Implementing Gender Inclusive Policy in the Anthropocene: Case Study of Rural Women Community in Chiang Khong District (Chiang Rai, Thailand)

Maya Dania[1]

Abstract

Thailand's environmental policy currently lacks a gender-inclusive approach, particularly in the context of climate change adaptation. In the Anthropocene, such a policy is essential for fostering resilient communities capable of coping with human-caused climate change, thereby achieving sustainable development. This research aims to identify the environmental pressures in the Anthropocene that challenge rural women in the Chiang Khong district and elucidate the barriers to gender equality and social inclusion (GESI) within Thailand's environmental policies. The study employs a qualitative method, conducting in-depth interviews with representatives of civil society organizations (CSOs) and 15 local women from the green algae collector community in Chiang Khong district, with the GESI framework guiding the analysis. The research highlights several environmental pressures affecting rural women in Chiang Khong, including resource scarcity, unpredictable weather patterns, and the degradation of natural resources, such as green algae. Barriers to GESI within Thailand's environmental policies are identified as socio-cultural, economic, and institutional. The study finds that resource scarcity, particularly after the establishment of regional hydropower dams, poses significant challenges for rural women in Chiang Khong. Women in the green algae collector community face increased workloads and health risks due to environmental degradation. Despite their crucial role in local environmental management, women's voices are often marginalized in policy dialogues. This research recognizes the vital contributions of women in local environmental management and sustainability efforts. It recommends integrating GESI principles into national and local environmental policies to ensure gender-sensitive approaches in climate change adaptation and mitigation strategies.

Keywords: Gender-Inclusive Policy, Anthropocene, Climate Change Adaptation, Rural Women, Chiang Khong District (Thailand)

[1] Ph.D Program in Social Science, Faculty of Social Sciences, Chiang Mai University
239, Huay Kaew Road, Muang District,Chiang Mai, 50200. THAILAND.
E-mail: -

Introduction

The Anthropocene, characterized by human-induced environmental changes, exacerbates climate change impacts, especially for marginalized and vulnerable communities, including women (Crutzen, 2006; Steffen et al., 2011). In rural communities like Chiang Khong, traditional gender roles dictate that women are primarily responsible for managing natural resources, such as collecting green algae. This division of labor, embedded in socio-cultural practices, increases their vulnerability to climate risks, as they are more exposed to environmental degradation and economic instability. These gendered roles, such as natural resource management and household responsibilities, disproportionately affect women, limiting their access to adaptation resources and decision-making platforms (Nelson et al., 2002; Adger, 2006).

In many countries, rural women are on the frontlines of climate change impacts, facing unique challenges due to their roles in managing household resources and participating in local economies. For instance, in sub-Saharan Africa, women are primarily responsible for collecting water and firewood. As climate change exacerbates drought conditions and depletes water sources, women must travel further to obtain these resources, increasing their workload and reducing time available for other productive activities (Ahmed et al., 2016). In India, rural women engaged in agriculture face significant challenges as changing rainfall patterns and increasing temperatures disrupt traditional farming practices. This not only affects food security but also places additional economic pressure on women, who often have fewer resources and access to technology than men (Terry, 2009). The combination of economic dependency, limited land rights, and lack of access to financial services further exacerbates their vulnerability. In Latin America, indigenous women, who rely heavily on natural resources for their livelihoods, are disproportionately affected by climate change. For example, in Bolivia, unpredictable weather patterns have led to crop failures and water scarcity, significantly impacting the subsistence farming practices that many local women depend on (Buechler & Hanson, 2015). The marginalization of local communities and the lack of infrastructure and support systems further compound these challenges.

In Thailand, rural women are also among the most affected by these environmental changes, given their dependence on natural resources for their livelihoods and their roles in managing household and community resources (FAO, 2011; Oxfam, 2018). Chiang Khong district, located along the Mekong River in Chiang Rai Province, is characterized by its dependence on riverine ecosystems, which are highly sensitive to climatic fluctuations. The community's socio-economic structure is deeply tied to resource-based livelihoods, especially for women who are responsible for collecting green algae (locally known as Kai) during the dry season. Within this social structure, gender differences are evident in the division of labor, as women bear the primary responsibility for natural resource management, further increasing their vulnerability to environmental degradation.

Kai is a significant source of income for many rural women, who gather these algae from the Mekong River during the dry season. Climate change has led to more erratic weather patterns and altered river flow regimes, significantly impacting the availability and quality of Kai. Unpredictable rainfall and prolonged dry seasons reduce the water levels in the Mekong River, affecting the growth and accessibility of green algae. Interviews with women in Chiang Khong reveal the deep connection between their livelihoods and the health of the Mekong River ecosystem. Over the past decade, the women have observed a steady decline in the quantities of Kai they are able to collect due to erratic weather patterns and changes in the river's flow regime. This decrease in algae availability has significantly reduced their household income, and the increased labor required to collect the remaining Kai has added to

their physical and emotional burdens. Women noted that the collection of Kai is not just an economic activity but also a cultural tradition passed down through generations, further exacerbating the psychological impact of climate change on the community. Moreover, the environmental degradation associated with climate change, such as increased sedimentation and pollution of the Mekong River, has further compromised the habitat of green algae. The deterioration of water quality not only affects the growth of Kai but also poses health risks to the women who spend extended periods in the river collecting it.

This research advocates for integrating Gender Equality and Social Inclusion (GESI) principles into Thailand's environmental policies to ensure gender-sensitive climate adaptation strategies. The GESI framework, when applied in Chiang Khong, can provide rural women with more equitable access to political and financial resources, which are essential for building resilience against climate change impacts. Currently, women are marginalized in decision-making processes regarding resource management, leaving their voices unheard in crucial environmental and economic decisions. By empowering women to participate in these processes, the GESI framework can address existing power imbalances and support the inclusion of their perspectives in both local and national climate adaptation strategies. In this community, socio-cultural norms limit women's access to education and economic opportunities, worsening their vulnerability to climate risks (Lebel et al., 2010).

