



# Gender and Adaptive Capacity in Climate Change Narratives from Rural Sudanese Women

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## Abstract

The research aims to investigate the differences between genders in tackling climate change, with a particular focus on assessing adaptation capacity in relation to gender. The study utilized a participatory gender analysis approach to highlight the experiences of women in six villages across three Sudanese states. Findings revealed that while both men and women face the impacts of climate change on agricultural and livestock practices at similar rates, their responses to these changes differ significantly. The adaptation strategies employed by men and women vary greatly. The research indicated that women face substantial challenges in securing funding for investment in adaptation technologies or in mitigating losses due to adverse weather, a situation exacerbated by their limited experience in these areas. Furthermore, the study assessed gendered adaptive capacity concerning household-level resources for drought management. It was found that, although some resources are available, men predominantly control access to and utilization of these resources. This lack of decision-making power over household resources diminishes women's ability to adapt, particularly during severe climate events. Consequently, women are disproportionately impacted by climate change, leading to maladaptive outcomes and diminishing the effectiveness of any adaptation initiatives.

## Subject Areas

Sociology

## Keywords

Gender Climate Change, Adaptation

## 1. Background

There are two primary approaches to addressing climate change: Mitigation, which involves minimizing our contribution to the factors that drive climate change, and Adaptation, which focuses on adjusting to the changes that are currently occurring or are anticipated. As noted by Corcoran-Nantes & Roy [1], the intersection of gender and climate change has garnered academic interest over the last thirty years, with a prevalent perspective highlighting that climate change is not neutral with respect to gender. Factors such as power dynamics, social norms, control over resources, and decision-making processes collectively influence the capacity-building efforts for vulnerable populations, especially women. Increasing emphasis on adaptation research aims to enhance understanding of how to effectively bolster women's adaptive capacities. This necessitates a collective approach that takes into account the social, cultural, situational, locational, and historical contexts of gender-specific vulnerabilities related to climate change [2].

Women in rural Sudan are confronted with a confluence of challenges, including poverty, environmental degradation, and systemic discrimination. Many are struggling to secure sufficient food to prevent their families from facing starvation. Unfortunately, government agricultural assistance programs typically exclude women, limiting their access to credit and essential agricultural resources such as seeds and fertilizers [3] [4].

The gender-related challenges associated with climate change in Sudan include the following:

- Agricultural and food security data are not categorized by gender.
- There is no distinct gender policy addressing agricultural issues.
- The contributions of women to agriculture and food security are undervalued, resulting in limited financial resources and funding.
- There is a lack of capacity building and awareness regarding the integration of gender considerations into climate change programming and projects [3].
- Access to land for women in Sudan is severely restricted [3].

Most women obtain indirect access to land through their husbands or male relatives, with these derived rights being weaker than those held by men [5] [6]. A review of land legislation and policy reveals that inequitable access to land remains a persistent issue, with few entities collecting land data in a gender-disaggregated manner [7]. It has been observed that there are very few registered land rights held by women, either individually or jointly [8]-[10].

In Sudan, 28% of households are led by women, a rise attributed to increasing poverty levels that reflect the evolving gender roles assumed by women in Sudanese society [11]. Rural women encounter a confluence of challenges, including poverty, environmental degradation, and discrimination. Many struggle to secure sufficient food to prevent their families from going hungry. However, government agricultural assistance programs typically exclude women, denying them access to credit and essential agricultural resources such as seeds and fertilizers. Consequently, due to climate change and gender bias, new generations are compelled to

abandon their agricultural livelihoods [3].

Despite the crucial roles women play in managing natural resources in Sudan, they remain economically and politically marginalized across various socio-economic and ethnic backgrounds. Furthermore, they have not been actively involved in the existing mechanisms for conflict resolution that address disputes over natural resources.

Community-level entities responsible for natural resource management and conflict resolution, such as traditional native administrations and popular committees, have either completely excluded women (in the case of native administrations) or included them only marginally (in popular committees), particularly in matters concerning conflict resolution [12]. This article is based on extensive research conducted by the three authors in collaboration with students from the School of Rural Extension Education and Development at Ahfad University for Women, focusing on gender and climate change in rural Sudan.

### 1.1. Objectives of the Study

- Analyze the Livelihood Risks Linked to Climate Change as Perceived by Women;
- Evaluate the variations in approaches to tackling climate change;
- Investigate Adaptive Capacity in the context of gender;
- Explore Coping Strategies and Adaptation Options concerning gender;
- Assess the requirements of women for adapting to climate change.

