Cultural Adaptation and Local Wisdom: The Role of Tolaki Women in Sustaining Rice Farming Under Climate Change

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Abstract
This study aims to explore the adaptive strategies of Tolaki women farmers in responding to climate change within the rice farming system in Matabuhu Village, South Konawe, Southeast Sulawesi. The focus is to understand how local women integrate traditional ecological knowledge with modern agricultural innovations to sustain productivity and community resilience. The research employed a qualitative ethnographic approach conducted from March to August 2025. Data were collected through participant observation, in-depth interviews with 20 key informants, and documentation. Thematic analysis was used to identify women's roles across each stage of the rice farming cycle, from land preparation to post-harvest management. The results show that Tolaki women play four central roles: as custodians of ecological knowledge, social mobilizers, adaptive innovators, and architects of local food security. They combine indigenous ecological knowledge with agricultural extension inputs to develop climate-smart practices, strengthen *samaturu* (collective cooperation) and *mosalipue* (mutual assistance), and maintain household food reserves through the *ala* (granary) system. These practices enhance ecological balance, social solidarity, and resilience to climatic uncertainty. This study highlights a community-based model of climate-smart agriculture led by women. The Tolaki women's adaptation model demonstrates that sustainable agriculture under climate pressure depends not only on technology but also on cultural values, gendered knowledge, and collective action—providing valuable insights for inclusive agricultural policy in tropical regions.

Keywords: Climate Change Adaptation, Tolaki Women, Traditional Ecological Knowledge, Food Security, Community-Based Agriculture

1. Introduction

Climate change represents one of the most urgent global challenges affecting multiple sectors of life, particularly those that depend directly on natural resources (Kundzewicz, Z.W., Krysanova, V., n.d.) The Intergovernmental Panel on Climate Change (IPCC) asserts that climate change is not merely a natural phenomenon but also the result of human activities that disrupt the balance of the Earth's ecosystems. Its impacts include rising surface temperatures, irregular rainfall patterns, and the intensification of extreme events such as droughts, floods, and storms (IPCC, 2007). These conditions pose significant challenges to sustainable development, especially in the agricultural sector, which is highly dependent on climate stability and hydrological cycles (Antriyandarti et al., 2024).

In the context of national development, agriculture plays a strategic role as a cornerstone of food security and as a source of livelihood for the majority of rural communities in Indonesia. Approximately 30 percent of Indonesia's workforce remains dependent on the agricultural sector

(BPS, 2024b). Among the various agricultural commodities, rice holds a central position as both a staple food and a key indicator of national food security. However, climate change over the past decade has placed serious pressure on rice production systems. Rising temperatures, shifting rainfall patterns, and the increasing frequency of natural disasters have caused disruptions in planting seasons, declines in productivity, and heightened risks of crop failure (IPCC, 2019).

Empirical evidence shows that the impacts of climate change on rice production have become apparent in many agrarian regions of Indonesia. Southeast Sulawesi Province, for instance, serves as one of the primary food production centers in eastern Indonesia, with a total harvested rice area of approximately 130,000 hectares between January and December 2024, an increase of 14.10 percent compared to 2023(Li, n.d.) (Department of Agriculture and Livestock of Southeast Sulawesi Province., n.d.,2025) However, this growth is not evenly distributed across all areas. Konawe Selatan Regency, known as one of the largest rice-producing centers, has experienced a decline of 3,391 hectares in harvested area over the past five years. This reduction has been influenced by prolonged droughts, shifts in planting seasons, and brown planthopper infestations, collectively reducing productivity by nearly 5 percent (BPS, 2024a).

One of the areas most affected by climate change within Konawe Selatan is Matabuhu Village in Baito Subdistrict, recognized for its rain-fed rice fields. The majority of the population in this village consists of farmers from the Tolaki ethnic community, who practice traditional agriculture rooted in local wisdom (Apriyana et al., 2025). Their heavy dependence on rainfall makes their agricultural system highly vulnerable to climatic variability. In recent years, farmers have faced declining yields due to drought, shifts in planting seasons, and increased pest attacks. These challenges not only threaten land productivity but also endanger household economic stability and local food security (Iswandi, R. M., 2025).

