



Rural Women at the Frontline of Climate Change: A Review of Livelihood Disruptions and Educational Challenge

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Abstract: As climate change continues to worsen, developing countries are even more at risk, particularly rural poor women. The aim of this paper is to understand how climate change affects the environment, and in turn how it affects the educational opportunities of women, particularly rural women. Rural women, in particular, are a large part of the informal sector and are unpaid. Most of the rural women are unpaid agricultural workers. For many rural women, even owning land is a financial barrier to negotiating and exerting economic self-determination. Drought, flooding, and irregular rainfall are the most extreme and most visible consequences of climate change. Rural women are already burdened with unpaid labor and food insecurity so climate change does not create additional burdens as they have already been impacted the most. Due to climate change, the environment is impacted, and as a result, so are the livelihoods of people. This covers issues such as family migration, child labor, and child marriage. Sadly, this leads to girls being less likely to attend and receive an education which is considered unimportant in many developing countries. This research seeks to understand the links between economic and educational marginalization in the rural, climate-changed affected areas of the world. Aside from the persistent structural and policy gaps, this research examines the coping strategies of women in rural areas impacted by climate change. These strategies include the use of informal local systems, community-based initiatives, and a broader range of economic activities.

Keywords: Climate Change, Livelihood Disruption, Gender Inequality, Educational Challenges, Climate Adaptation, Rural Development, Food Security, Sustainable Development Goals (SDGs)

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INTRODUCTION

Nowadays, climate change impacts more than the environment. It has evolved into a serious economic issue that impacts people's ability to stay alive, the structure of economies and society, and the progress of nations. The threat of climate change is now global and has no geographical boundaries. Those living in rural regions that rely on natural resources are particularly at risk from the effects of climate change and other extreme weather occurrences. Every person will feel the effects of climate change differently. Developing nations' rural women bear the brunt of this problem (Belle, J., 2024). Among the many climate change pressures caused by essential societal activities, they bear the brunt. The stresses are worse for women in rural poor nations because they are less likely to own property, have access to finance, utilize technology, have an education, or have a voice in decision-making.

This article centers on rural women's contributions to climate justice advocacy and how their changing environment impacts their work. Environmental changes and their impact on females' education are also covered. Within the context of rural communities hit hard by the climate catastrophe, there is a confluence

of factors, including employment instability and the consequent erosion of educational options. Many families are having to pull their girls out of school because they are unable to adjust to the changes brought about by a decline in revenue and food production on the farm. Amidst the various complexities of international relations in different parts of the world, it becomes even more vital to ascertain the role of rural women, particularly in the climate emergency affected areas where women's jobs are being created, and where the focus is on closing the gap of inequality. The synthesis of rural women's experiences focuses on their flexibility, resilience, and climate change responsiveness.

Climate Change and Rural Vulnerability

The foundation of rural economies is agriculture and agro-based sectors such as sericulture, aquaculture, and forestry, all of which are significantly reliant on favorable weather conditions. As a result, rural areas are among the most vulnerable to the effects of climate change. The majority of rural families in developing nations rely on rain-fed agriculture for both revenue and subsistence. The unpredictable nature of rainfall or the occurrence of extreme weather events that ruin crops will always cause rural families to lose harvest, income, and food, and the likelihood of famine and debt will rise regardless of the agricultural tactics they employ. Those living in rural areas are more at risk from the effects of climate change because they lack access to alternative sources of income, unlike their urban counterparts. The drying up of small bodies of water and the depletion of groundwater aquifers are clear symptoms of rural water shortage made worse by climate change. Then, in order to satisfy their water demands, households are forced to relocate further away. In contrast, natural disasters like floods and cyclones brought on by human-caused climate change and unpredictability lead to water scarcity and human relocation. Rural communities are affected more by the deconstruction of houses, schools, and clinics. Rural communities are negatively affected by climate change and face problems such as a lack of funding. Also, rural communities are negatively affected by an absence of insurance, delayed disaster recovery, and weak institutional frameworks (Dharamshi, K., 2023).

