Adaptive Governance Research

e-ISSN 3063-0878 (online)

Volume 2, Issue 2 2025
Page 114-129

https://doi.org/10.71435/685962

# Building Community Resilience through Adaptive Governance: A Socio-Ecological Approach to Environmental Change

**Mahturai Rian Fitra[1], Wiwiet Wulandari[1]**

[1]Environmental Science Study Program, Sriwijaya University, Indonesia

**ARTICLE INFO**

**Received: 10 August 2025**
**Revised: 07 October 2025**
**Accepted: 02 December 2025**
**Available online: 06 December 2025**

**Keywords:**
Adaptive Governance
Community Resilience
Socio-Ecological Approach
Climate Change

**Corresponding Author:**
Mahturai Rian Fitra

Email:
mahturairf@gmail.com



ABSTRACT

***Purpose**: This study aims to examine the role of adaptive governance in building community resilience to environmental change in South Sulawesi, Indonesia, by using a socio-ecological approach. It focuses on how governance structures, local knowledge, and multi-stakeholder collaboration can enhance community resilience in response to deforestation, climate change, and resource overexploitation.*

***Subjects and Methods:** The research adopted a mixed-methods approach, combining qualitative data from semi-structured interviews and focus group discussions (FGDs) with quantitative survey data. A total of 30 key informants from local communities, government, and NGOs were interviewed, and a survey was conducted among 200 households across different regions in South Sulawesi. The qualitative data were analyzed using thematic analysis, while the quantitative data were analyzed through descriptive statistics.*

***Results:** The findings highlight that adaptive governance frameworks, which emphasize local knowledge, stakeholder collaboration, and multi-level participation, are crucial for fostering resilience. However, the study also identified significant barriers to effective implementation, including political fragmentation, limited institutional capacity, and resistance to change in some communities. Despite these challenges, community-led initiatives, such as coastal management and ecosystem restoration, were found to enhance local resilience and demonstrate the potential of adaptive governance.*

***Conclusions:** This research underscores the importance of adaptive governance in addressing environmental challenges in socio-ecologically complex regions like South Sulawesi. The study emphasizes the need for inclusive, flexible, and locally relevant governance strategies. Future research should focus on expanding adaptive governance models and exploring the sustainability of community-driven adaptation efforts.*

## INTRODUCTION

The increasing threats posed by environmental change, exacerbated by human activities, have prompted an urgent need for adaptive governance strategies that can foster resilience within communities (Haque & Doberstein, 2021; Moore & Schindler, 2022). South Sulawesi, an Indonesian province characterized by a diverse socio-economic structure and rich natural resources, is facing significant environmental challenges. These include deforestation, land degradation, climate change impacts, and the overexploitation of natural resources. These

challenges are not only ecological but also socio-political, as they impact the livelihoods of local communities who depend on agriculture, fisheries, and other natural resources for their survival.

According to Biswas & Nautiyal (2023) and Twinomuhangi et al. (2023), environmental change, therefore, is not a singular issue but a complex interplay of ecological degradation and socio-economic vulnerabilities. Consequently, building community resilience to environmental change is critical in addressing these interconnected challenges (Dushkova & Ivlieva, 2024; Imperiale & Vanclay, 2021). Recent studies have shown that traditional governance mechanisms, often centralized and top-down, are no longer effective in managing the complex dynamics of environmental change (Ouyang et al., 2020; Shinn, 2016). Adaptive governance, which emphasizes flexibility, local participation, and collaborative decision-making, has emerged as a promising approach to enhancing resilience at the community level.

This concept focuses on the ability of systems whether ecological, social, or institutional to adjust and transform in response to shifting environmental conditions and socio-economic pressures. A socio-ecological perspective on governance integrates both the social and ecological dimensions, acknowledging that human communities and ecosystems are interconnected and must be managed in tandem to achieve long-term sustainability (Berkes, 2017; Rabbi, 2025). The need for adaptive governance in the context of South Sulawesi is critical, given the province's vulnerability to both environmental degradation and the effects of global climate change.