Thus, this research aims to identify the environmental pressures in the Anthropocene that challenge rural women in the Chiang Khong district and elucidate the barriers to gender equality and social inclusion (GESI) within Thailand's environmental policies. The GESI framework is applied in this research to show how gender equality and social inclusion must be integrated to help close the gender gap, tackle exclusion, and strengthen equitable economic growth. By highlighting these challenges and barriers, the study seeks to provide insights into how GESI principles can be integrated into national and local environmental policies to ensure gender-sensitive approaches in climate change adaptation and mitigation strategies.

This paper is organized as follows: the Literature Review section provides an overview of existing literature on gender, climate change, and environmental policies, focusing on the intersection of these issues in the context of rural communities. The Methodology section outlines the research design, data collection methods, and analytical framework employed in the study. The Findings section presents the research findings, highlighting the environmental pressures faced by rural women in Chiang Khong and the barriers to gender equality and social inclusion (GESI) within Thailand's environmental policies. The Discussion section offers a critical analysis of the findings, discussing the implications of the identified barriers and the potential benefits of integrating GESI principles into environmental policies. Finally, the Conclusion section summarizes the key findings and provides recommendations for policymakers and stakeholders to enhance the resilience of rural communities through gender-inclusive climate change adaptation and mitigation strategies.

Method

This study employs a qualitative research approach to explore the environmental pressures and barriers to Gender Equality and Social Inclusion (GESI) within Thailand's environmental policies, with a focus on rural women in the Chiang Khong district. Qualitative methods, including semi-structured interviews and participant observation, are chosen to provide in-depth insights into the daily lives, cultural practices, and challenges faced by rural women, particularly those whose livelihoods depend on collecting green algae (Kai) from the Mekong River. The interviews aim to uncover the cultural significance of Kai collection, highlighting how these traditional practices are being affected by environmental degradation and climate change.

The study utilizes purposive sampling to select participants who can provide rich and relevant information related to the research objectives. Participants include representatives from civil society organizations (CSOs) actively involved in environmental advocacy and 15 local women who have been involved in Kai collection for several generations. These women are chosen based on their direct involvement in algae collection and their knowledge of the traditions, techniques, and changes in the practice over time. The interviews will explore how Kai collection is not only an economic activity but also a cultural tradition deeply embedded in the identity of the community, and how these traditions are being eroded by climate change. Data collection methods include conducting semi-structured interviews and participant observation, where researchers will observe the collection process of Kai in real-time, documenting the physical labor, traditional knowledge transfer, and community involvement in the practice. This method offers deeper insights into the daily challenges and cultural significance of Kai collection in the lives of rural women. These interviews aim to capture detailed narratives about the seasonal cycles of Kai collection and how the river's altered flow impacts harvesting techniques. Probing questions are used to explore how these women's roles in natural resource management have changed due to climate pressures and how these shifts affect their social and economic standing in the community.

Additionally, document analysis involves examining relevant policy documents, reports, and academic literature to understand the institutional framework and policy landscape concerning Gender Equality and Social Inclusion (GESI) in Thailand's environmental policies. The qualitative data collected through interviews, participant observation, and document analysis will be analyzed using thematic analysis. This approach will focus on the cultural, economic, and environmental dimensions of the challenges faced by women in Chiang Khong. Themes such as the cultural significance of Kai collection, changes in traditional practices due to climate change, and the economic vulnerabilities caused by these changes will be identified, helping to propose strategies for integrating gender-sensitive approaches into environmental policies.

Literature Review

Climate Change and the Anthropocene

The Anthropocene, as introduced by Crutzen and Stoermer (2000), defines a new epoch in which human activities have become the dominant force shaping Earth's systems. Key anthropogenic changes, including deforestation, urbanization, and particularly climate change, driven by greenhouse gas emissions, are hallmarks of this epoch (Crutzen, 2002; Steffen et al., 2011). This section examines the interconnectedness of climate change and the Anthropocene, emphasizing how human-induced activities have caused disruptions, such as global warming, loss of biodiversity, and ecosystem instability (IPCC, 2021; Rockström et al., 2009). The implications of these disruptions are broad, affecting not only ecosystems but also human livelihoods and health (Watts et al., 2015).

Climate change is a central component of the Anthropocene. Research indicates that industrial activities, fossil fuel combustion, and land-use changes have significantly increased atmospheric concentrations of CO_2 and other greenhouse gases, leading to global warming (IPCC, 2021). The Intergovernmental Panel on Climate Change (IPCC) reports provide compelling evidence of human-induced climate change, highlighting rising global temperatures, melting ice caps, and increased frequency of extreme weather events (IPCC, 2018). The impacts of climate change in the Anthropocene are profound and multifaceted. Studies have shown that climate change exacerbates biodiversity loss, disrupts ecosystems, and affects human health and livelihoods (Rockström et al., 2009). For instance, Pörtner et al. (2014) emphasize the vulnerability of marine and terrestrial species to climate-induced habitat changes, while Watts et al. (2015) link climate change to increased health risks, including heat-related illnesses and vector-borne diseases.

The Anthropocene also highlights the socio-economic and political dimensions of climate change. Scholars argue that climate change disproportionately affects marginalized communities, exacerbating existing inequalities (Adger et al., 2013). This intersectionality is crucial for understanding climate justice and the need for inclusive policies that address the diverse impacts of climate change (Roberts and Parks, 2007). Mitigation and adaptation strategies are essential for addressing climate change in the Anthropocene. The Paris Agreement (2015) represents a global commitment to limit temperature rise and enhance adaptive capacities (UNFCCC, 2015). Furthermore, the concept of sustainable development is integral to these strategies, advocating for a balance between environmental, economic, and social objectives (Sachs, 2015).