The adaptive capacity of rural communities to climate change is a key determinant of agricultural sustainability (Ismail et al., 2025). Rose, (2017) notes that there are two dimensions of resilience to climate change: inherent and adaptive**.** Inherent resilience reflects the ability of individuals or groups to prepare for unforeseen conditions through careful planning, while adaptive resilience refers to the capacity to adjust through behavioral, technological, and socio-economic changes (Ndamani, F., Watanabe, 2015). This resilience framework is relevant to understanding how local communities, particularly women farmers, develop adaptation strategies to cope with climatic stressors (Antriyandarti et al., 2024). Within the Tolaki community of Matabuhu Village, resilience is reflected through the active role of women in the rice farming system. Tolaki women not only contribute as laborers but also as decision-makers in land management, seed selection, and timing of planting based on seasonal shifts. They employ local adaptation strategies such as the use of drought-resistant varieties, traditional irrigation systems, and collective work (gotong royong) to overcome water scarcity. These practices highlight that the local knowledge of Tolaki women directly contributes to the resilience and sustainability of the rice production system (Sarpin, 2018).

Moreover, Tolaki cultural values such as *mosandukuno* (maintaining harmony among humans, soil, and water) and *mosiwo mombepoko* (cooperation and solidarity) form the moral foundation of sustainable farming practices. These cultural principles strengthen the adaptive capacity of Tolaki women in maintaining ecological balance and social sustainability (Mulyoutami, E., Van Noordwijk, M., & Lusiana, 2019). However, scientific documentation on the socio-cultural contributions of Tolaki women to climate change adaptation remains limited. Most existing research in Southeast Sulawesi focuses on technical aspects of agriculture without adequately exploring gender, social, and cultural dimensions (Desi Permata Sari, Wa Kuasa Baka, 2018).

This research gap underscores the need for studies that integrate gender perspectives, local culture, and climate adaptation to comprehensively understand the dynamics of community food security (Alisha Adhikarim, 2025). Such an approach not only enriches the literature on climate-smart agriculture in Indonesia but also provides empirical foundations for designing context-specific and community-based adaptation policies. Therefore, this study aims to examine the role of Tolaki women in adapting to climate change and their contribution to the sustainability and productivity of rice farming in Matabuhu Village, Konawe Selatan Regency. This research is expected to provide deeper insights into the interrelationship between local knowledge, cultural values, and women's adaptive strategies in building inclusive and sustainable food security in rural areas.

2. Research Method

This study applies a qualitative descriptive ethnographic approach to explore how Tolaki women in Matabuhu Village adapt to climate change through cultural and agricultural practices (Spradley, 2007). Ethnography provides an in-depth understanding of a community's worldview, values, and daily life, uncovering symbolic meanings behind social actions (Putra, 2017). This approach enables a holistic interpretation of the relationship between people, culture, and the environment within the framework of local wisdom and sustainability (Hammersley, M., & Atkinson, 2019). Based on Koentjaraningrat (2009) the study refers to cultural elements such as the natural environment, livelihood systems, language, social organization, knowledge, art, and religious values. These serve as an analytical lens to understand how Tolaki women manage resources and develop adaptive strategies in rice farming. The focus on gender roles and ecological knowledge aligns with the anthropological linkage between culture, environment, and adaptation (Geerts, 1983).

The research subjects consist of *informants* and *social situations* (Maemunah, 2018). Informants include women farmers, group leaders, and customary elders possessing relevant knowledge, while social situations refer to daily agricultural and household activities observed in the community, especially within *Kelompok Wanita Tani* (Women Farmers' Groups). Data were collected through participant observation, in-depth interviews, and documentation (Craswell J. W., 2007). The researcher participated in farming activities—planting, weeding, harvesting—and

observed rituals and social interactions reflecting Tolaki values such as *mosandukuno* (harmony between humans, soil, and water) and *mosiwo mombepoko* (collective cooperation). Interviews explored perceptions of climate variability, adaptation strategies, and the integration of traditional and modern practices.