The central issue addressed by this study is the lack of effective governance structures in South Sulawesi that can foster resilience in local communities. Despite growing recognition of the importance of adaptive governance, the implementation of such frameworks in regions like South Sulawesi remains limited. This research seeks to examine how adaptive governance can be designed and applied in South Sulawesi to build community resilience in the face of ongoing environmental change. The study will focus on identifying the barriers to adaptive governance in the region and exploring strategies for overcoming these barriers.

Furthermore, it will investigate the role of local knowledge and practices in shaping adaptive governance strategies that are contextually relevant and culturally appropriate. Recent literature has pointed out several general approaches to addressing the governance challenges posed by environmental change. Nagendra & Ostrom (2012) framework for governing the commons emphasizes the importance of local communities in managing common-pool resources. According to Ostrom, sustainable management is best achieved when communities are given a central role in decision-making, supported by flexible, polycentric governance structures.

This approach contrasts with centralized, top-down governance models that often fail to address the nuanced needs of local communities. In line with this, Foxon et al. (2009) advocates for adaptive management, which emphasizes iterative learning, stakeholder participation, and the integration of feedback mechanisms in the management of environmental systems. These general frameworks provide valuable insights into how governance can be adapted to better suit the dynamic and unpredictable nature of environmental change, but they remain largely theoretical when applied to specific regional contexts such as South Sulawesi.

One solution to these governance challenges is the development of adaptive governance structures that integrate both ecological and social resilience (Adebayo, 2025; Pacoma et al., 2025). Recent studies have underscored the importance of multi-level governance systems in managing environmental change, particularly in regions with complex social and ecological systems (Glaser & Glaeser, 2014). By adopting a multi-level approach, governance structures can more effectively address the needs of local communities while incorporating broader regional and national policies. Furthermore, the integration of local knowledge and participatory decision-making processes has been identified as a crucial component of adaptive governance frameworks (Klenk et al., 2017).

This approach not only empowers local communities but also ensures that governance strategies are rooted in the lived experiences of those most affected by environmental changes. In the context of South Sulawesi, adaptive governance solutions must be tailored to the unique socio-ecological conditions of the region. The province's diverse cultural and ethnic makeup, coupled

with its reliance on natural resource-based industries, necessitates a governance approach that is both flexible and context-specific.

The involvement of indigenous communities in decision-making processes has been shown to improve the effectiveness of conservation efforts, as these communities possess deep-rooted knowledge of local ecosystems and sustainable practices. This underscores the importance of recognizing indigenous knowledge systems in the design of adaptive governance frameworks. Moreover, studies suggest that the creation of locally managed conservation areas, where communities have authority over resource use, can enhance both environmental and social resilience (Delgado-Serrano et al., 2018).

These insights from the literature offer promising pathways for developing adaptive governance in South Sulawesi, but further research is needed to understand how these solutions can be operationalized in the region. While adaptive governance frameworks have been extensively discussed in the literature, a gap remains in applying these frameworks in the specific context of South Sulawesi, where environmental changes are rapid and socio-economic vulnerabilities are high. Despite the potential for adaptive governance to enhance community resilience, little research has been conducted on how these models can be implemented effectively in Indonesian provinces like South Sulawesi.

The role of local institutions and the integration of traditional governance structures with adaptive management practices remain underexplored. Addressing these gaps is critical to advancing our understanding of adaptive governance and its role in fostering resilience in regions experiencing significant environmental challenges. This study aims to fill these gaps by providing a comprehensive analysis of how adaptive governance can be implemented in South Sulawesi to build community resilience. The specific objectives of this research are to identify the barriers to adaptive governance in the region, explore strategies for overcoming these barriers, and assess the role of local knowledge and institutions in shaping governance practices.

The study will contribute to the development of practical, context-specific solutions for enhancing resilience in South Sulawesi. This research is novel in its approach, as it combines a socio-ecological perspective with an in-depth exploration of local governance structures in a region that is both ecologically sensitive and socially diverse. The findings of this study are expected to inform policy decisions and provide insights for practitioners working to implement adaptive governance strategies in similar socio-ecological contexts.