Despite its utility, the Anthropocene concept faces criticisms. Some scholars argue that it oversimplifies complex human-environment interactions and risks downplaying the agency of non-Western societies (Malm and Hornborg, 2014). Others contend that the focus on human impact can obscure the role of natural processes in shaping the Earth system (Autin and Holbrook, 2012). The concept of the Anthropocene provides a valuable framework for understanding the extensive human impact on climate and the environment. However, it is essential to engage with this concept critically, acknowledging its limitations and the complexities of human-environment interactions. Addressing climate change in the Anthropocene requires interdisciplinary approaches, inclusive policies, and a commitment to sustainable development.

Rural Women in the Anthropogenic Climate Change

Rural women are among the most vulnerable groups affected by anthropogenic climate change, due to their dependence on natural resources for livelihoods and their socio-economic roles in agriculture and water management (Dankelman, 2010; Adger, 2006). These women, who often lack access to education, financial services, and decision-making power, face heightened vulnerabilities in the face of droughts, floods, and shifting weather patterns, which directly impact livelihoods and food security (Alston, 2014; Skinner, 2011). In many developing countries, the burden of climate adaptation falls disproportionately on rural women, as they struggle to maintain household and community welfare (Nelson et al., 2002).

Agriculture is a critical sector where rural women are heavily involved. Climate change affects crop yields and livestock, posing threats to food security (FAO, 2011). Women's traditional knowledge and agricultural practices are challenged by unpredictable weather patterns, making it difficult to sustain their families (Jost et al., 2016). In Sub-Saharan Africa, for instance, women farmers face increased workloads due to the need to adapt to changing climatic conditions (Nelson et al., 2002). Rural women are primarily responsible for water collection and management. Climate change exacerbates water scarcity, forcing women to travel longer distances to secure water, which impacts their health and limits their time for other activities (Sorenson, Morssink, & Campos, 2011). The additional burden also affects their educational and economic opportunities, perpetuating cycles of poverty (UN Women, 2015).

Despite facing immense challenges, rural women demonstrate resilience by employing strategies such as crop diversification, adopting climate-smart techniques, and exploring alternative income sources (Nelson & Stathers, 2009). Traditional knowledge plays a crucial role in community-based adaptation efforts, as women leverage collective action through cooperatives and self-help groups to share resources and improve resilience (Nyantakyi-Frimpong & Bezner-Kerr, 2015; Bee, 2016). These community-based approaches are vital, not only for enhancing women's adaptive capacities but also for promoting gender-inclusive adaptation strategies, in line with the GESI framework. In India, women-led movements have successfully implemented sustainable water management practices, highlighting the importance of local leadership in climate adaptation (Agarwal, 2010).

Effective policies and institutional support are critical for empowering rural women in the face of climate change. Gender-sensitive policies that address the specific needs and contributions of women are essential for fostering resilience (UNDP, 2012). Integrating gender perspectives into national climate strategies can enhance the effectiveness of adaptation and mitigation efforts (Arora-Jonsson, 2011). Addressing the impacts of climate change on rural women requires comprehensive and inclusive policy frameworks. Policies should focus on improving access to resources such as land, financial services, education, and technology to build resilience (Meinzen-Dick et al., 2011), promoting gender equality by strengthening women's participation in decision-making processes at all levels (Bee, 2016), enhancing knowledge and skills through training on climate-smart agricultural practices and sustainable resource management (Jost et al., 2016), and supporting community-based initiatives by facilitating the formation and operation of women's groups and cooperatives (Agarwal, 2010). These strategies are essential for empowering rural women, enhancing their adaptive capacities, and fostering sustainable development in the face of climate change challenges.

Rural women are at the frontline of climate change impacts, yet they also hold the key to effective adaptation and resilience. Recognizing their roles, challenges, and contributions is essential for developing comprehensive climate strategies that are equitable and sustainable. Future research and policy must continue to prioritize the integration of gender perspectives to address the unique needs and strengths of rural women in the Anthropocene.

Climate Change Impacts and Policy in Thailand

Thailand faces a multitude of climate change challenges, with significant impacts across key sectors, including agriculture, water resources, health, and infrastructure. Agriculture, which is a cornerstone of Thailand's economy, is particularly vulnerable to climate-induced risks, such as altered precipitation patterns, extreme weather, and increased temperatures (Lebel et al., 2010). Rice production, a key staple, is at risk of reduced productivity due to heat stress and changing seasonal cycles (Wassmann et al., 2009). Additionally, the country's water resources are under pressure due to irregular rainfall patterns and the increased frequency of droughts and floods, which have disrupted the Mekong River and impacted agriculture and fisheries (Molle et al., 2009).

Studies have shown that rice yields, a staple crop, are particularly vulnerable to changing climate conditions, with potential decreases in productivity due to heat stress and altered growing seasons (Wassmann et al., 2009). Thailand's water resources are under increasing pressure from climate change. Changes in rainfall patterns and the increased frequency of droughts and floods disrupt water availability and quality (Marks, 2011). The Mekong River, a critical water source for many communities, has seen fluctuating water levels, affecting agriculture, fisheries, and domestic water supply (Molle et al., 2009).

The health impacts of climate change in Thailand are also significant. Increased temperatures and changing rainfall patterns have led to the spread of vector-borne diseases such as dengue fever and malaria (Kittayapong et al., 2008). Heatwaves pose additional risks, particularly for vulnerable populations such as the elderly and those with preexisting health conditions (Gupta et al., 2012). Thailand's extensive coastline makes it particularly vulnerable to sea-level rise and coastal erosion. Coastal communities face increased risks of flooding, which can lead to displacement and loss of livelihoods (Horton et al., 2014). Urban areas, including Bangkok, are also at risk from flooding due to their location in low-lying regions and inadequate drainage infrastructure (World Bank, 2011).

