus areas. The keyword analysis was conducted using VOSviewer (version 1.6.20), which identified a total of 43 keywords. The most frequently occurring keywords, based on their correlation and frequency within the selected literature, are presented in table III.

Table III indicates that the top keywords in this topic are "climate change" with a high number of occurrences (5) and link strength (48), and "adaptation" with many occurrences (13) and a relatively low number of link strength (20). The other keywords include "food security" with a few occurrences (3) and high link strength (30), and "agriculture" with a moderate number of occurrences (11) and link strength (15).

These keywords were further visualized using a density map as shown in fig. 3

TABLE III TOP TEN KEYWORDS BASED ON ITS LINK STRENGTH AND OCCURRENCES

Keyword	Occurrences	Total link strength
Climate change	5	48
Food security	3	30
Gender	2	23
Adaptation	13	20
Agriculture	11	15
Coastal areas	3	10
Livelihoods	2	10
Resilience	2	10
Food systems	2	9
Climate change adaptation	4	8

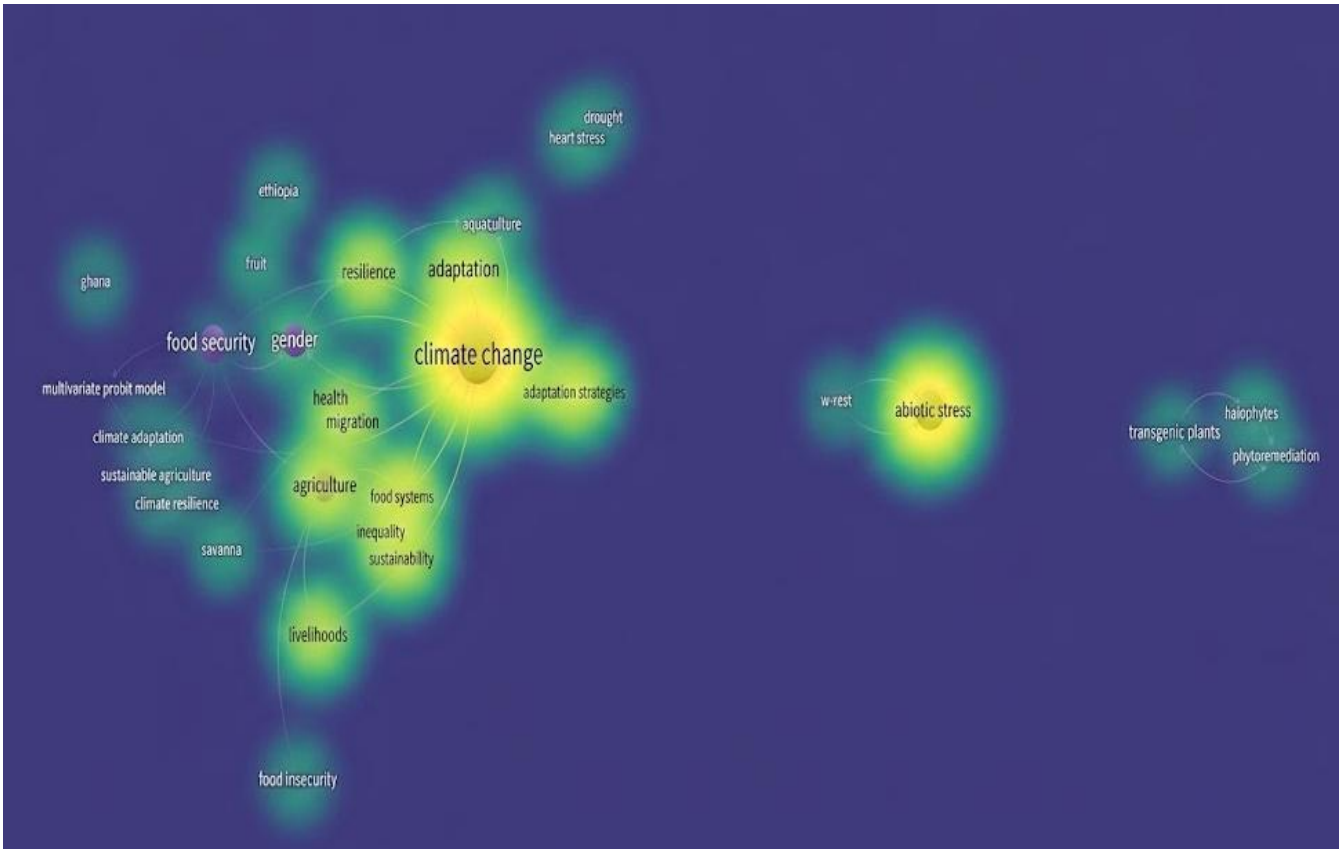

Fig. 3 Frequency of Keyword Occurrences

Fig. 3 demonstrates that climate change, adaptation, and agriculture have been the highest frequency keywords in the study, highlighting their significance in literature. The high frequency of co-occurrence indicates that research activities in the field are mainly focused on adaptation in agriculture, paying more attention to gender aspects.

In the visualization, the larger the node used to represent each of the keywords, the higher is the occurrence of those particular keywords within the documents analyzed. Also, the thicker the line connecting two nodes, the stronger is the connection between those two keywords.

The connections between different research topics have been illustrated in fig. 4, where climate change and adaptation have been placed at the center of the cluster. Food security, agriculture, and socio-economic factors constitute other clusters within the topic. The small clusters represent new research areas.