Many people leave rural areas to move to cities because of unpredictable weather. The male members of the family move away to leave the farm but not because of financial worse opportunities, and the females stay behind to manage the farm, take care of the family, and look after the community. The extra burden on women referred to as the "feminization of agriculture," does not help women to gain more control over their lives. Climate changes, particularly for people living in rural areas, has a reorganizing and far-reaching social and economic impact, exacerbating poverty. As economies fail, food shortages occur, infrastructures collapse, and social protection systems in the local populations, who are already a put to a great deal of work to keep them there, fail. No matter how isolated or difficult the environment, women face the most difficult situations, and their situation is particularly difficult, leaving them more stressed than others.

Gender Dimensions of Climate Change

Rural populations feel the impacts of climate change the most due to existing gender norms and inequities. Women spend their time working at home and performing unpaid roles which include food cultivation, storing seeds, managing livestock, and collecting water and firewood. The environment deteriorating makes these tasks harder and more time-consuming. For example, when firewood becomes scarce, women have to walk further to collect it and when water becomes scarce, they have to spend more time collecting it. This leads to them spending less time on income-generating activities and acquiring skills and education. Rural

women, although pivotal in agricultural production, do not have ownership of productive resources or land. In many countries of the globe, women's access to land and financial resources is constrained by existing patriarchal systems and customary laws. Women's access remains locked when it comes to finance, agricultural extension services, climate-resilient crops, irrigation, and technology due to the land title and collateral framework. And because of this, women are less prepared to face climate change.

In families and communities, women are usually not included in decision making. In planning for crises, managing climate change, or planning how to use resources, women's specific needs and particular expertise are rarely considered. Women's exclusion adds to inequality and is likely to undermine climate change initiatives. Women's knowledge and experience are critical when it comes to traditional practices of crop diversity and sustainable land management during times of water scarcity. Due to climate change, vulnerability of certain social groups is intensified. The economic crisis and hunger have linked increased cases of domestic violence, child marriage, and the child marriage, and the reduced financing of education for girls. During a crisis, families are likely to prioritize boys' education because they view men as potential breadwinners. Rural women and girls bear the most severe disadvantages from the combination of climate change and gender inequality. In order to reduce these disadvantages and build resilience, it is important to recognize the gendered nature of the challenges.

Linking Livelihood and Education in a Climate Context

Rural families most deeply feel the impacts of climate change in the way it disrupts their intertwined livelihood, security and education. Because of floods and droughts, agricultural production may decrease or even eliminate animals. Household income therefore plummets. To cut costs or get their kids to help out around the house, parents may have to take their kids out of school, particularly the females. Educational systems can be impacted by climate-related catastrophes as well. Schools' transportation networks are not immune to natural disasters including floods, hurricanes, and severe droughts. In the midst of the drought, additional children may perish from heat exhaustion or perhaps drown in the river that transports them to and from school. Some schools are converted into humanitarian catastrophe shelters in the event of climate disasters; thus, these schools are closed for an extended period of time. Even when water is readily available, females still have to stay home to take care of household tasks, which leads to a high proportion of kid dropouts (Duru, J., 2022).

As the digital gap widens, rural communities are hit particularly hard in the realm of education. When weather-related disasters occur, they throw off the regular schedule of classes. Problems arise when traditional classroom instruction is replaced with online learning, such as participants' lack of reading skills and an inadequate power supply, which leads to unreliable internet connectivity. Educators and rural, socially and culturally vulnerable teenage girls are a particular target of rising digital illiteracy rates. When it comes to adapting to climate change, climate education is generally overlooked. Despite the gender gap in the workforce, female educators are taking action on climate change by increasing the use of innovative, environmentally friendly farming practices. In addition, by including the formerly marginalized women in her neighborhood, diversifying her income-generating activities, and making use of climate information services, she becomes more climate responsive. When it comes to adapting to climate change, education is generally overlooked. Family life, the environment, and future generations may all benefit from investments

in rural youth education that help mitigate the effects of climate change. Giving education to rural teenage girls also benefits society as a whole. Efforts to improve economic conditions and educational opportunities must be considered in tandem. Any policy worth its salt will factor in measures to limit economic growth, strengthen social safety nets, and build climate-resilient, gender-inclusive educational facilities. Inequalities can only be mitigated and climates protected by employing these strategies.