The implementation of adaptive governance in South Sulawesi offers a promising path forward for building community resilience in the face of environmental change. By integrating local knowledge, fostering multi-level governance, and ensuring the active participation of communities, adaptive governance can contribute to more sustainable and effective responses to environmental challenges. This research, through its focus on the socio-ecological dynamics of South Sulawesi, aims to provide valuable insights into how adaptive governance can be tailored to meet the specific needs of local communities while addressing broader environmental concerns.

## METHODOLOGY

This study adopts a socio-ecological approach to understanding the dynamics of community resilience and adaptive governance in the context of environmental change in South Sulawesi. The primary aim of this research is to explore how adaptive governance frameworks can be applied to strengthen the resilience of local communities in the face of environmental challenges. This section outlines the research design, data collection methods, data analysis techniques, and the rationale for the chosen methodology. The study's methodological approach integrates both qualitative and quantitative research strategies to offer a comprehensive analysis of the issue at hand.

### Research Design

The research design for this study is primarily based on an exploratory case study approach, focusing on the application of adaptive governance in building community resilience in South Sulawesi. A case study approach is particularly suitable for understanding complex social

phenomena within real-life contexts (Annamalah, 2024). In this case, South Sulawesi serves as a relevant case due to its vulnerability to environmental change, diverse socio-economic landscape, and the ongoing efforts to adapt governance structures to better address these challenges. According to Schlüter et al. (2019), case studies are valuable for providing in-depth insights into specific contextual factors and for examining the interactions between different elements of a socio-ecological system. This research will thus explore the interaction between environmental changes, governance practices, and community resilience, with a specific focus on the mechanisms of adaptive governance. The study follows an integrated approach that combines both qualitative and quantitative methods, which enables the researcher to gain a more comprehensive understanding of the complex issues involved. This mixed-methods approach allows for the triangulation of data, enhancing the reliability and validity of the research findings (Creswell, 2014). The qualitative component provides in-depth insights into local experiences, perceptions, and governance practices, while the quantitative component allows for statistical testing of relationships between variables, offering generalizable data to support or refine theoretical frameworks.

## Research Setting

South Sulawesi is selected as the research setting for several key reasons. First, the province is experiencing significant environmental changes, including deforestation, climate variability, and degradation of natural resources, making it an ideal context for studying adaptive governance in the face of such challenges. Second, South Sulawesi is a socio-ecologically diverse region, home to various ethnic groups, indigenous communities, and economic practices, which provides a rich setting for examining how different communities respond to and adapt governance structures in the face of environmental change (Burch et al., 2014). The province's rural and urban areas both face unique but interconnected environmental challenges, providing a dynamic backdrop for understanding the complexities of governance adaptation.

## Population and Sampling

The study's population consists of local communities in South Sulawesi who are directly impacted by environmental change, as well as key stakeholders involved in governance processes. These include community leaders, indigenous groups, local government officials, and environmental organizations. As the research is focused on understanding local-level resilience and governance practices, the sample was chosen based on purposive sampling. According to Ames et al. (2019), purposive sampling is appropriate when the researcher aims to focus on specific characteristics of a population that are relevant to the study's objectives. In this case, the sample includes individuals who have direct experience with environmental change and governance in their respective areas. The sample size for the qualitative component includes approximately 30 key informants, consisting of a mix of community leaders, government officials, and representatives from non-governmental organizations (NGOs). This sample is sufficient to provide diverse perspectives on governance practices and community resilience in response to environmental challenges. For the quantitative component, a survey will be distributed to 200 households across different regions of South Sulawesi. The survey will focus on measuring community perceptions of resilience, adaptive capacity, and the effectiveness of governance structures. The sample size for the survey was determined based on standard statistical calculations for surveys with an unknown population size, ensuring that the data collected will be statistically significant (Bolarinwa, 2020).

## Data Collection Methods

Data collection in this study will be carried out using a combination of qualitative and quantitative methods. These methods are designed to gather rich, contextual information while also providing quantifiable data to test the research hypotheses.