Data analysis followed an inductive approach, identifying patterns of adaptation derived from observation and interviews (Miles, M. B., Huberman, A. M., & Saldaña, 2014). Interpretation was framed by Tolaki cultural elements—knowledge of weather, kinship relations, economic patterns, and spiritual beliefs—to reveal how local wisdom supports resilience. Triangulation ensured data credibility through cross-checking sources and validating interpretations with key informants (Steward, 1955). Overall, the ethnographic approach allowed this study to portray comprehensively how Tolaki women sustain rice farming amidst climate uncertainty, emphasizing that local wisdom remains a vital foundation for agrarian resilience in Southeast Sulawesi.

3. Results and Discussions

From the conducted research, it was found that Tolaki women play a central role in climate change adaptation strategies within the rice farming sector. Shifts in seasonal and weather patterns have prompted them to adjust planting systems, select drought-resistant rice varieties, and manage water and fertilizer use more efficiently. This chapter discusses Tolaki women and their rice farming systems, the cultural values that influence their adaptation strategies, and the various forms of their contributions in maintaining the sustainability and productivity of rice farming in Matabuhu Village, South Konawe.

Tolaki women in Matabuhu Village occupy a highly significant position within the traditional shifting cultivation system. At every stage of production—from land selection to post-harvest management—they play a central role not only as laborers but also as custodians of cultural values and local ecological knowledge. The process of land preparation carried out by Tolaki women can be described as follows:

3.1. Land Selection Stage (*Monggiki Ando'olo)*

In the initial stage of *monggiki ando'olo* (land selection), women actively participate in determining which land will be cultivated for rice. They rely on natural indicators passed down through generations, such as the falling of teak leaves or the appearance of ground ants, to signify that the land is ready for cultivation. As one farmer woman, Mrs. Rini (48 years old), explained: *"When many ants come out of the soil and teak leaves begin to fall, it means the land is dry and ready to beworke*d." This practice of reading natural signs reflects a form of traditional ecological knowledge that guides local decision-making in agriculture.

These findings align with ecofeminist theories articulated by (Shiva, 1988), who argue that women in agrarian societies possess a spiritual and ecological closeness to nature because of their direct involvement in food production. Women's knowledge of natural cycles is not merely

empirical practice but also a manifestation of a symbolic relationship between humans and the environment (Mies, M., & Shiva, 1993). In the context of Tolaki women, their ability to interpret ecological signs exemplifies what Berkes (1999) calls *traditional ecological knowledge*—a system of understanding born from long-term interaction between communities and their ecosystems, transmitted collectively across generations.

The results also correspond with findings by Saediman, M A Limi, Y Indarsyih (2020) in Konda Regency, South east Sulawesi, which showed that women farmers possess a keen ability to read microclimatic changes in their surroundings, particularly in determining planting and fertilization times. Similarly, Hastuti, E., Ndoen, E. T., & Londa, (2022) found in East Nusa Tenggara that women play a decisive role in determining cropping patterns during climate anomalies. Thus, the phenomenon in Matabuhu Village underscores the gender dimension of agricultural adaptation to climate change, consistent with the *Gender and Climate Change Adaptation Framework* which identifies women as key community-based adaptation agents (Limpo et al., 2022).

Beyond its ecological significance, this land selection practice also embodies Tolaki socio-cultural values such as *mosandukuno* (living in harmony with nature) and *mosalipue* (mutual cooperation and helping one another). These principles reinforce collective decision-making and reflect what Ostrom (2009) refers to as *community-based resource governance*, a system of managing resources effectively through social norms and collective trust. In this context, Tolaki women serve as vital connectors between cultural values, the environment, and agricultural production.