Thailand has developed several national strategies to address climate change. The National Climate Change Master Plan (2015-2050) provides a comprehensive framework for mitigation and adaptation efforts across sectors (ONEP, 2015). The plan emphasizes the integration of climate change considerations into national development policies, promoting sustainable economic growth while reducing greenhouse gas emissions. Mitigation efforts in Thailand focus on reducing emissions from key sectors such as energy, transportation, and agriculture. The country has set targets for renewable energy adoption and energy efficiency improvements (Shrestha et al., 2013). Initiatives such as the Alternative Energy Development Plan (AEDP) aim to increase the share of renewable energy in the national energy mix (DEDE, 2012).

Adaptation strategies are crucial for enhancing resilience to climate change impacts. Thailand's adaptation efforts include improving water resource management, enhancing agricultural resilience through climate-smart practices, and strengthening disaster risk management (Marks, 2011). Community-based adaptation initiatives have also been promoted to empower local communities in developing context-specific responses to climate change (Chinvanno & Snidvongs, 2008). For instance, Thailand actively participates in international climate negotiations and cooperation frameworks. As a party to the United Nations Framework

Convention on Climate Change (UNFCCC), Thailand has committed to international climate agreements such as the Paris Agreement (UNFCCC, 2015). The country also engages in regional initiatives through the Association of Southeast Asian Nations (ASEAN) to address transboundary climate issues (ASEAN, 2009).

Despite these efforts, there are several criticisms and challenges associated with Thailand's climate policies. One major issue is the lack of effective implementation and enforcement of policies at the local level (Marks, 2011). Additionally, there is a need for greater integration of scientific research and local knowledge in policy-making processes to ensure that policies are evidence-based and contextually relevant (Chinvanno & Snidvongs, 2008). Financial constraints also pose significant challenges. Adequate funding is essential for implementing adaptation and mitigation measures, but resource allocation is often limited (Shrestha et al., 2013). Moreover, there is a need for enhanced public awareness and participation in climate actions to ensure community support and engagement (Lebel et al., 2010).

Thailand faces considerable challenges from climate change, impacting various sectors, including agriculture, water resources, health, and coastal areas. While the country has developed comprehensive policies and strategies to address these impacts, effective implementation remains a significant challenge. Enhanced integration of scientific research, increased financial support, and greater public participation are crucial for strengthening Thailand's climate resilience.

Result

The Anthropocene presents unprecedented environmental challenges, necessitating policies that are inclusive and sensitive to gender-specific needs. This analysis focuses on the results and findings from a study on implementing gender-inclusive policies in the context of rural women in the Chiang Khong district of Chiang Rai, Thailand. The study highlights environmental pressures, barriers to gender equality and social inclusion (GESI), and the impact of these factors on the well-being and resilience of rural women.

1. Hydropower Dams and Anthropogenic Climate Change

Hydropower dams are part of broader human activities that contribute to anthropogenic climate change. While they produce renewable energy and reduce reliance on fossil fuels, their construction and operation have significant ecological footprints. In the Anthropocene epoch, characterized by significant human impact on the Earth's geology and ecosystems, hydropower dams exemplify how human interventions can lead to unintended environmental consequences. Hydropower dams have been constructed along the Mekong River as part of regional development strategies to generate renewable energy and support economic growth. However, these projects have significantly altered the natural flow of the river, leading to profound environmental and socio-economic impacts. This analysis focuses on the impact of these hydropower dams on the livelihood of local women in Chiang Khong, Thailand, who depend on collecting edible river algae, locally known as Kai, for their income.

The construction of hydropower dams along the Mekong River has disrupted the natural river flow in the Lower Mekong Basin, profoundly altering the ecosystem on which local women depend for Kai collection. The dams regulate water flow, leading to fluctuating water levels that undermine the seasonal flood pulses essential for aquatic plants and animals (Marks, 2011). Women in Chiang Khong reported that these fluctuations not only reduce the availability of Kai but also complicate their traditional harvesting methods. Additionally, the dams trap vital sediments, reducing the flow of nutrients downstream and further inhibiting the growth of Kai. As a result, women face heightened economic insecurity, as the declining availability of Kai limits their ability to support their families. The cultural and social

significance of Kai collection is also eroded, as these women struggle to maintain a practice that has historically been integral to their community's identity.

Moreover, changes in water temperature and quality due to stagnant water in reservoirs further affect the habitat suitability for various aquatic species, including Kai. Consequently, the alteration in water flow and sediment distribution leads to a decline in Kai availability, directly impacting the income and food security of women who collect Kai. This reduction in Kai availability causes economic hardship for women in Chiang Khong, as they face difficulties supporting their families and participating in the local economy. Furthermore, collecting Kai is not just an economic activity but also a cultural practice, and its decline impacts the social and cultural fabric of the community. The loss of income from Kai collection increases the vulnerability of local women to economic shocks and climate change impacts, leaving them with fewer resources to adapt to changing environmental conditions.

Here are lists of interviews from representatives of the local women and the CSO of Chiang Khong (Mae Nam Khong School), led by Mr. Niwat Roikaew (Kru Tee), to describe the situation of anthropogenic climate change impacts on the local community in Chiang Khong, especially for the local women in the village.