CLIMATE CHANGE AND LIVELIHOOD DISRUPTIONS AMONG RURAL WOMEN

The economic impacts due to climate change have affected women living in rural areas and more deeply affected those whose economic activities do not go beyond their immediate environments. Collectively, women of many developing areas play a pivotal role in small-scale subsistence and/or extensive farming, animal husbandry, fishing, and forestry activities. These climate change phenomenon including increasing temperatures, more frequent rising and falling of climate changes, and erosion of soil are particularly relevant to their domains of activities. Changes in climate are causing rapid changes to farming and increasing food insecurity, financial instability, and informal women grazing. Herding work changes are the result of climate change, negatively impacting women farmers in remote areas who lack any form of modern farming tools. Women farmers, even those who can access modern farming chemicals and seed treatment technologies, face financial and land ownership constraints/obstacles.

For women in rural areas, it is very important for them to keep and raise cattle for financial support. But it's also susceptible to attack. Heat waves, water scarcity, and disease outbreaks caused by climate change all contribute to lower cattle productivity and higher mortality rates. When families lose cattle, it not only reduces their income but also threatens their food security. It is usual practice to rely on the sale of milk, eggs, and poultry to supplement income, and the lost meat and dairy products are vital dietary supplies for all people, especially women. The loss of cattle weakens a woman's bargaining position and financial autonomy (Lamichhane, S., 2025). Climate change compounds the enormous amount of unpaid work that rural women already do. As a result, women are increasingly being forced to travel greater distances to do the traditionally allocated responsibilities of gathering fuelwood and water, as these resources are becoming increasingly rare. They will have less time to work, get education, and participate in community decision-making as a result of this extension. In addition to worsening their already precarious health, prolonged, severe weather causes emotional and physical weariness.

There are several potential threats to a person's ability to make a living, but having trouble securing enough food is one of the most significant. Because women typically prioritize feeding their families during times of poor harvests and rising food prices, malnutrition and health problems among women are real concerns. When women are unable to meet their own nutritional needs, they are less able to contribute financially to their families. When families cut back on food, sell items that may be put to better use, or take out loans with exorbitant interest rates, their financial condition can deteriorate even more. Significant changes in rural ways of earning a livelihood are brought about by climate change and poor rural food security. The males of the family typically leave the countryside for the metropolis in search of employment opportunities when their income from farming decreases. The women of the family also undergo transformations when this occurs, as they assume leadership roles within the family. They do not only do farming and caregiving;

they do all the community work as well. Although this change may give women some voice in policy issues, it usually involves the retention or even reduction of previous resource, training and institutional support. Thus, women continue to absorb more and more work without the necessary means.

Women in rural areas are impacted by climate change as they lose their informal and micro-enterprises such as food processing and selling in local markets and crafting. Severe weather can damage transport systems and supply chain routes and limit consumer access which all create barriers to rural women's micro-enterprises. Women-owned micro-enterprises are believed to be the most financially climate vulnerable because these women are often uninsured and below the poverty line financially. Against all odds, rural women have persevered due to their ingenuity. Diversifying crops, self-help group membership, the planting of drought-resistant seeds, and community resource mobilization are just some of the many initiatives rural women have taken (Sukumar, A., 2025). Unfortunately, the formal institutional frameworks and policies aimed to support rural women have almost completely failed to recognize the approaches rural women have taken. Climate change adaptation strategies must take into account the unique difficulties faced by rural women if they are to be successful in alleviating these issues. Additionally, these actions should be considerate of women's needs and work to increase their access to land, credit, technology, education, and social security. In order to build climate-resilient and -sustainable communities, we must first recognize that women are vital to rural sustainable development and not only climate change victims.