### 1.2. Methodology

The research employed a participatory gender analysis methodology. This diagnostic instrument identifies particular gender-based obstacles and discriminatory norms by utilizing focus groups to formulate targeted, actionable recommendations aimed at promoting enhanced gender equality and social justice.

The study area comprised six villages, with two villages selected from each of the three states: White Nile, Gedaref, and Kassala. These states were chosen based on specific criteria that represent the cultural diversities impacted by varying degrees of climate change. The villages were selected purposefully with the assistance and support of local leaders.

The study employed two data collection tools: a household survey and focus group discussions, conducted separately for males and females. Two group discussions were held in each village, with 10 - 12 participants in each group selected with the help of local leaders. The data were analyzed using content analysis techniques. To evaluate adaptive capacity, the research utilized an Adaptive Capacity Assessment Matrix, which assessed the resources available at both household and national levels for managing drought. During the focus group discussions, both men and women answered questions regarding their abilities to adapt to climate change. Key topics included access to and control over essential resources necessary for effective drought management, as well as the existing resources available at the household level.

### **1.3. Limitation**

The results of a gender analysis typically cannot be generalized beyond the particular socio-cultural context in which they were performed, as gender roles, relationships, and experiences are not universal but are influenced by that specific environment. It is essential to take these factors into account when interpreting the results, and additional research is required to investigate wider populations and employ integrated quantitative methods to improve generalizability.

## **2. Results**

### **2.1. General Information on Six Villages**

The total population across the six villages is approximately 52,650, with around 60% being female. Additionally, 50% of the residents live in extended family structures. These villages are notably lacking in social services. Among the households surveyed, 40% identified livestock husbandry as either their second or least important livelihood activity, while an overwhelming 90.8% ranked farming as their primary livelihood. Furthermore, 62.7% of households engaged in non-farming activities, with most of them considering these as their secondary or least significant sources of income, as reported by local leaders of six villages

### **2.2. Climate Change and Adaptation**

Climate change impacts various communities, households, and individuals in distinct ways. The capacity to respond to and anticipate climate change is referred to as a person's adaptive capacity.

#### **2.2.1. Climate Change in Six Villages**

The natural resources in the villages have undergone significant changes over the past decade, as reported by both men and women during focus group discussions (FGDs).

#### **2.2.2. Condition of Villages a Decade Ago as Described by Men**

All male participants in the FGDs concurred on the alterations in their villages due to climate change, as articulated by men from different areas.

Men from the White Nile villages noted that ten years ago, the land was abundant with dense vegetation, including a variety of trees, shrubs, weeds, and herbs. The soil was fertile and conducive to high agricultural yields. In contrast, the current situation is markedly different; many of these plants and trees have vanished, and soil fertility has significantly declined.

Residents of the villages in Gedaref reported that a decade ago, the soil was significantly more fertile. They attribute the current decline in agricultural output to the continuous annual cultivation practices. Additionally, they noted that the land has deteriorated as a result of this persistent usage.

Similarly, men from the villages in Kassala remarked that ten years prior, the area was lush and abundant with trees, and there was a reliable source of fresh water located to the north of the village.

### **2.2.3. Condition of Villages a Decade Ago as Described by Women**

All women who participated in six group discussions concurred on the changes in natural resources over the past ten years. A decade ago, the land was fertile and produced abundant crops; however, currently, soil fertility has declined significantly, leading to a deterioration of both farming and grazing lands. Women from Gadaref reported that corn production has fallen to less than half of what it used to be, attributing this decline to delayed rainfall and the proliferation of agricultural pests. Another woman from a village in Kassala noted that ten years ago, rainfall was plentiful, and most of the land was saturated with water.

### **2.2.4. Livelihood Risks Associated with Climate Change as Perceived by Women**

The impact of climate change, particularly the lack of rainfall, significantly affects us since we rely on agriculture for our livelihoods, as expressed by a woman from Gedaref State. Women from a village in the White Nile highlighted that one of the major risks to their livelihoods is the scarcity of water for both drinking and farming. A woman from the same state recounted that in 2016, our village experienced severe drought, leading to reduced agricultural production, prompting them to temporarily relocate during the summer months.

Women from Kassala village noted that insufficient rainfall delayed farming activities, resulting in increased living difficulties. Consequently, villagers were compelled to cut back on their daily meals. One woman from Kassala mentioned that climate change has adversely affected livestock, making it challenging to obtain milk.

Another woman from the same state remarked that many men were forced to leave the village in search of alternative sources of income.

## **2.3. Addressing Climate Change**

Climate change significantly impacts the agricultural and livestock practices of both men and women. Women, due to their local expertise, can play a vital role in addressing climate change. However, discussions reveal that women often lag behind men in technical knowledge, particularly regarding climate-smart livestock and farming practices.