## Qualitative Data Collection

The qualitative data will be collected through semi-structured interviews and focus group discussions (FGDs). Semi-structured interviews will allow the researcher to gather in-depth, narrative data from key informants about their experiences with adaptive governance and

community resilience. These interviews will explore themes such as local perceptions of environmental change, governance practices, the role of local knowledge, and the effectiveness of current adaptation strategies. Semi-structured interviews are particularly valuable for capturing detailed insights into individuals' experiences and perspectives, providing nuanced data that is difficult to obtain through other methods. In addition to interviews, focus group discussions will be conducted with community members, including indigenous leaders, local farmers, and women's groups. FGDs are useful for exploring collective understandings and social dynamics within communities, as they provide a platform for participants to share their views, engage in dialogue, and reflect on shared experiences. The FGDs will focus on understanding community-level responses to environmental change, governance structures, and strategies for building resilience.

### Quantitative Data Collection

The quantitative data will be collected through a structured survey designed to assess community perceptions of resilience and adaptive governance. The survey will be administered to households in selected regions of South Sulawesi. It will include questions related to the effectiveness of local governance structures, the perceived impacts of environmental change, and the adaptive capacity of the community. The survey will use Likert scale questions to quantify perceptions of resilience and governance, allowing for statistical analysis of the relationships between different variables. The survey will also include demographic questions to capture variations in responses based on factors such as age, gender, income level, and educational background. This will enable the researcher to analyze how different socio-economic factors influence perceptions of adaptive governance and resilience. The data collected will be analyzed using statistical software to perform descriptive statistics, and regression modeling, providing insight into the key factors that influence community resilience in response to environmental challenges.

### Data Analysis Techniques

The qualitative data collected from interviews and focus groups will be analyzed using thematic analysis. Thematic analysis, as described by de et al. (2021), involves identifying, analyzing, and reporting patterns (themes) within the data. This method will allow the researcher to examine the underlying meanings and insights that emerge from the interviews and FGDs, providing a deep understanding of how communities in South Sulawesi perceive and respond to environmental change and adaptive governance. For the quantitative data, descriptive statistics will be used to summarize the responses from the survey, providing an overview of community perceptions of resilience and governance. The quantitative data were analyzed using descriptive statistics to summarize respondents' perceptions regarding governance effectiveness, adaptive capacity, and socio-ecological resilience.

### Ethical Considerations

Ethical considerations in this study include ensuring informed consent, maintaining confidentiality, and protecting the privacy of participants. All participants will be fully informed about the purpose of the research, the voluntary nature of participation, and their right to withdraw at any time without penalty. Informed consent forms will be provided, and participants will be assured that their responses will be kept confidential and used solely for research purposes. Additionally, the research will adhere to ethical guidelines for research involving human subjects as outlined by the institutional review board (IRB) and relevant ethical committees.

## RESULTS AND DISCUSSION

This section presents the results of the research conducted on the application of adaptive governance to build community resilience in South Sulawesi. The findings are organized according to the research objectives, focusing on the effectiveness of governance structures, community resilience, and the socio-ecological factors that shape these dynamics. The results are derived from both qualitative and quantitative data collected through interviews, focus group discussions (FGDs), and surveys. These findings are discussed in relation to the literature

reviewed in the introduction, and where applicable, are linked to existing theoretical frameworks of adaptive governance and resilience.

**Community Perceptions of Environmental Change**

The qualitative data collected through interviews and focus group discussions revealed a strong awareness among communities in South Sulawesi regarding the environmental changes they are experiencing. These changes are primarily associated with deforestation, soil degradation, and the negative impacts of climate change, such as irregular rainfall patterns and rising temperatures.

> *"Over the past several years, we have experienced major changes in seasonal patterns that directly affect agricultural production. Rainfall is becoming increasingly unpredictable, while dry seasons are lasting longer than before. Many farmers in our village have failed to determine the correct planting season because climate conditions are no longer stable. Water availability has also declined significantly during the dry season, forcing some households to purchase clean water from neighboring areas. These environmental changes are not only affecting our income but also creating uncertainty regarding food security and household sustainability."* (Participant 3, Local Farmer, Maros Regency)

The interview findings indicate that agricultural communities are among the most vulnerable groups affected by climate variability and water scarcity. Participants consistently emphasized that environmental uncertainty has disrupted traditional farming patterns and reduced household economic stability. Many participants expressed concerns about the shrinking availability of natural resources, such as water and arable land, which are essential for their livelihoods, particularly for farmers and fishermen. According to Wilson (2014), such environmental changes pose a direct threat to community resilience, as they undermine the resource base upon which local communities depend. In coastal areas, environmental degradation was perceived as having a direct impact on fisheries productivity and settlement safety. Coastal communities highlighted increasing exposure to extreme weather conditions and ecosystem degradation as major challenges affecting their daily livelihoods.