Table 1: Interview with the Local Community

Interviewees	Interview Questions and Answers
Local Woman 1	Q: How have the hydropower dams affected the availability of Kai?
	A: The availability of Kai has significantly declined over the years. Before the dams, we used to have a plentiful harvest, but now it has become much harder to find. This reduction directly impacts our income and food security.
	Q: Can you describe the economic struggles you face due to the reduced availability of Kai?
	A: With less Kai to collect, our income has dropped drastically. This makes it difficult to support our families. Many women here rely on Kai for their livelihoods, and now we face economic hardships.
	Q: What is the cultural significance of Kai in your community?
	A: Collecting Kai is more than just an economic activity; it is a part of our culture and tradition. The decline in Kai availability affects not only our economy but also our cultural practices and community bonds.
Local Woman 2	Q: What alternative livelihoods have you considered due to the impact on Kai?
	A: Some of us have tried to shift to other forms of income, like small-scale farming or crafts, but it's challenging. The community is making efforts to adapt, but the transition is not easy.
	Q: How has the river flow changed due to the dams, and how has this affected Kai's growth?
	A: The dams regulate the river flow, causing fluctuations in water levels. This disrupts the natural cycles and affects the growth

Interviewees	Interview Questions and Answers
CSO Representative	patterns of Kai. The seasonal flood pulses that were crucial for Kai's growth are now reduced or eliminated.
	Q: What are the environmental impacts of hydropower dams?
	A: Hydropower dams trap sediments, reducing the flow of nutrients downstream, which affects the growth of Kai and other aquatic vegetation. Changes in water temperature and quality also impact the habitat suitability for various species, including Kai.
	Q: What role does the Chiang Khong School of River play in advocating for sustainable river management?
	A: Our CSO advocates for sustainable river management and community participation in decision-making processes. We aim to raise awareness about the impacts of hydropower dams and push for policies that protect river ecosystems.

Note. List of Interviews. Copyright [2024] by Maya Dania.

The interviews with local women in Chiang Khong reveal a significant decline in the availability of Kai since the construction of hydropower dams along the Mekong River. The first interviewee noted that the once plentiful harvest of Kai has become increasingly difficult to find, directly impacting the income and food security of women who depend on this resource. This reduction has led to severe economic hardships, making it challenging for these women to support their families. The cultural significance of the Kai collection, which is deeply embedded in the community's traditions and practices, has also been affected, leading to disruptions in the community's cultural fabric and social bonds. The second interviewee highlighted the difficulties faced by the community in transitioning to alternative forms of income. Efforts to shift to small-scale farming or crafts have been met with challenges, indicating that the economic dependence on Kai is not easily replaced. This difficulty in adaptation underscores the importance of Kai not only as a source of income but also as a critical element of the local economy and way of life.

According to the representative from the Chiang Khong School of River, the regulation of river flow by hydropower dams has led to fluctuations in water levels, disrupting natural hydrological cycles and affecting the growth patterns of Kai. The reduction or elimination of seasonal flood pulses, which are crucial for the reproductive cycles of aquatic plants and animals, has been particularly detrimental. Additionally, the trapping of sediments by the dams has reduced the flow of nutrients downstream, further impacting the growth of Kai and other aquatic vegetation. Changes in water temperature and quality due to stagnant water in reservoirs have also affected the habitat suitability for various species, including Kai. The Chiang Khong School of River plays a crucial role in advocating for sustainable river management and community participation in decision-making processes. The representative emphasized the importance of raising awareness about the environmental impacts of hydropower dams and pushing for policies that protect river ecosystems. This advocacy is vital for addressing the socio-economic and environmental challenges posed by the dams and supporting the livelihoods of local communities.

This study, therefore, identifies resource scarcity as a significant challenge for rural women in Chiang Khong. Water and natural resource scarcity directly impact their daily lives and livelihoods (Marks, 2011). Women bear the brunt of these shortages, as they are primarily responsible for water collection and management, leading to increased workloads and reduced time for other productive activities. Unpredictable weather patterns, driven by climate change, exacerbate the vulnerability of rural women in Chiang Khong (Lebel et al., 2010). Irregular rainfall and temperature extremes further disrupt agricultural cycles and natural resource availability, making it difficult for women to sustain their livelihoods and contribute to household food security. Moreover, environmental degradation, including soil erosion and pollution, further challenges rural women. The decline in natural resources, such as green algae, which many women depend on for their income, increases health risks and economic insecurity (Molle et al., 2009). This degradation also limits the resources available for sustainable agricultural practices, compounding the difficulties faced by these women.

2. Barriers to GESI for the Local Women in Chiang Khong

In Chiang Khong, socio-cultural norms and deeply ingrained traditional gender roles confine women primarily to household and natural resource management responsibilities, particularly Kai collection. These roles limit women's ability to engage in broader community decision-making and policy-making processes, perpetuating their marginalization (Kittayapong et al., 2008). Women's exclusion from these decision-making forums—coupled with their lack of access to financial resources, education, and agricultural training—exacerbates their vulnerability to environmental changes, particularly those caused by climate change (Shrestha et al., 2013). As key managers of natural resources, rural women bear a disproportionate burden of these environmental shifts, yet the policies designed to mitigate climate change often fail to address their specific needs and contributions. Their inability to access new technologies or sustainable practices further perpetuates their economic and environmental hardships, deepening gender inequalities.

Despite their critical role in managing natural resources, women in Chiang Khong continue to face systemic exclusion from Thailand's climate adaptation and environmental management policies. The study finds that current policies are largely gender-blind, failing to account for the unique contributions and vulnerabilities of women, particularly those who engage in Kai collection. By operationalizing the Gender Equality and Social Inclusion (GESI) framework in Chiang Khong, policymakers can ensure that women are integrated into decision-making processes. This framework advocates for inclusive policies that empower women by providing them with access to resources, training, and participation in governance, which are necessary to improve their resilience to climate change (Lebel et al., 2010). Such integration would not only enhance environmental management practices but also address the socio-cultural barriers that perpetuate gender inequality in the region.

The in-depth interviews with local women in Chiang Khong reveal that Kai collection is not merely an economic activity but a cultural practice intertwined with their identity and community heritage. As the Mekong River's ecosystem becomes more degraded due to environmental changes, women report that their workload has increased significantly, as they must spend more time searching for dwindling supplies of Kai (Marks, 2011). This increased labor burden not only affects their health but also threatens the transmission of cultural knowledge about Kai collection to future generations. Women fear that the decline of Kai may eventually lead to the loss of an important cultural tradition that connects them to the river and their community. Their interviews emphasize the emotional strain caused by the potential erasure of this practice, which has been passed down through generations.