3.2. Land Cultivation Stage (*Motasu)*

The *Motasu* or planting stage represents the core of the traditional upland rice farming cycle, marking the beginning of new life on cultivated land. Among the Tolaki community in Matabuhu Village, this activity is not merely technical but also deeply symbolic and spiritual. Women play a central role throughout the *motasu* process, from seed selection and planting distance determination to leading ritual practices before planting begins. They are believed to have a spiritual connection with the earth (*wuta*), which makes them the most appropriate figures to "awaken" life in the newly prepared soil.

According to interview findings, women usually lead a simple ritual before planting, known as *mepora wuta*—a traditional prayer ceremony honoring the earth to seek fertility and protection for the crops. As one respondent, Mrs. Nining (37), explained:

> *"Before planting, we take a handful of seeds and pray. We believe rice has a spirit, so it must be respected. If not, it might 'get angry' and refuse to grow well."*

This statement reflects the women's understanding of spiritual ecology, a system of values viewing nature not as an object of production but as a living entity possessing a moral relationship with humans. Such understanding aligns with ecofeminist theory (Mies, M., & Shiva, 1993) which places women as guardians of ecological harmony. According to this perspective, women's agrarian experiences shape a heightened ecological consciousness, arising from their direct interaction with natural elements such as soil, water, and seeds.

The integration of local wisdom and scientific knowledge in this context represents what Jasanoff (2004) and Tengö et al. (2014) describe as co-production of knowledge, where traditional female knowledge collaborates with modern science to create a more adaptive and sustainable agricultural system. In the era of climate change, this ability to combine both knowledge systems positions women as key agents in the implementation of climate-smart agriculture (Food and Agriculture Organization of the United Nations (FAO)., 2018). Beyond its ecological and epistemic dimensions, motasu also embodies strong social values that reinforce community solidarity. The planting process is carried out through samaturu—collective cooperation among households where women coordinate labor division and synchronized planting schedules to ensure uniform crop growth and ease of management. As Mrs. Wati (42) noted:

> *"We invite our neighbors to help, and the next day we return the favor. That's what we call samaturu."*

Through this practice, women not only optimize labor efficiency but also ensure that planting aligns with increasingly unpredictable rainfall patterns. This illustrates the social function of mutual cooperation (*gotong royong*) as a mechanism for strengthening community cohesion, echoing (Putnam, 2000) *social capital* theory, which emphasizes that social networks and mutual trust form the foundation of collective success in rural development (Saefullah, 2017). From the perspective of the *participatory knowledge framework* (Chambers, 1994) the active involvement of women in the planting stage demonstrates genuine participation in agricultural resource management. Women's knowledge is not merely recognized but becomes the foundation for designing technical innovations and guiding collective decision-making at the village level. Thus, Tolaki women are not passive recipients of innovation but rather *producers of adaptive knowledge* who bridge tradition and science, ensuring that their farming system remains resilient, collaborative, and ecologically balanced amid the challenges of climate change (Chambers, 2004).

3.3. Crop Maintenance Stage (*Mosaira* and *Mete'ia*)

In the crop maintenance stage (*mosaira* and *mete'ia*), Tolaki women play a crucial role as natural weather observers and ecological pest managers. They conduct daily field monitoring, observing weather patterns, humidity levels, and the condition of rice leaves and stems to detect signs of environmental stress. This activity highlights their capacity as *local climate observers*—

individuals who closely monitor microclimatic changes and contribute directly to adaptive decision-making at the community level.

As described by Mrs. Tini (44 years old):

> *"Nowadays pests appear earlier because of prolonged heat. We used to use papaya leaves and lemongrass for natural sprays. Now, we mix them with the liquid from agricultural training—it lasts longer."*

This statement illustrates a process of *knowledge hybridization,* the blending of traditional ecological knowledge with scientific innovations introduced through agricultural extension programs. Rather than rejecting new technology, women adapt and integrate it with local wisdom that has long proven ecologically effective. This dynamic interaction reflects the *co-production of knowledge* concept (Jasanoff, 2004; Tengö et al., 2014), where local communities and scientific knowledge systems collaborate to develop context-specific solutions to environmental challenges. In this sense, Tolaki women serve as essential bridges between tradition and innovation.