> *"The coastal environment has changed considerably during the last decade. Fish catches are decreasing because sea conditions are becoming more extreme and difficult to predict. Fishermen often face strong waves and storms that limit fishing activities for several days. Mangrove degradation has also reduced coastal protection, making several settlements more vulnerable to tidal flooding. Community members increasingly realize that environmental degradation is closely related to climate change and unsustainable resource exploitation occurring around coastal areas."* (Participant 7, Fisherman and Community Leader, Pangkep Regency)

The findings further demonstrate that environmental degradation is not only viewed as an ecological issue but also as a social and cultural concern. Several participants explained that land conversion and declining environmental awareness among younger generations have weakened traditional environmental conservation practices within local communities.

> *"In our community, many people have started to notice that environmental conditions are no longer the same as before. Forest areas near the village have decreased because of land conversion and illegal logging activities. This situation has affected water springs and agricultural productivity. Some residents are concerned because younger generations are becoming less interested in preserving the environment. Although environmental awareness has improved, communities still need stronger support from local governments to implement sustainable environmental programs effectively."* (Participant 11, Indigenous Community Representative, Bone Regency)

The interviews also revealed that environmental change has disproportionately affected vulnerable social groups, particularly women in rural communities. Participants emphasized that women frequently bear additional responsibilities related to water management, household food security, and family welfare during environmental crises.

> *"Extreme weather events are becoming more frequent in this region. Floods now occur more often during the rainy season, while prolonged droughts affect agricultural production during dry periods. Women in rural communities are particularly affected because they are responsible for managing household water and food supplies. Environmental stress has increased household economic burdens and created additional social challenges within families. Many residents believe that environmental adaptation programs should involve local communities more actively in planning and implementation processes."* (Participant 15, Women's Group Representative, Takalar Regency)

The qualitative findings demonstrate that communities in South Sulawesi possess a high level of awareness regarding environmental change and its socio-economic consequences. The recurring themes identified through interviews and FGDs indicate that climate variability, environmental degradation, and resource scarcity have become critical concerns influencing local resilience and adaptive capacity.