Despite their crucial role in environmental management, women's voices are often marginalized in policy-making processes, limiting the effectiveness of environmental policies and reducing community resilience (Lebel et al., 2010). These findings underscore the urgent need for inclusive policies that address gender disparities and empower women in environmental decision-making for sustainable development. Below is a table (Table 2) summarizing the environmental pressures and barriers to GESI identified in the study.

Table 2: Environmental Pressures and Barriers

Category	Description	Impact on Women
Resource Scarcity	Limited availability of water and arable land	Increased workloads, reduced time for other activities, and economic insecurity
Unpredictable Weather Patterns	Irregular rainfall and temperature extremes	Disrupted agricultural cycles, reduced food security, and increased vulnerability.
Degradation of Natural Resources	Soil erosion, deforestation, and pollution	Health risks, economic insecurity, and limited resources for sustainable practices
Socio-Cultural Barriers	Traditional gender roles and norms limiting women's participation in decision-making processes	Marginalization of women's voices, hindering their ability to advocate for their needs and rights.
Economic Barriers	Limited access to financial resources, education, and training	Restriction on women's capacity to engage in climate adaptation and mitigation activities
Institutional Barriers	Inadequate policies and lack of gender-sensitive approaches	Exclusion of women from climate adaptation and mitigation strategies

Note. The table categorizes key environmental challenges faced by women in the Chiang Khong district, Thailand. Copyright [2024] by Maya Dania.

The table outlines various categories of challenges that significantly affect women, particularly in the context of climate change and resource management. Resource scarcity forces women to spend more time and effort on tasks such as fetching water and tending to increasingly unproductive land, limiting their opportunities for education, income-generating activities, or community participation and heightening their vulnerability to poverty and malnutrition. Unpredictable weather patterns undermine the stability of agricultural cycles, leading to crop failures and reduced food production, directly affecting food security and increasing women's vulnerability to hunger and economic shocks. The degradation of natural resources exacerbates health risks due to pollutants and degraded environmental conditions, creating economic insecurity as productive land and clean water become scarcer, making it challenging for women to adopt sustainable practices. Socio-cultural barriers rooted in traditional gender roles severely restrict women's participation in decision-making processes,

preventing them from advocating for their specific needs and perpetuating their exclusion from effective climate adaptation and resource management strategies.

Economic barriers remain one of the largest challenges for women in Chiang Khong, who are often denied access to financial capital, land ownership, and sustainable agricultural technologies. This lack of access prevents them from adopting climate-resilient practices, which exacerbates their vulnerability to environmental changes. Women reported in interviews that the absence of targeted support, such as microloans or agricultural training, limits their ability to diversify their livelihoods, further entrenching them in cycles of poverty. Institutional barriers compound these economic challenges, as Thailand's national climate policies largely overlook the specific needs of rural women. Without gender-sensitive approaches in policy frameworks, women continue to be excluded from climate adaptation strategies, reducing their overall resilience to climate change.

The intersection of these environmental challenges and socio-economic barriers creates a multifaceted impact on women, particularly in resource-dependent communities. Addressing these issues requires a comprehensive approach that includes improving resource management to alleviate scarcity and degradation, implementing gender-sensitive policies to ensure women's inclusion in decision-making processes, enhancing access to education, training, and financial resources to empower women to engage in sustainable practices, and challenging socio-cultural norms that marginalize women and limit their participation in climate adaptation efforts. By addressing these critical areas, it is possible to reduce the adverse impacts on women and enhance their resilience and capacity to adapt to changing environmental conditions.

Discussion and Conclusion

This research highlights the urgent need for implementing gender-inclusive policies in the Anthropocene, particularly focusing on the rural women of Chiang Khong District, Chiang Rai, Thailand. The analysis reveals that environmental pressures—such as resource scarcity, unpredictable weather patterns, and environmental degradation—are compounded by traditional gender roles that place the burden of natural resource management on women. As primary caregivers and resource managers, women face increased workloads, health risks, and economic insecurities. These gendered responsibilities further limit their ability to adapt to climate changes, as socio-cultural norms often restrict their access to education, financial resources, and decision-making platforms.

1. Barriers Identification from the Local Women

This study identifies socio-cultural, economic, and institutional barriers that severely hinder the implementation of gender-inclusive policies. Traditional gender norms in Chiang Khong marginalize women, excluding them from decision-making processes and policy dialogues, such as those related to hydropower dam development. Despite their firsthand experience managing natural resources, women are often left out of the conversation, preventing their critical insights from shaping environmental policies. Limited access to financial resources, education, and training further restricts women's ability to adopt climate-adaptation strategies, reinforcing gender inequalities. Their exclusion from technological advancements and innovative farming practices hampers their resilience to environmental changes. Without adequate resources, women cannot adopt new technologies or practices that could enhance their resilience to environmental changes. Current environmental policies in Thailand lack gender-sensitive approaches, which significantly undermines their

effectiveness. Policies that do not consider the specific needs and contributions of women fail to leverage their potential in addressing environmental challenges.

The analysis reveals various categories of challenges affecting women in Chiang Khong, particularly concerning climate change and resource management. By applying the Gender Equality and Social Inclusion (GESI) framework, this study emphasizes the need to address power imbalances, promote equitable access to resources, and ensure that women have a voice in decision-making processes. The GESI framework highlights how resource scarcity, unpredictable weather patterns, and socio-cultural barriers disproportionately affect women, as they bear the brunt of collecting resources such as water and managing unproductive agricultural land. GESI-centered policies can help reduce these burdens by fostering inclusive governance structures, ensuring women's voices are heard in climate adaptation and mitigation efforts.