EDUCATIONAL CHALLENGES FACED BY RURAL WOMEN AND GIRLS

On already-restricted educational opportunities for women and girls, the widespread and pervasive consequences of climate change will have a much greater impact on rural and outlying places. In many outlying places, a family's economic prospects directly impact their educational options. When a family is dealing with the effects of climate change, such as a drought, flood, storm, or failed harvest, schooling takes a back seat. Because they can't afford what is formerly considered a luxury, such as school fees, uniforms, transportation, and school supplies, families find themselves unable to finance an education. One of the several signs of the firmly embedded belief that education for males is more essential is the fact that these families pull their girls out of school first. An increasingly large number of students are choosing not to attend school or dropping out altogether as a direct result of the increased climate variability brought about by climate change. More so than boys, girls bear the brunt of this situation when their parents are compelled to change their work strategies. They may be expected to work in farming, stay at home and care for younger siblings, go to work or seek employment, and, in the case of girls, even go to the extremes of washing and gathering wood, all in the name of fighting for limited economic resources. Thus, in many instances, girls (and occasionally boys) drop out of school to study and never return because of the additional financial strain on the household (Zavala, M. D., 2024).

Natural catastrophes such as floods, hurricanes, and landslides can cause significant damage or even destruction to school buildings, furnishings, and educational resources. Schools are closed for extended periods of time because of this. The disruption of instruction that occurs when schools transform into makeshift shelters is real. Due to inadequate cooling and heating, classrooms in schools become unbearably hot and stuffy. When pupils are unable to learn due to pain, they will cease attending classes. Because they lack the resources to construct or renovate schools that are climate resilient, the majority of rural schools

will not be able to meet the difficulties presented by climate change. The educational level of the impacted communities would inevitably fall as a result of this. Droughts and floods are becoming more often due to climate change, which in turn causes water contamination. Girls are particularly discouraged from attending school as a result of the lack of adequate water and sanitary facilities. School attendance is discouraged, particularly among teenage females, due to inadequate or nonexistent water and sanitary facilities caused by floods and droughts. The absence of resources tailored to girls' needs in schools leads to a higher rate of adolescent dropout, which in turn widens the achievement gap between the sexes.

As a result of families struggling to make ends meet due to climate-related financial difficulties, child labor and early marriage may become more commonplace. When families aren't sure how they'll make ends meet, they often marry off their daughters as dowries or to help alleviate financial hardship. There is little opportunity for a girl to become economically independent or a member of the working class when she is married since, in most cases, she quits attending school. Another issue is that families may need to take children out of school, particularly females, to help make finances meet. These cases illustrate how societal prejudice against women exacerbates the climate crisis's negative effects on some families. Poverty exacerbates the "digital divide" and its negative effects on education in emerging nations (Rao, N., 2019). It is especially true during times of global catastrophe like the COVID-19 epidemic when people living in rural areas lack access to energy, digital devices, and digital literacy due to the increasing digitization of schooling. In many remote areas, females lack access to computers and other electronic devices because the region's culture perceives technology as something only men should use. This further increases the gap in education and technology in the rural areas.

Even with these challenges, education is still fundamental in responding to climate change. Educated women are more likely to understand climate change and impact less environment using and adaptive agricultural methods, economize in a variety of ways, and participate in environmental policy. A household's well-being is improved when its members are educated on the significance of health, nutrition, and environmental preservation. Thus, ensuring that girls and women in rural areas have unfettered and equal access to education is crucial for reasons other than social justice. Improving climate change resistance and incorporating sustainable development also depend on it (Arora-Jonsson, S., 2011). Combining social protection, the construction of climate-resilient infrastructure, gender-responsive school designs, and community awareness are all necessary innovative methods to addressing the educational challenges in rural regions, particularly in places where the climate has altered. Rural women and communities may turn climate-induced obstacles into opportunities to show leadership and resilience by protecting girls' education in a world where climate change is a challenge.