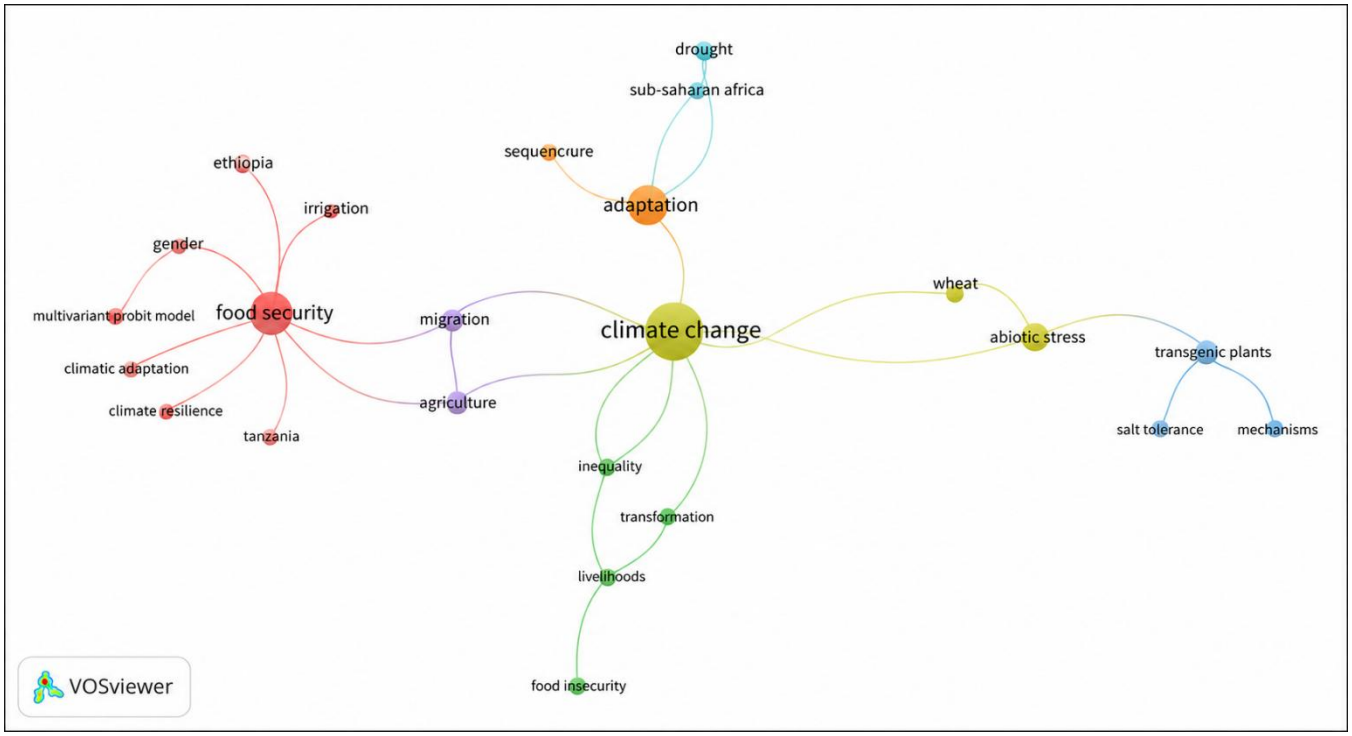

Fig. 4 Network Visualization for Co-Occurrence of Keywords

The commonly appearing keywords were identified, grouped into nine major categories as depicted in fig. 4, with each category representing a theme. The categories were differentiated based on colors used for the nodes. The clustering process was performed using VOS viewer, which grouped the keywords based on the strength of their co-occurrence relationships. The thematic clusters are described as follows:

• Group 1 (Red)- *Climate Change Adaptation and Sustainable Agriculture Resilience:*

The keywords in this cluster include climate adaptation, climate resilience, food security, and smallholder farmers, with geographic locations being Ghana and Tanzania. There are also some methodological keywords in this cluster that include "multivariate probit model." This particular cluster represents an area that receives a great deal of research attention concerning adaptation by smallholder farmers towards food security and resilience.

• Group 2 (Green)- Food Systems and Sustainability Transitions:

This group encompasses concepts like food systems, sustainability, transformation, and livelihoods associated with inequalities, food insecurity, and climate variabilities. It emphasizes the importance of scholarly works dedicated to building resilient and sustainable food systems that promote equity.

• Group 3 (Blue)- Salinity Stress and Plant Adaptation in Coastal Ecosystems:

The key words in this cluster include soil salinity, halophytes, phytoremediation, transgenic plants, and salt tolerance processes. The focus of these studies is on the problems connected with the impact of salinity on plants.

• Group 4 (Yellow)- Genomic Approaches to Crop Adaptation Under Climate Stress

The keywords in this cluster are "wheat," "abiotic stress," "climate change," "genomics," and "adaptation." This cluster represents research related to developing climate-resistant crops using genetic and genomic methods.