Participants from two separate group discussions—one for men and one for women—focused on smart livestock practices aimed at mitigating the effects of climate change.

During the discussions, some men demonstrated familiarity with these practices, while none of the women identified key strategies such as cover cropping and drought-tolerant livestock.

The awareness of climate-smart farming practices varied, with a majority of men recognizing methods like water harvesting, composting, and improved grain storage.

In contrast, most women were only aware of composting as a practice.

During a group discussion, women from Kassala expressed that we are significantly impacted by climate change and noted that, we are unlike men; we are not well-versed in adaptation practices.

Similarly, women from villages in the White Nile area stated that we are profoundly affected by climate change and bear the responsibility of ensuring food security for our families. It is necessary to acquire technical knowledge to effectively adapt to these changes. We rely on traditional knowledge, such as the use of compost, but men possess most of the information needed for climate change adaptation.

## 2.4. Adaptation

Nathan L. [13] mentioned that Adaptive capacity is a central, but often overlooked concept within both vulnerability and resilience frameworks. The assessments of adaptive capacity that draw from the benefits of both vulnerability and resilience research can serve to advance theory and application within the field of sustainability science.

The Adaptive Capacity Assessment Matrix provides a comprehensive framework for evaluating various social, economic, and environmental factors that influence rural communities' ability to adapt to climate change, which is essential for understanding gender-specific vulnerabilities and resilience in settings like rural Sudan [14]. Adaptation encompasses a variety of strategies aimed at minimizing vulnerability to the effects of climate change. However, it encounters several obstacles, such as insufficient funding, gaps in knowledge, and institutional limitations, especially in developing nations [15].

There is a study by Sarah *et al.* [16]. It highlights that in agrarian societies, gender roles and household demographics influence responses to climate shocks; it's affecting adaptation choices and capacities. Data from surveys across Mali, Ghana, Kenya, and Ethiopia reveal significant gender disparities in adaptive capacity, which hinder effective climate resilience, emphasising the need for gender-sensitive policies that promote equal access to resources and support women's roles in adaptation and migration strategies. This is largely consistent with the results of this study, which revealed that women in six villages faced significant barriers in accessing adequate financial resources to address weather-related losses or to invest in adaptation technologies. This conclusion came from an analysis of adaptive capacity utilising the Adaptive Capacity Assessment Matrix, which evaluates resources available at both household and national levels for drought management (refer to **Table 1**). The results indicated that men and women possess differing capacities to adapt to climate change, largely due to gender disparities in access to and control over assets, services, and decision-making processes. Specifically, the women often lack access to financial resources, which are predominantly controlled by men. Additionally, women's capacity to adapt is further constrained by prevailing gender norms, roles, and biases within communities, workplaces, and institutions.

**Table 1.** Adaptive capacity assessment matrix example—resources available at household and national level for drought management.

Required resources for supporting drought management	Existing resources at the household level	Access who uses it? men/women	Control who decides how it will be used? men/women
Private well	Village wells	Men	Men
Water tanks	Barrels and clay pots ground pits/tanks	Both men and women	Men
Information about risks	Radio and TV	men	Men
Information about storage measures	The daily rate of use	Both men and women	Men
Financial resources	Farming Free-lance work salary	Men	Men
Savings	NO	No	No
Remittances	Not applicable	Not applicable	Not applicable
Alternative income sources		Men	Men
Social Cohesion	Solidarity by 56.2 and collective work/nafeer	Both men and women	Both men and women
Good relationship with community	Solidarity and support social capital	Both men and women	Both men and women
Member of village committee	Relatives and kinship	Both men and women	Men
Member of village council	Not applicable	Not applicable	Not applicable

## 2.5. Coping Strategies, Adaptation Options, and Gender

Although women often face limited resources that hinder their ability to adapt, they employ various strategies to cope with climate shocks and changes.

### Women's Responses to Climate Shocks: Coping Strategies and Adaptation Options

Women from Kassala villages said (most of the Families reduced the three main meals into two or one meal per day).

A woman from white Nile State village said (we rent part of our land).

Adaptation options and strategies differ from men

Yes, women's options differ from men because women can manage home savings to meet the needs of the family in times of hardship said women from Gedaref State, villages.

Women from White Nile villages said we differ from men, as our chances of working are weak, with the lack of financial resources and job opportunities outside and inside the village.

Women from Gedaref villages said: Yes, men search for different livelihoods or sell livestock and sometimes lands and immigration outside the area, whereas women live peacefully with the situation and seek to reduce spending according to priorities.