COPING STRATEGIES, ADAPTATION, AND RESILIENCE

Women in rural areas face several threats, not the least of which being the effects of climate change. In response to the climate catastrophe, they put plans into action. Despite their importance to effecting good change and combating climate change, these tactics are frequently unacknowledged and unstructured. Rural women and girls are employing a number of tactics, one of which is the quick and agile transition to climate-smart agricultural structural diversification. When it comes to agriculture, economics, and climate change, formal discourse and frameworks frequently mislead or totally exclude women's perspectives. In

the realm of women-inclusive agriculture, the operational area is mostly unrecognized, unwritten, and informal. Nonetheless, the economic, environmental, and social benefits of women's agribusiness are substantial, and the sector is growing rapidly (Beuchelt, T. D., 2013). There is a beneficial and substantial effect of women's agribusiness on the economy, climate, and ecology. In rural areas, it is not uncommon for women to engage in the informal but very beneficial agriculture. Economics, agribusiness, and climate-smart agriculture all have quite formal frameworks. However, women primarily engage in informal agriculture. Many women's agriculture activities go undocumented, unofficial, and unacknowledged. However, they adapt to both the favorable and negative aspects of the world environment.

A more resilient population is one that has diversified its income sources beyond farming. Some examples of their activities include making their own crafts, preparing their own food, or even keeping tiny animals. They could even set up shop in the neighborhood or nearby town, selling homemade goods and food. Microfinance, which refers to partnerships and groups working to empower women in community development, enables the formation of communal self-help branches that facilitate the provision of modest loans, savings, and micro-investment opportunities for enterprises. These offshoots provide social safety nets, self-organized groups, and commercial networks to rural microfinance communities (Alston, M., 2014). A larger contact net for creating adaption strategies is also created when women self-organize. adaption measures can be developed through increased self-organization through community management and adaption strategies. As an example, the safety and security of rural microfinance community groups is enhanced when women self-organize to create adaption strategies. In areas prone to disasters, they aid in the development of safety and security practices and the implementation of adaptation measures that help communities survive and recover. In order to establish and improve community safety systems, women must organize and devise adaptation strategies that make use of community and home resources.

Educational programs that also prioritize skill building activities are also an important part of adaptive capability. Climate adaptive programs help teach women so that they can make more informed decisions about sustainable farming, financial literacy, and prediction. The mobile climate extension service system assists people in shifting to more climate resilient livelihoods. Along with the increasing of women's rights to access communal resources and modern technologies, these strategies certainly increase women's adaptive capacity. However, women's adaptive capacity is more than just coping with shocks; it is the capacity to dismantle the deeply rooted structural inequities. Transformational resilient inclusive decision-making frameworks that are responsive to gender-based violence, women's rights, and AV policies are the bottom line. It is a civil rights issue that women suffer violence because of their gender. Not to mention, violence is the principal and most visible manifestation of social protection. What a mess. Climate change social protection, intersecting arms of, public employment schemes, financial transfers, and crop insurance. To tackle the climate crisis, social protection must have intersecting arms. What a mess.

Programs that give people jobs, provide basic income, and insurances are ways that help people cope with the effects, and even, give structure and stability to families, like the new stability and structure families receive with the new climate protection policies, and new climate protection policies. also social reduction and the climate-related stresses (Agarwal, B., 2018). Rural women show extraordinary ability through adaptive agricultural practices, diversified livelihoods, collaborative initiatives, and community leadership. Their approaches demonstrate the value of integrating local knowledge with institutional support for

climate change initiatives. Rural women are more vulnerable to the impact of climate change, however, their adaptive capacities could be strengthened through the implementation of policies that are both woman-sensitive and climate supportive. Despite the challenges of climate change, this will equip rural women with the necessary means to contribute significantly towards sustainable development.

POLICY FRAMEWORKS AND GENDER-RESPONSIVE INTERVENTIONS

Climate change affects every single person in a community, however, when it comes to the finances of the rural population, the elements of the gender gap, sustainable livelihoods, and educational possibilities, need to be merged with the rural population's adaptation processes to ever-changing climate. Recently, a number of global and national treaties and documents have been framed on the impact of the climate emergency on the women in the community. However, the enigmas of implementing these works in practice has been the most challenging aspect. A more responsive, gender equal participation of women, is not the end of the story, as the world still has a long way to go in reconstructing the barriers to women's adaptive capacities. Gender equality is at the heart of the climate change fallout articulation in the SDGs, the Paris Agreements, and the UNFCCC Gender Action Plan. Goals 5 and 13 underline the necessity for a more pronounced participation of women in all processes of environmental governance. The gender equality in the ability to adapt and respond to the changing climate is one of the pillars of the Paris Treaty on Climate Change. The integration of women's rights and climate resilience should be leveraging to the most for these treaties to be the basis of any national framework on climate change policies (Le Masson, V, 2016).