• Group 5- Socio-economic and Gender Dimensions of Agriculture:

Keywords in this cluster include "agriculture," "gender," "health," "livestock," and "migration." These keywords represent research related to assessing the socio-economic impacts of crop production, including the impact of climate change on socio-economic status associated with agricultural livelihoods, particularly gender-specific impacts and health effects.

• Group 6- Climate Stress and Community Vulnerability in Sub-Saharan Africa:

This set contains terms like drought, heat stress, qualitative research, and Sub-Saharan Africa. These papers examine community vulnerability, adaptation, and climate stress using qualitative methods.

• Group 7 (Orange)- Climate Adaptation in Aquaculture Systems:

The keywords in this group are adaptation, aquaculture, and Kenya, representing the topic of climate adaptation and resilience within aquaculture-based livelihoods.

• Group 8- Climate Impacts and Resilience in Ethiopia:

This cluster contains the keywords such as *Ethiopia*, *impact*, and *resilience*. It represents research related to indigenous people and their response to climate change. It is located quite far from other clusters, indicating its specialization.

• Group 9- Indigenous Adaptation and Arctic Climate Resilience:

The cluster contains the keyword Inuit, which refers to studies conducted on indigenous groups and their responses to climate change. It is seen that this cluster is quite isolated from others, implying that this is a niche field of study.

From the results of the keyword analysis, climate change research has been observed to be spread over different interrelated subjects. Of the identified groups, the dominant one is the group covering climate change adaptation, sustainable agriculture, and food security, especially for small-scale farmers. Other groups include social economics and gender relations, methodology, crop resilience, and regionally focused examples such as Kenya, Ethiopia, and the Arctic regions.