The role of women in weather monitoring and pest control also reflects the dimension of *socio-ecological resilience* described by (Berkes, 1999). Berkes, F., & Folke (2000), said Resilience here refers not only to the ecological system's ability to withstand disturbances but also to the social system's capacity to learn and adapt. Through routine observation, manual recording, and inter-group communication among women farmers, Tolaki women establish a *social learning system,* a mechanism that enables them to anticipate seasonal shifts and implement adaptive measures collectively (Pérez et al., 2017). This finding in Nigeria, both of which demonstrate that women farmers play a vital role in building *early warning systems* based on local knowledge (Nyong et al., 2007). They can detect climatic changes earlier by observing plant behavior, rainfall patterns, and pest emergence.

In the Tolaki context of Matabuhu Village, this role is vividly evident—women act not only as technical implementers but also as *data recorders* who track microclimatic changes more accurately than formal reports. Local agricultural extension officer Sarno (45) acknowledged the significance of their observations, noting that such field-based information provides valuable input for planting schedule planning. Through their continuous engagement, Tolaki women exemplify a form of *grassroots resilience science*—where experiential knowledge, collective learning, and gendered environmental awareness converge to sustain agricultural productivity in the face of an increasingly unpredictable climate (Desi Permata Sari, Wa Kuasa Baka, 2018).

3.4 Harvest Season Stage (*Mosowi*)

During the *mosowi* or harvest season, the role of Tolaki women in Matabuhu Village becomes even more prominent. They are not only physically involved in harvesting rice but also act as the social and spiritual orchestrators of the entire process. For the Tolaki community, the harvest represents more than agricultural success—it is a sacred moment to celebrate harmony

between humans, nature, and the Creator. Women determine the timing of the harvest based on ancestral ecological indicators, such as the full yellowing of rice grains, the hardening of stalks, and the warm sea breeze signaling the arrival of harvest time. This practice demonstrates the continuity of ecological knowledge passed down through generations. As Mrs. Lilis (50) explained:

> *"When the grains turn golden and the wind from the sea feels warm, that's the sign to harvest. We work together as one big family. After the first harvest, we cook and eat together to thank the earth."*

This statement reflects the interconnection between ecological knowledge, social solidarity, and agrarian spirituality. According to *cultural ecology theory* (Steward, 1955), the relationship between humans and their environment is not purely material but guided by cultural value systems that shape how people adapt to their ecosystems. In Tolaki society, women maintain the balance between economic activities and moral values that preserve harmony with nature. Their knowledge of natural signs serves as an *ecological calendar system*, helping the community determine accurate planting and harvesting times.

The harvest process in Matabuhu is carried out through *samaturu*, a traditional form of collective labor involving extended families and neighbors in cutting, tying, and drying the rice. After the first harvest, the community holds a communal meal called *mosoha* as an expression of gratitude for the earth's blessings. This tradition embodies the principle of *reciprocity* (Sulastri, 2018) where mutual assistance, food sharing, and collective labor are expressions of solidarity and respect. Women play a central role in maintaining this reciprocal system by organizing labor distribution and ensuring fair allocation of harvest yields among participants.

From the perspective of *social capital theory* Putnam (2000) *mosowi* functions as a key arena for strengthening trust and cooperation within the community. Core Tolaki values such as *mosalipue* (mutual help) and *mosandukuno* (living in harmony with nature) serve as moral mechanisms that reinforce social cohesion. Women, as logistics coordinators and ritual custodians, play a strategic role in sustaining *trust* and *bonding capital* among community members. The local agricultural extension officer in Matabuhu confirmed this by noting that even though some farmers now use modern tools such as sickles or mini threshers, "the spirit of *gotong royong* (collective cooperation) remains at the heart of Matabuhu's agricultural system (Meinzen-dick et al., 2014).