The national administration has launched climate adaptation, social protection, and programs for rural areas, but women are almost never the focus of these initiatives. In most cases, policies do not prioritize women but rather males. Extreme inequality in land ownership, financial resources, and mobility is a common experience for rural women. Agricultural extension, climate-resilient technology, and secure land tenure should all be part of any gender-focused project. To empower women economically and negotiate more effectively, there have been reforms that expand inheritance rights and shared land title regulations. The educational policies also have a tendency to ignore the financial risks that climate change poses (Sultana, F., 2014). During times of crisis, we can reduce the number of cases of girl children dropping out of school if we invest in schools to make them climate-resistant and offer women with safe sanitation options. Because climate change is already here, it is critical that women have access to information that will empower them to safeguard the environment via sustainable practices and disaster preparedness. Scholarships, monetary awards, and advertising campaigns give power to women, especially in the countryside.

Women should take the initiative at the community level. Women's local adaptation planning is enhanced with the use of quotas and participatory decision-making in water user groups, disaster management groups, and climate committees. Knowledge transfer and adaptation actions can be enhanced through the collaboration of legislators, NGOs, and community women's groups. In relation to the financial risks of climate change, the Social Protection Mechanism should target the most vulnerable. Using child labor and early marriages as survival strategies should become the last option. By taking an inclusive approach, we can assist women in recognizing their unpaid informal economic activity and shift the risks connected to informal economic activity to the women. Given the complexity of climate vulnerability, disruption of

livelihoods, and educational inequities, the policy frameworks should be intentionally and integratively designed to target multiple issues simultaneously. Policies that are responsive to gender issues should focus on structural change, inclusive governance, and constant financing for women's empowerment (Hunter, L. M., 2015). By creating new links between climate change and gender justice, policymakers can transform rural economies and empower women from positions of subordination to actively contributing to the construction of transformative, climate-resilient, sustainable economies.

CONCLUSION

Climate change is affecting a lot of different aspects in society and not just in environmental ways. One of those is rural areas and the livelihoods of people in those areas. When thinking about rural areas and climate change, the first thing that comes to people's minds is the rural women. This is due to the fact that women have a lot of different economic, social and domestic responsibilities. The agro-pastoral production of rural areas is also their responsibility, and from the perspective of food security, water is also their responsibility, along with the economy, and income of rural areas. The change(s) of the climate includes all of the above, and these are the multiple challenges posed by climate that are worsened by rural women. When it comes to challenges in education, it is even worse for women, in particular, girls. With the loss of economic activities, these challenges posed in education are furthered. Girls are highly disadvantaged by the economic climate which causes them to have a lot of responsibilities at home, participate in early marriages, and there is also a lack of adequate physical facilities. Rural women are the most resilient and flexible to change. Engaging their bottom-up communal systems and participatory indigenous knowledge, rural women adapt and change their practices to incorporate different forms of agriculture, establish different means of livelihood, and much more.

Rural women provide stability for their families, and also assist in the sustainable use of household resources. Furthermore, rural women are no longer perceived as passive victims of under-development, but rather as active drivers of development. Rural women's adaptive capacity and resilience to systemic climate change have been endlessly created and destroyed in the face of inadequate land tenure and rights, limited access to credit, technology, exclusion, and the absence of leadership and decision-making opportunities. Researchers and decision-makers should consider climate change's gendered impacts on livelihoods and education in the intertwined web of access and rights. Well-defined social protection systems, equitable resource distribution, climate-resilient infrastructure, and the education of women should form the basis of sustainable adaptation strategies. Given the climate crisis, rural women's social empowerment is vital in recognizing and building inclusive and resilient rural communities.

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