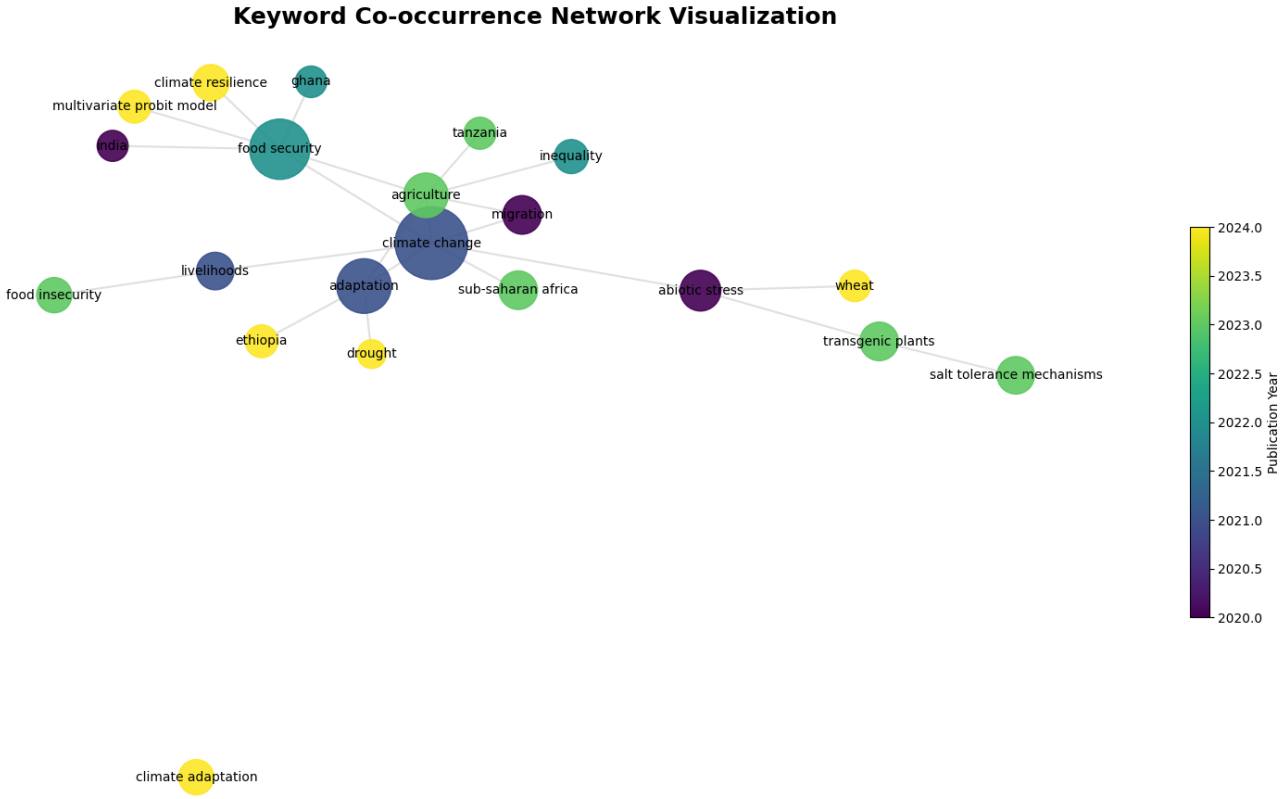

Fig. 5 Dynamics Over the Years of Research Core Themes by Keywords

Thematic Analysis:

Fig. 5 Demonstrates how there have been major shifts in research topics, with previous topics centered on agriculture, vulnerability, and food security, while current research topics focus on resilience and adaptation to climate change, as well as employing advanced methodology techniques.

The analysis indicates that the most recent keywords, with an average publication year of 2025, include "*climate resilience*" and "*multivariate probit model*." This suggests that climate resilience has emerged as a contemporary research priority, and that advanced statistical modelling techniques are increasingly being applied to analyze climate adaptation processes. Similarly, "*climate adaptation*" shows a recent average publication year of 2024.667, further confirming adaptation as a central focus of current research

Keywords such as *"migration" (2024), "heat stress" (2024),* and *"Ethiopia" (2024)* highlight a growing emphasis on the social and regional dimensions of climate change, particularly the relationship between environmental stressors and human mobility in vulnerable regions. The appearance of *"sustainable agriculture" (2024)* further underscores the increasing importance of climate-resilient agricultural practices in ensuring food security.

In contrast, technically oriented keywords such as *"genomics" (2023), "transgenic plants" (2022),* and *"abiotic stress" (2018)* reflect earlier research emphasis on crop improvement and biological adaptation to climate stress, indicating that technological approaches have been established areas of study for a longer period.