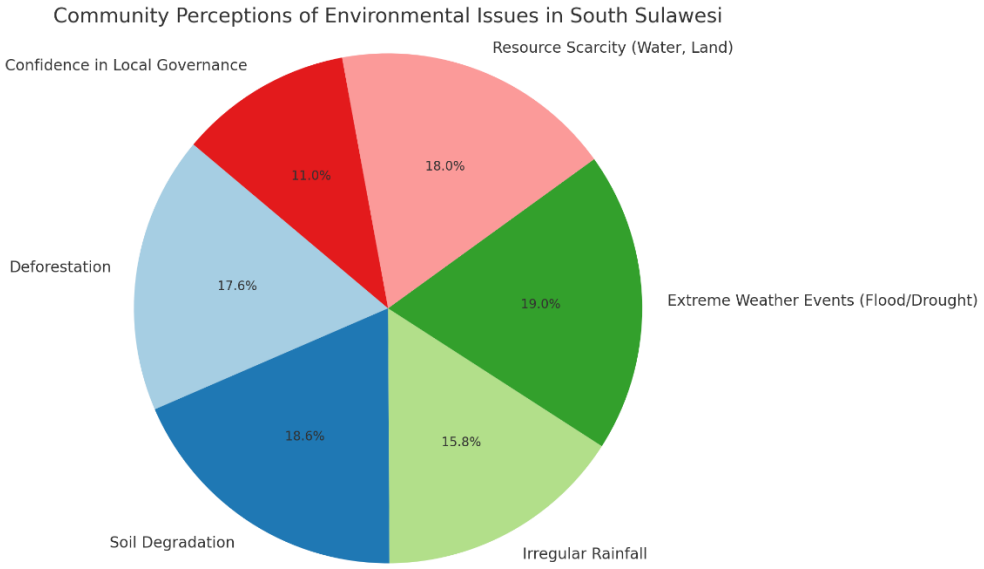


**Figure 1.** Community Perceptions of Environmental Change in South Sulawesi
*Source: Survey Data, 2025*

Figure 1 presents respondents' perceptions regarding environmental changes based on Likert-scale survey responses collected from 200 households in South Sulawesi. The figure illustrates the frequency distribution of respondents who perceived environmental degradation, climate variability, and declining natural resources as major challenges. Participants in both rural and urban areas emphasized the increasing frequency and intensity of extreme weather events, including floods and droughts, which they attributed to climate change. This observation aligns with the findings of Chaffin et al. (2014), who noted that adaptive governance requires an understanding of how ecological shifts impact the vulnerability and resilience of communities. The respondents' heightened awareness of these environmental challenges is significant because it indicates a growing recognition among community members that action must be taken to mitigate and adapt to these changes. However, many respondents also expressed a lack of confidence in local governance structures to adequately address these environmental issues, a sentiment that aligns with the criticisms outlined in the literature on the inefficiencies of traditional governance systems in dealing with complex environmental dynamics.

## Governance Structures and Adaptive Capacity

The data revealed mixed perceptions regarding the effectiveness of existing governance structures in South Sulawesi. On the one hand, some participants acknowledged that local government initiatives, particularly those focused on environmental management, have been beneficial in promoting sustainable agricultural practices and raising awareness about conservation. However,

others expressed frustration with the lack of coordination between different levels of government and the limited capacity of local governments to implement adaptive policies effectively. This supports the findings of Jörgensen et al. (2015), who argued that multi-level governance structures are necessary to address the interconnected challenges of environmental change, but that these structures are often hindered by a lack of coordination and integration.

Table 1. Perceived Effectiveness of Governance Structures in South Sulawesi

| Governance Challenge | Percentage of Respondents (%) |
|---|---|
| Lack of Coordination Between Levels | 65.4% |
| Limited Local Government Capacity | 58.3% |
| Insufficient Financial Resources | 61.9% |
| Lack of Integration of Local Knowledge | 50.7% |
| Local Government Initiatives (positive impact) | 73.2% |

*Source: Survey Data, 2025*

Local government representatives, interviewed as part of the study, emphasized the challenges they face in managing environmental resources in the context of competing economic interests, political pressures, and resource limitations. These challenges underscore the complexity of adaptive governance, which requires balancing ecological, social, and economic factors in decision-making processes. While some local initiatives have been implemented to address climate change and environmental degradation, such as reforestation programs and the promotion of eco-friendly farming techniques, the overall governance framework remains fragmented. Many local officials acknowledged the need for more integrated, adaptive governance practices but expressed concerns about the political will and resources required to implement such changes.

> *"Coordination between government institutions is still relatively weak when dealing with environmental management issues. Different agencies often implement programs independently without proper integration at the local level. This situation creates overlapping responsibilities and delays policy implementation in communities affected by environmental degradation. In several cases, local governments lack sufficient technical expertise and financial resources to support adaptation programs effectively. As a result, communities often rely on informal initiatives rather than institutional support to respond to environmental challenges."* (Participant 5, Local Government Official, Makassar City)

Institutional fragmentation remains one of the primary obstacles to adaptive governance implementation in South Sulawesi. Participants repeatedly highlighted that ineffective coordination among government agencies often reduces policy effectiveness and limits community access to environmental support programs. In addition, several participants argued that governance systems remain overly centralized, preventing meaningful community participation in environmental decision-making processes.