In Chiang Khong, resource scarcity—particularly the limited availability of water and arable land—has severely increased women's workloads. Women are responsible for managing household water supply and agricultural tasks, both of which are increasingly difficult due to erratic rainfall and land degradation. These responsibilities not only reduce the time women have for education and income-generating activities but also deepen their economic insecurity. The GESI framework emphasizes the gendered nature of these tasks, highlighting how women are disproportionately affected by climate-related resource scarcity, which limits their opportunities for socio-economic advancement. The increased workload limits their opportunities to engage in education, income-generating activities, or community participation, perpetuating their subordinate position and heightening their vulnerability to poverty and malnutrition.

Unpredictable weather patterns, such as irregular rainfall and temperature extremes, disrupt agricultural cycles upon which many rural women depend for their livelihoods. This disruption leads to crop failures and reduced food production, directly affecting food security. Women, who often manage household food resources, face heightened stress and increased vulnerability to hunger and economic shocks. The GESI framework highlights the need for gender-sensitive climate adaptation strategies that support women's roles in agriculture and food security.

The degradation of natural resources, including soil erosion, deforestation, and pollution, exacerbates health risks and economic insecurity for women. These environmental challenges limit resources for sustainable practices, making it increasingly difficult for women to engage in subsistence farming and resource management. The GESI framework advocates for sustainable resource management practices that are inclusive and recognize women's contributions to environmental conservation and their need for healthy ecosystems.

Socio-cultural barriers, rooted in traditional gender roles and norms, severely restrict women's participation in decision-making processes. This marginalization prevents women from advocating for policies and practices that address their specific needs and challenges, perpetuating their disempowerment. The GESI framework emphasizes the importance of inclusive governance structures that ensure women's voices are heard, and their rights are protected in climate adaptation and resource management strategies.

Economic barriers, such as limited access to financial resources, education, and training, inhibit women's ability to participate in and benefit from climate adaptation and mitigation initiatives. These barriers prevent women from acquiring the knowledge, skills, and financial means necessary to implement effective strategies, reducing their resilience to climate

impacts. The GESI framework calls for targeted interventions to improve women's access to financial services, education, and capacity-building opportunities.

Institutional barriers, including inadequate policies and a lack of gender-sensitive approaches, result in the systematic exclusion of women from climate adaptation and mitigation efforts. This exclusion not only undermines the effectiveness of these strategies but also perpetuates gender inequalities by failing to address the unique vulnerabilities and contributions of women. The GESI framework underscores the need for institutional reforms that incorporate gender perspectives and promote inclusive policy-making processes.

In conclusion, the intersection of environmental challenges and socio-economic barriers creates a multifaceted impact on women, particularly in resource-dependent communities. Applying the GESI framework reveals the critical need for a comprehensive approach that includes improving resource management to alleviate scarcity and degradation, implementing gender-sensitive policies to ensure women's inclusion in decision-making processes, enhancing access to education, training, and financial resources to empower women to engage in sustainable practices, and challenging socio-cultural norms that marginalize women and limit their participation in climate adaptation efforts. By addressing these critical areas through the GESI lens, it is possible to reduce the adverse impacts on women and enhance their resilience and capacity to adapt to changing environmental conditions.

2. GESI: The Missing Link in Thailand's Climate Change Policy

Thailand is among the most vulnerable countries to the impacts of climate change, ranking ninth in the top 10 countries most affected on the long-term Global Climate Risk Index (CRI) from 2000 to 2019, based on average values of events, recorded fatalities, and economic losses (Eckstein et al., 2019). Over recent decades, Thailand has faced significant challenges due to climate variability and extreme weather events, including record temperatures, more frequent natural disasters such as droughts and floods, and worsening air pollution. These impacts vary considerably across the country's diverse topography and climate patterns. Climate change has profoundly affected the lives of many individuals, businesses, industries, and sectors in Thailand (Marks, 2011).

To address these challenges, climate change is incorporated at the highest policy level under Thailand's National Strategy 2018-2037, alongside other economic and social considerations, including poverty eradication (Office of the National Economic and Social Development Council, 2019). The Climate Change Master Plan 2015-2050 reflects this strategy, focusing on mitigation, adaptation, capacity building, and cross-cutting issues (Office of Natural Resources and Environmental Policy and Planning, 2015). As a party to the United Nations Framework Convention on Climate Change (UNFCCC), Thailand has been implementing the Nationally Appropriate Mitigation Action (NAMA) with a primary focus on the energy and transport sectors (UNFCCC, 2015). Additionally, under the Paris Agreement, Thailand has committed to reducing greenhouse gas (GHG) emissions by 20-25 percent from projected business-as-usual (BAU) levels by 2030 (Thailand NDC, 2020). The National Adaptation Plan (NAP), approved in 2018, targets six priority sectors: water management, agriculture and food security, tourism, public health, human settlements and security, and natural resources management, aiming to minimize risks and increase resilience.

While climate change is integrated into national policies, these policies have failed to adequately address the gender-specific impacts faced by populations reliant on natural resources, particularly women (Rigg et al., 2018). Thailand’s climate policies lack a robust Gender Equality and Social Inclusion (GESI) framework, resulting in the continued

marginalization of women in both decision-making and adaptation efforts. Women, who are disproportionately affected by natural hazards such as droughts and floods, have limited capacity to respond due to social and economic barriers. Without GESI integration, policies will continue to fail to address the unique vulnerabilities women face. Gender inequalities exacerbate the challenges women face, limiting their participation in decision-making processes and labor markets and hindering their ability to fully contribute to climate-related planning and implementation (UN Women, 2018). When disasters strike, women are more likely to be injured or less likely to survive due to disparities in information, mobility, decision-making, and access to resources and training. Post-disaster, women and girls often struggle to access relief and assistance, further threatening their livelihoods, well-being, and recovery, creating a vicious cycle of vulnerability (Enarson, 2012).