Keywords directly relevant to the present research also demonstrate important temporal trends. For example, *"coastal areas" (2023)* indicates growing contemporary attention to geographically vulnerable regions. The keyword *"gender" (2020)* appears relatively earlier, suggesting that gender-focused research has been an established area, which is now being integrated with emerging themes such as climate resilience. Similarly, economic dimensions are reflected through keywords such as *"livelihoods" (2020)*, highlighting the longstanding importance of livelihood vulnerability in climate change research.

Older keywords, including *"adaptation strategies" (2015), "Inuit" (2017),* and *"health" (2018)*, indicate earlier research focus on specific adaptation approaches, indigenous populations, and health impacts. These findings suggest that previous research concentrated on vulnerability and adaptation strategies within specific communities, while recent studies have expanded toward broader themes such as resilience, migration, and advanced analytical methods.

One thing that strikes a chord is that while foundational topics such as gender, livelihoods, coastal vulnerability, and health have remained relevant between 2020 and 2023, contemporary research (2024–2025) has increasingly shifted toward broader resilience-oriented frameworks and the application of advanced quantitative methods. This reflects a transition from descriptive and community-specific vulnerability studies toward more integrated, analytical, and resilience-focused climate change research.

Table IV provides a comparison of how climate change affects women and men in relation to some socio-economic factors. This table identifies differences in adaptation approaches, mobility behaviors, resource availability, labor division, and forms of vulnerability based on some highly regarded research findings.

TABLE IV COMPARATIVE ANALYSIS OF GENDER-DIFFERENTIATED CLIMATE CHANGE IMPACTS AND ADAPTATION STRATEGIES

Aspect	Women	Men	Key Studies
Adaptation Strategy	Informal, low-cost	Market-based, technological	Assan et al., (2018) Stringer et al., (2020)
Migration	Limited	High	Jacobson et al., (2019)
Resource Access	Restricted	Higher	Alhassan et al., (2019)
Labour Role	Agriculture + household	Income generation	Singh et al., (2017)
Vulnerability Type	Social, economic	Occupational, mobility	Alam & Collins, (2010)

The information provided indicates that women tend to employ low cost, informal adaptation approaches but experience limited resource availability and increased household burden, while men use more market-based and technological adaptations, and show higher levels of mobility via migration, as well as greater access to institutional resources. At the same time, the vulnerability of women is mostly linked to socio-economic issues, whereas that of men is related to occupational exposure and mobility.

V. Discussion

A critical evaluation of the top ten most cited publications revealed several key themes that have significantly contributed to the scientific understanding of gendered socio-economic impacts of climate change (Table V).

It is observed that women are affected by climate-induced disasters disproportionately because of the social pressure of care-giving responsibilities, their reduced mobility, and the prevailing gender norms. However, the trends that are identified do not operate in a vacuum but rather indicate some larger structural conditions, in which existing gender imbalances overlap with climate-induced livelihood shocks. The citation network information reveals that since 2018-2019, there is a noticeable shift in the way scholars engage with the issue and begin to focus on structural factors behind the existing gender-related vulnerabilities.

Finally, from keyword co-occurrences, one can see an interesting trend regarding the fragmented nature of adaptation studies within the climate context. Indeed, while it can be seen that scholars are interested in talking about "adaptation," their link strength to other topics such as "food security" and "climate change" is noticeably weaker, which might point towards limited socio-economic engagement with adaptation knowledge.

The analysis of both coastal and agricultural communities highlights the way climate change affects people's livelihood and their's strategies to cope with new challenges. While women play an important role in ensuring survival through various types of informal employment and livelihood diversification, men rely mainly on migration or market-based adaptations. It is worth noting that women's strategies are characterized by their resource-scarcity and labor-intensity nature, which is due to structural exclusion from formal mechanisms such as financial support, land tenure, and agriculture advice.