Women from White Nile State said Women depend on selling assets such as

gold/silver/household utensils/home furniture and selling livestock if available. Men can engage in income-generating activities or overtime work outside the village throughout the year, during the summer, or as needed.

Women from villages in Kassala reported that many families have reduced their daily meals from three to one or two. A woman from the White Nile State village mentioned that we rent out part of our land.

Coping strategies and adaptation options that are preferred by women include diversifying livelihood methods and seeking new income opportunities, as noted by women from Gedaref. Some women from the same state shared their experiences. They said we are selling assets, livestock, and working in markets to sell tea and food.

### 3. Discussion

Rural women in Sudan encounter numerous challenges, including systemic discrimination, poverty, and environmental degradation. A significant number of these women struggle to secure sufficient food to prevent their families from experiencing hunger. The depletion of natural resources and the increased burden on women are direct consequences of climate change and gender-based discrimination [10] [17] [18].

When discussing the gender aspect of climate change and adaptation, we refer to the distinct ways in which men and women contribute to climate change, the varying impacts it has on each gender, and the different strategies they employ to respond to and cope with these changes [17]-[20].

An analysis conducted a decade ago in six villages revealed significant degradation of natural resources, with the disappearance of several key trees and shrubs. Climate change affects rural communities in Sudan, impacting households and individuals in diverse ways. The findings indicated that while both men and women experienced similar climate shocks, men were generally more aware of the impacts and effects of climate change compared to women. Furthermore, the study highlighted that the adaptation strategies employed in response to climate change differ significantly between genders [21].

In Sudan, the availability of agricultural land is a critical factor for achieving sustainable social and economic development, ensuring food security, alleviating poverty, promoting sustainable livelihoods, maintaining community stability, securing housing, advancing rural development, and protecting the environment [22].

The analysis of gender disparities revealed that women face significant challenges in accessing financial resources necessary to mitigate weather-related losses or invest in adaptation technologies. Furthermore, their lack of experience exacerbates these difficulties.

The study assessed the gendered adaptive capacity concerning resources available within households for managing drought. It found that while some resources exist at the household level, men predominantly control access to and utilization

of these resources. This disparity highlights that women's access to productive agricultural resources and services is not on par with that of men, thereby diminishing their adaptive capacities, particularly during critical climate change events [2] [23].

Moreover, women lack decision-making authority within the household and over household resources, further limiting their adaptive capacities during extreme climate-related events. This situation renders women disproportionately vulnerable to the impacts of climate change, leading to maladaptive outcomes, and diminishes the likelihood of successful adaptation efforts [1] [24]. The research suggests that women are aware of the differences in reasons between themselves and men regarding the adaptation options available to them. The risk management strategies accessible to women may be more constrained than those available to men, partly due to traditional gender roles that impose a greater domestic workload on women and limit their mobility [21] [25]. Women have articulated their need for technical knowledge and access to resources, particularly funding, to enhance their capacity to adapt to climate change [26].

#### **4. Conclusion**

Women serve as the primary providers of water, food, and energy within households and communities in the three project states, making them significantly reliant on natural resources for their livelihoods. This reliance renders them particularly susceptible to the impacts of climate change. It has been observed that prevailing social and cultural norms continue to dictate women's participation, potentially hindering their involvement and thereby worsening existing gender inequalities. Conversely, women possess distinct knowledge and skills that can enhance the effectiveness and sustainability of climate change responses.

#### **5. Recommendations**

The findings of this study may assist planners, practitioners, and researchers who are actively engaged in addressing climate change in formulating gender-sensitive adaptation strategies. The concept of adaptive capacity is closely linked to the skills and resources available to individuals or communities, enabling them to either shield themselves from negative climatic effects or capitalize on opportunities presented by climate change.

It is essential to implement climate solutions that are community-led and responsive to gender considerations. Promoting the involvement of women and supporting women-led initiatives in climate action leads to more effective, equitable, and comprehensive results.

Facilitating access to customized financial resources and effective resource management is crucial. By equipping communities with appropriate resources, including financial support, they can develop more tailored and climate-resilient strategies, significantly enhancing their capacity for climate adaptation and mitigation.

Addressing climate change through a gender perspective not only advances women's rights but also fosters greater gender equality. Also, gender considerations should be integrated into national and local climate change adaptation policies and strategies. Additionally, it promotes partnerships among government agencies, NGOs, community organizations, and women's groups to coordinate efforts and leverage resources. And encourage community-based approaches that empower women and integrate traditional knowledge with scientific practices.

### Conflicts of Interest

The authors declare no conflicts of interest.

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