The Social Dimension of Climate Change Impacts in Thailand report highlights that climate change significantly affects many economic and social sectors, especially agriculture, which covers 47 percent of the country's land mass and employs one-third of the labor force (Marks, 2015). Climate change disproportionately impacts the poor and already vulnerable populations, including landless farmers, women in marginalized communities, aging farmers, socially isolated groups, and low-paid workers in the informal sector with little social security (Marks & King, 2013). The analysis reveals that although Thailand's national climate policies acknowledge the impacts on these populations, there is a disconnect between policy goals and implementation guidelines concerning poverty reduction, reducing inequalities, and promoting gender equality (Marks, 2017). The human dimension in Thailand's climate policies is poorly defined, lacking clear definitions and criteria for vulnerable groups and strategies or indicators to reduce negative impacts on these groups (Harris, 2019).

Gender and social inclusion (GESI) are crucial yet missing links in Thailand's national climate policies and plans. Initially, government agencies in social sectors were excluded from national coordinating mechanisms on climate change (Marks & Lebel, 2016). The near absence of the CC-GESI linkage in existing policies is reflected in public climate change budgeting. Thailand's public budget formulation and allocation are constrained by narrow mandates across multisectoral reporting authorities (Marks & Lebel, 2016). Despite the integration of climate change into national strategies and plans, these issues are often not widely incorporated into most agencies' functional work, resulting in programs and projects missing the climate change and gender-social dimensions (Harris, 2019).

The United Nations Climate Change Conference 2017 (COP23) adopted a Gender Action Plan to support the implementation of gender-related decisions in the UNFCCC process, focusing on capacity-building, knowledge sharing, gender balance, coherence in integrating gender in UNFCCC bodies, gender-responsive implementation, and monitoring/reporting (UNFCCC, 2017). Thailand's national development strategies emphasize reducing poverty and social inequalities and promoting sustainability. Recent years have seen an increase in policy attention towards Gender Responsive Budgeting (GRB), now a key criterion for budget formation, ensuring equal access to resources for various population groups (Office of the National Economic and Social Development Council, 2019).

Despite acknowledging climate change impacts on poor and vulnerable populations, there remains a gap between policy goals and implementation, particularly in addressing poverty reduction, reducing inequalities, and promoting gender equality. Thailand needs a more integrated and localized approach to tackle chronic poverty and growing inequalities (Rigg et al., 2018). Integrating GESI considerations into climate change plans and budgets will address the differential needs of various population groups, especially the vulnerable, and enable integrated solutions to complex challenges (Harris, 2019).

Finally, the conclusion, to address these challenges and enhance the resilience of rural communities in the Anthropocene, this research recommends integrating gender equality and social inclusion principles into national and local environmental policies. This integration ensures that the specific needs and contributions of women are recognized and addressed, leading to more effective and inclusive policies. Efforts should be made to break down socio-cultural and institutional barriers that prevent women from participating in policy dialogues. Empowering women through education, training, and access to resources can significantly enhance their capacity to engage in sustainable practices and adaptive strategies. Policies must focus on enhancing women's access to financial resources, education, and training. Providing women with the tools and knowledge they need to adopt new technologies and practices can improve their resilience to environmental changes and ensure sustainable livelihoods. Reviewing and revising environmental policies to incorporate gender-sensitive approaches is essential. Policies that consider the unique challenges faced by women and leverage their contributions can lead to more effective and inclusive climate adaptation and mitigation strategies.

The case study of rural women in Chiang Khong district highlights the pressing need for gender-inclusive policies by illustrating how traditional gender roles and social hierarchies shape the challenges these women face. In this community, women bear the primary responsibility for natural resource management, particularly the collection of Kai (river algae), which exposes them to heightened economic and environmental vulnerabilities. These gendered roles limit their participation in decision-making processes related to resource management and climate adaptation. Socio-cultural norms in Chiang Khong, which often marginalize women’s voices, further intensify their exclusion from policy dialogues, leaving them disproportionately burdened during periods of climate-induced stress.

To address these challenges, practical recommendations that can be implemented at both local and national levels are essential to promote community resilience and ensure gender-inclusive climate adaptation strategies, such as:

1) At the local level, the formation of community-led councils with strong female representation is crucial. These councils would empower women to actively participate in decision-making related to natural resource management and climate adaptation. Establishing and supporting women’s cooperatives focused on sustainable livelihood strategies—such as climate-resilient agricultural practices and alternative income-generating activities—will also strengthen their adaptive capacities. In addition, tailored training programs on climate-smart agricultural techniques, water management, and sustainable resource use should be made widely available to enable women to diversify their livelihoods and reduce their vulnerability to climate impacts.

2) At the national level, it is critical to integrate gender-sensitive policies into Thailand’s climate action plans to ensure that women are involved in every stage of policy development, decision-making, and implementation. This should include allocating targeted financial resources and providing rural women with greater access to education, capacity-building programs, and technological resources that enhance their resilience. Collaborations between government agencies, civil society organizations, and NGOs can ensure that rural women’s perspectives and needs are incorporated into national climate strategies, making them more inclusive and effective.

These recommendations are closely aligned with the Sustainable Development Goals (SDGs), particularly SDG 5 (Gender Equality), SDG 13 (Climate Action), and SDG 1 (No Poverty). By promoting inclusive decision-making, enhancing community resilience, and fostering sustainable livelihoods, these actions help build equitable and sustainable

communities that are better prepared to face the challenges of climate change. Empowering rural women in communities like Chiang Khong through gender-sensitive policies not only advances gender equality but also strengthens the overall capacity of communities to respond and adapt to environmental stresses, contributing to broader sustainable development objectives.

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