TABLE V GENDERED SOCIO-ECONOMIC IMPACTS OF CLIMATE CHANGE

Key theme	Climate change impact	Gender-differentiated effects	Outcomes	References
Agricultural productivity decline	Reduced crop growth, yield instability, and production uncertainty due to temperature and rainfall variability	Women face increased labour burden in agriculture; men shift toward alternative livelihoods or migration	Decline in plant productivity and disruption of fertilizer efficiency affects farming households	Raza et al., (2019)
Displacement, migration, and psychological stress	Climate disasters force relocation, disrupting livelihoods and social systems	Women experience higher emotional distress due to caregiving roles and attachment to land; men migrate for economic survival	Psychological distress including sadness, helplessness, and frustration more prevalent among women	Cunsolo Willox et al., (2012)
Need for climate-resilient agricultural transformation	Climate change necessitates sustainable farming practices and reduced carbon emissions	Women play a major role in adaptation but lack access to resources and training; men adopt technology-based solutions	Transition toward climate-resilient farming systems integrating cultural and economic considerations	Stringer et al., (2020)
Gendered disaster vulnerability and mobility constraints	Natural disasters increase household vulnerability and risk exposure	Women face mobility restrictions due to caregiving roles and social norms; men dominate relocation decision-making	Women's evacuation decisions influenced by household responsibilities and social expectations	Alam & Collins, (2010)
Geographic and climatic vulnerability and relocation challenges	Frequent cyclones disrupt livelihoods and delay evacuation decisions	Men face livelihood loss in fishing and agriculture; women face increased caregiving and livelihood burdens	Bay of Bengal coastal communities delay relocation due to shelter limitations, asset protection concerns	Hossain et al., (2018)
Livelihood diversification and adaptive roles	Climate change forces communities to adopt alternative livelihood strategies	Women engage in informal labour, domestic work, and diversification; men migrate or shift occupations	Collective coping strategies including water harvesting, alternative farming, and informal employment	Assan et al., (2018); Singh et al., (2017)
Financial constraints and resource inequality	Limited access to finance restricts adaptive capacity	Women rely on low-income coping strategies; men sell livestock or access capital-based adaptation options	Women engage in handicrafts, borrowing, and forest product collection; men use asset-based strategies	Assan et al., (2018); Alhassan et al., (2019)
Water, health, and livelihood burden in coastal areas	Climate variability reduces water availability and increases disease risks	Women bear disproportionate burden of water collection and household survival; men migrate due to livelihood loss	Women travel long distances for water, face wage discrimination and health risks	Hossain et al., (2018)
Gendered labour division and adaptation strategies	Climate change reshapes agricultural roles and labour allocation	Women dominate subsistence agriculture; men dominate market-oriented and income-generating roles	Women adopt pest control and livelihood diversification; men engage in market-linked adaptation	Singh et al., (2017)
Female-headed household vulnerability	Limited access to land, finance, and institutional support reduces adaptive capacity	Female-headed households face higher food insecurity, economic instability, and adaptation constraints	Women engage in lower-income activities due to structural resource limitations	Alhassan et al., (2019)
Institutional and policy access inequalities	Unequal access to training, finance, and adaptation programs	Women face barriers to agricultural training and market participation; men benefit from institutional access	Limited access to agricultural extension services and adaptation programs among women	Tavenner et al., (2019); Jacobson et al., (2019)
Migration and labour restructuring	Climate change accelerates male migration and labour redistribution	Men migrate for income; women assume greater agricultural and household responsibilities	Labour shifts create increased workload for women and reduce household adaptive capacity	Jacobson et al., (2019)

First of all, the analysis of these articles highlights a situation when climate-induced stresses result in women experiencing a "double burden" since increased workload does not let them develop any productive potential due to limited access to resources and training opportunities. At the same time, men rely on their resource-based approach to adaptation, which is

facilitated by formal institutions. Further, there is evidence that men may experience a maladaptive phenomenon of migration that may affect agricultural sustainability without providing additional income.

The overall implication of this study is that gender-responsive policies are needed in terms of climate adaptation in response to structural inequalities and inclusive adaptation strategies.

However, some limitations need to be mentioned for this literature review study. In particular, it should be noted that the use of secondary data from the Scopus database could be the first limitation as it excludes possible articles that might have been published in other databases and not indexed in the Scopus database. Secondly, despite the wide coverage in terms of time from 1965 to 2025, it still could have included more recent trends, namely, those developed after 2025 when many new publications would appear. Another limitation is connected to the method used by the author as the bibliometric method allows analyzing the quantity but not the quality of works or the context in which research was conducted. Moreover, due to a lack of primary data, there is no possibility to incorporate local views on adaptation measures and their impact on women and men in different regions and communities.