Field observations in Matabuhu also reveal a strong dimension of *gendered leadership* during harvest time. Women serve as primary coordinators for labor division, harvest scheduling, and *mosoha* organization. They decide when to begin harvesting, who participates, and how the yields are distributed. Research by shows that women's participation in agricultural decision-making directly improves efficiency and equity in resource distribution. A similar pattern is seen in Matabuhu, where women's leadership ensures that both labor and rewards are valued fairly—strengthening family and community harmony (Syarah et al., 2017).

The *mosowi* and *mosoha* traditions also function as mechanisms of cultural transmission. Young girls typically accompany their mothers during the harvest, learning how to read ecological signs, cut rice properly, and uphold the values of cooperation in collective labor. Thus, the harvest season becomes a living classroom for ecological and social education, reinforcing Tolaki identity and continuity. This aligns with *enculturation theory* (Haviland, W. A., Prins, H. E. L., Walrath, D., & McBride, 2014) which posits that cultural values and practices are transmitted through direct participation in communal and ritual activities.

Similar findings have been documented in other agrarian regions. Studies by (Rafi & Mada, 2024) in Central java found that women farmers play dominant roles in organizing harvests and post-harvest social activities. They act as the nucleus of social networks, ensuring that solidarity and togetherness remain strong despite technological changes in agriculture.

In Matabuhu, even as modern harvesting tools are gradually introduced, women continue to be the driving force preserving the *samaturu* spirit—the foundation of social harmony in Tolaki society. Therefore, the *mosowi* stage is not only a phase of agricultural production but also a site of *social and cultural reproduction*. Tolaki women stand as the symbolic link between work, prayer, and life itself ensuring that rice cultivation yields not only food but also strengthens the spiritual and social bonds of their community (Desi Permata Sari, Wa Kuasa Baka, 2018).

3.5. Post-Harvest Stage (*Mowiso i Ala*)

The *mowiso i ala*, or post-harvest stage, represents the final phase in the rice cultivation cycle of the Tolaki community in Matabuhu Village. In this stage, women play a central role as managers of harvest yields and coordinators of the household food system. They are responsible for the entire post-harvest process—from drying and pounding the rice to storing it in the *ala* (granary) and managing the distribution of rice for household and social needs. These activities are far from merely domestic; they highlight women's strategic position as guardians of the subsistence economy and the community's food security system.

As Mrs. Ani (46) explained:

> *"When the harvest is small, we share it with our neighbors so everyone can cook. It's our custom—no one should go hungry."*

This statement reflects the strong moral dimension embedded in post-harvest activities. Sharing the harvest is not merely an act of generosity but a *social obligation* that maintains balance and cohesion within the community. This aligns with(Scott, 2000)) concept of the *moral economy*, which posits that traditional agrarian economies are governed by social norms of fairness and solidarity rather than by market logic or profit accumulation. In the Tolaki context, women serve as custodians of this moral order, ensuring that harvest yields are used for the collective good and preventing social inequality among villagers.

From the perspective of *subsistence economy* (Pedersen, 2010) women's post-harvest management reflects an economy oriented toward basic needs rather than commercialization. The rice stored in the *ala* serves multiple functions: as a household food reserve, as seed for the next planting season, and as a social resource to support others during lean periods. Thus, the *ala* functions not only as an economic structure but also as a *symbolic institution*—a marker of family stability, honor, and prosperity. As managers of the *ala*, women hold authority over the sustainability of the community's food system.

Within the *gendered food security framework* (Food and Agriculture Organization of the United Nations (FAO), 2018) women play vital roles in the four pillars of food security—*availability*, *access*, *utilization*, and *stability*. The activities of Tolaki women in *mowiso i ala* illustrate their involvement in all four aspects. They ensure food availability through stock planning, manage household food access through internal sharing systems, enhance utilization by diversifying food preparations, and maintain stability by storing reserves to anticipate crop failure or famine. In this way, women act as *architects of local food security*, ensuring household resilience amid climatic uncertainty.