VI. Conclusion

From this study, it is evident that there is an urgent need to develop gender-sensitive adaptation practices because women are more exposed to climate change owing to pre-existing socio-economic disparities. Women in agricultural and coastal areas are under a "double burden" where they are overworked yet denied access to resources, learning opportunities, and involvement in decision making. However, men are more inclined towards adaptation approaches such as migration in search of other income sources, which affects their families negatively, leaving them more vulnerable. The statistical evidence from bibliometric analysis shows an increased number of studies focused on exploring gendered socio-economic impacts of climate change, showing a close to exponential growth in the number of publications from one in 2011 to 27 projected in 2025. Regarding the citation trends, there is an obvious peak in 2019, when 1,635 articles were cited.

The theoretical frameworks include Feminist Political Ecology (FPE), Disaster Risk Theory (DRT), and gendered masculinities approaches. These theoretical approaches allow a comprehensive evaluation of the relationship between gender and vulnerability in terms of adaptation to climate change because they require looking at gender as socially reproduced, implying the structural inequalities that deny women resources and power. The results highlight the necessity for gender-sensitive policies that guarantee equality in the provision of financial support, technical skills, and participatory processes for women. Specific actions include improving the security of land tenure, increasing access to educational facilities, health care services, and social services, as well as encouraging female participation in community-based adaptation plans. Future studies must consider the challenges that vulnerable groups encounter and promote an approach that is both gender-sensitive and inclusive.

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References

[1] Alam, E., & Collins, A. E. (2010). Cyclone disaster vulnerability and response experiences in coastal Bangladesh. *Disasters*, *34*(4), 931-954. https://doi.org/10.1111/j.1467-7717.2010.01176.x

[2] Alhassan, S. I., Kuwornu, J. K., & Osei-Asare, Y. B. (2019). Gender dimension of vulnerability to climate change and variability: Empirical evidence of smallholder farming households in Ghana. *International Journal of Climate Change Strategies and Management*, *11*(2), 195-214. https://doi.org/10.1108/IJCCSM-10-2016-0156

[3] Assan, E., Suvedi, M., Schmitt Olabisi, L., & Allen, A. (2018). Coping with and adapting to climate change: A gender perspective from smallholder farming in Ghana. *Environments*, *5*(8), 86. https://doi.org/10.3390/environments5080086

[4] Birkmann, J., Jamshed, A., McMillan, J. M., Feldmeyer, D., Totin, E., Solecki, W., ... & Alegría, A. (2022). Understanding human vulnerability to climate change: A global perspective on index validation for adaptation planning. *Science of the Total Environment*, *803*, 150065. https://doi.org/10.1016/j.scitotenv.2021.150065

[5] Blaikie, P., Cannon, T., Davis, I., & Wisner, B. (2014). *At risk: natural hazards, people's vulnerability and disasters*. Routledge. https://doi.org/10.4324/9780203714775

[6] Boas, I., de Pater, N., & Furlong, B. T. (2023). Moving beyond stereotypes: The role of gender in the environmental change and human mobility nexus. *Climate and Development*, *15*(1), 1-9. https://doi.org/10.1080/17565529.2022.2032565

[7] Chant, S. H., & Gutmann, M. C. (2000). *Mainstreaming men into gender and development: Debates, reflections, and experiences*. Oxfam.

[8] Cunsolo Willox, A., Harper, S. L., Ford, J. D., Landman, K., Houle, K., & Edge, V. L. (2012). "From this place and of this place:" Climate change, sense of place, and health in Nunatsiavut, Canada. *Social science & medicine*, *75*(3), 538-547. https://doi.org/10.1016/j.socscimed.2012.03.043

[9] Enarson, E. (2016). Men, masculinities and disaster: An action research agenda. In *Men, masculinities and disaster* (pp. 219-233). Routledge. https://doi.org/10.4324/9781315678122-19

[10] Ericson, M. (2020). Gendering risk and vulnerability: Tensions and conflicting views in crisis preparedness work in Sweden. *Gender, Work & Organization*, *27*(6), 1308-1320. https://doi.org/10.1111/gwao.12487

[11] Ericson, M. (2021). 'It is men who die and all that, so what is new?'Male vulnerability, institutionalised masculinity and the present absence of a problem in Swedish rescue service accident prevention. *Norma*, *16*(3), 159-173. https://doi.org/10.1080/18902138.2021.1908761

[12] Garutsa, T. C. (2021). Considering an Intersectional Lens in Agriculture and Climate Change: A Systematic Literature Review. *African Journal of Gender, Society & Development*, *10*(4). https://doi.org/10.31920/2634-3622/2021/v10n4a8

[13] Hossain, M. A., Ahmed, M., Ojea, E., & Fernandes, J. A. (2018). Impacts and responses to environmental change in coastal livelihoods of south-west Bangladesh. *Science of the Total Environment*, *637*, 954-970. https://doi.org/10.1016/j.scitotenv.2018.04.328

[14] Jacobson, C., Crevello, S., Chea, C., & Jarihani, B. (2019). When is migration a maladaptive response to climate change? *Regional Environmental Change*, *19*(1), 101-112. https://doi.org/10.1007/s10113-018-1387-6

[15] Jena, D., Das, S., Mishra, P., Kar, B., Patnaik, S., & Panda, I. In the Shadow of Climate Change: Exploring Livelihood Vulnerability in the Juanga Communities of Keonjhar. *Disaster Advances, 18*(6), 7-17 (2025). https://doi.org/10.25303/186da07017

[16] Manzungu, E., & Makanha, H. (2026). Financing adaptation to climate-driven agricultural risks in Zimbabwe. *Disaster Prevention and Management: An International Journal*, 1-17. https://doi.org/10.1108/DPM-12-2024-0321

[17] Pradhan, B., Kumar, S., & Nayak, D. (2025). From Vulnerability to Resilience: A Systematic Review of Odisha's Integrated Approach to Disaster Risk Reduction. *International Journal of Disaster Risk Management*, *7*(1), 519-532. https://doi.org/10.18485/ijdrm.2025.7.1.30

[18] Rather, K. N., & Mahalik, M. K. (2025). Do climate change and world uncertainty exacerbate gender inequality? Global evidence. *Population and Environment*, *47*(1), 5. https://doi.org/10.1007/s11111-025-00479-6

[19] Ravera, F., Martín-López, B., Pascual, U., & Drucker, A. (2016). The diversity of gendered adaptation strategies to climate change of Indian farmers: A feminist intersectional approach. *Ambio*, *45*(Suppl 3), 335-351. https://doi.org/10.1007/s13280-016-0833-2

[20] Raza, A., Razzaq, A., Mehmood, S. S., Zou, X., Zhang, X., Lv, Y., & Xu, J. (2019). Impact of climate change on crops adaptation and strategies to tackle its outcome: A review. *Plants*, *8*(2), 34. https://doi.org/10.3390/plants8020034

[21] Sewando, P. T. (2023). Climate change adaptation strategies for agro-pastoralists in Tanzania. *Asian Journal of Advances in Agricultural Research*, *21*(2), 30-39.30–39. https://doi.org/10.9734/AJAAR/2023/v21i2414

[22] Singh, R. K., Zander, K. K., Kumar, S., Singh, A., Sheoran, P., Kumar, A., ... & Garnett, S. T. (2017). Perceptions of climate variability and livelihood adaptations relating to gender and wealth among the Adi community of the Eastern Indian Himalayas. *Applied geography*, *86*, 41-52. https://doi.org/10.1016/j.apgeog.2017.06.018

[23] Stringer, L. C., Fraser, E. D., Harris, D., Lyon, C., Pereira, L., Ward, C. F., & Simelton, E. (2020). Adaptation and development pathways for different types of farmers. *Environmental Science & Policy*, *104*, 174-189. https://doi.org/10.1016/j.envsci.2019.10.007

[24] Tavenner, K., Van Wijk, M., Fraval, S., Hammond, J., Baltenweck, I., Teufel, N., ... & Manda, L. (2019). Intensifying inequality? Gendered trends in commercializing and diversifying smallholder farming systems in East Africa. *Frontiers in Sustainable Food Systems*, *3*, 10. https://doi.org/10.3389/fsufs.2019.00010