Beyond food management, *mowiso i ala* also reveals women's role as mediators of community solidarity. The tradition of sharing harvest yields with less fortunate neighbors embodies the Tolaki principle of *mosalipue* (mutual assistance), the moral foundation of Tolaki social life. Women not only distribute rice but also strengthen inter-household social networks through empathy and collective responsibility. As explained by *social reciprocity theory* such acts of giving create enduring relationships based on trust and moral obligation. Thus, Tolaki women serve as *social binders* who sustain community harmony (Haviland, W. A., Prins, H. E. L., Walrath, D., & McBride, 2014).

Ecologically, women are also responsible for maintaining the quality of stored rice. They use natural drying methods—sunlight exposure and open-air circulation—to preserve the aroma and quality of local rice varieties. For storage, they add dried leaves such as pandan and lemongrass to repel insects without using synthetic chemicals. These practices reflect a deep understanding of *indigenous agroecology* applying local ecological principles to sustain food quality and environmental health (Hanawa et al., 2015).

The post-harvest stage also carries profound spiritual significance. The act of storing rice in the *ala* is often accompanied by prayers of gratitude and hope that the harvest will bring prosperity to the family. In Tolaki cosmology, the *ala* symbolizes the "womb of life"—a sacred space where seeds are preserved for the rebirth of the next planting cycle. Thus, women bear not only economic and social responsibilities but also symbolic ones, serving as *guardians of life continuity* itself.

Ethnographic studies support these findings. Adiyoga, W., & Sumarno (2018) in South Sulawesi found that women hold primary responsibility for seed and food storage, as they best understand household needs and environmental conditions. Similarly, Puspitawati (2019) noted that women farmers play central roles in deciding when harvest yields are used, sold, or stored.

Therefore, post-harvest management is not merely a domestic activity but an integral part of the community's *economic and ecological resilience system*.

From the lens of the *sustainable livelihood framework*(Chambers, 2004) ,*mowiso i ala* exemplifies how women manage productive assets (harvest yields) to sustain long-term household and community welfare. Through local knowledge, social networks, and cultural values, they build a *sustainable livelihood system* that remains resilient in the face of climatic and market fluctuations. In essence, Tolaki women's roles in *mowiso i ala* demonstrate a sophisticated integration of economic, ecological, moral, and spiritual dimensions—ensuring that rice is not only a source of sustenance but also a symbol of solidarity, sustainability, and life itself.

4. Conclusion

This study affirms that the adaptation strategies of Tolaki women to climate change within the rice farming system of Matabuhu Village, South Konawe, represent a tangible integration of local wisdom and modern innovation. Their adaptive practices extend beyond productivity enhancement, encompassing the preservation of social, ecological, and spiritual values that underpin community sustainability. Tolaki women play a central role throughout the entire agricultural cycle as custodians of ecological knowledge by interpreting natural signs to determine planting and harvesting times, demonstrating adaptive capacity rooted in traditional ecological knowledge. They also act as social mobilizers through the practice of *samaturu* (collective cooperation) and *mosalipue* (mutual assistance), strengthening community solidarity through joint labor and shared harvest systems that reflect the concepts of social capital (Putnam, 2000) and moral economy.

In addition, Tolaki women function as adaptive innovators by developing botanical pesticides, organic fertilizers, and climate-resilient planting strategies that integrate local knowledge with agricultural extension innovations, illustrating a clear process of knowledge co-production. They also serve as architects of local food security by managing post-harvest storage (*ala*), organizing household food stocks, and establishing social safety systems grounded in humanitarian values aligned with the gendered food security framework. Therefore, the sustainability of rice farming under climate stress does not rely solely on technological innovation but is strongly supported by enduring cultural values, social solidarity, and women's leadership in maintaining ecological balance. This adaptation model exemplifies a community-based climate-smart agriculture approach and offers a relevant framework for promoting sustainable agricultural development in tropical regions such as Southeast Sulawesi.

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