> *"Adaptive governance cannot function effectively if local communities are only treated as policy recipients. In many villages, community members possess valuable ecological knowledge that should be integrated into environmental management strategies. However, decision-making processes are still dominated by top-down approaches that limit local participation. Communities frequently feel excluded from discussions regarding natural resource management even though they are directly affected by environmental changes. Greater collaboration between governments and local communities is necessary to improve adaptive capacity."* (Participant 9, NGO Environmental Activist, Gowa Regency)

The survey results indicated that community members perceive adaptive governance as critical to enhancing resilience, but they also believe that more needs to be done to integrate local knowledge into governance practices. When asked about the role of local knowledge in decision-making, the majority of survey respondents indicated that incorporating traditional ecological knowledge could improve the effectiveness of environmental management strategies. This

suggests that while formal governance structures are necessary, they must be complemented by the integration of indigenous knowledge systems to create more adaptive, locally relevant solutions.

**Socio-Ecological Factors Affecting Resilience**

A significant finding from the research is the critical role that socio-economic factors play in shaping community resilience. The survey data revealed that communities with higher levels of social capital such as strong networks of trust, mutual support, and community participation reported higher levels of resilience to environmental change. Who highlighted the importance of social capital in building community resilience. Social capital facilitates the collective action necessary for adaptive governance by fostering cooperation among community members, local governments, and other stakeholders.

Table 2. Socio-Ecological Factors Contributing to Resilience in South Sulawesi

| Socio-Ecological Factor | Percentage of Respondents (%) |
|---|---|
| Social Capital (strong networks) | 74.1% |
| Gender Inclusivity in Decision-making | 68.2% |
| Community Participation in Local Governance | 66.5% |
| Adopting Adaptive Strategies (e.g., diversification) | 70.9% |
| Access to External Support (e.g., NGOs) | 52.4% |

*Source: Survey data, 2025*

In contrast, communities with lower levels of social cohesion were found to be more vulnerable to environmental changes, as they had fewer resources to cope with the impacts of climate variability and environmental degradation. Who argued that community resilience is not only about ecological factors but also about the social networks that enable communities to adapt to environmental challenges. The study found that communities with strong social networks and active local organizations were better able to adapt to changes in resource availability, such as shifts in fishing yields or crop productivity. These communities were more likely to engage in adaptive strategies, such as diversifying their income sources or adopting new agricultural techniques.

Another important socio-ecological factor identified in the study was the role of gender in resilience-building. Female participants, particularly in rural areas, highlighted the importance of women's involvement in decision-making processes related to environmental management. Many women in these communities are directly involved in managing natural resources and have a deep understanding of the local environment. This finding echoes the literature on gender and resilience, which asserts that empowering women and ensuring their participation in governance processes is essential for enhancing community resilience. The study found that women's leadership in environmental initiatives, particularly in agricultural practices and resource management, contributed significantly to the community's adaptive capacity.

**Effectiveness of Adaptive Governance Strategies**

One of the key research questions addressed by the study was the effectiveness of adaptive governance strategies in promoting community resilience. The data indicated that while some adaptive governance practices have been successfully implemented, challenges remain in ensuring that these practices are widespread and sustainable. Participants in both rural and urban communities expressed a desire for more proactive and inclusive governance that involves local communities in decision-making and empowers them to take action on environmental issues. community participation plays a crucial role in determining the success of adaptive governance initiatives. Participants explained that environmental programs tend to be more effective when local communities are directly involved in planning, implementation, and monitoring activities. Community engagement not only improves environmental outcomes but also strengthens collective responsibility and social cohesion within local communities.

> *"Community-based environmental programs have shown positive impacts in our village, particularly in coastal management and mangrove restoration activities.*

*Residents are more willing to participate when they feel directly involved in planning and implementation processes. Through collective activities, communities have improved ecosystem conditions while also strengthening social cooperation among residents. These initiatives demonstrate that adaptive governance can function effectively when local communities are given authority and responsibility in environmental management." (Participant 6, Coastal Community Representative, Pangkep Regency)*

Participatory governance approaches contribute significantly to increasing public awareness regarding environmental sustainability. Several participants highlighted that environmental governance has gradually shifted from a purely top-down approach toward more collaborative practices involving local organizations and community-based groups. This transition has encouraged communities to become more active in monitoring environmental conditions and implementing local adaptation strategies.

*"Participatory governance approaches encourage communities to become more aware of environmental sustainability issues. In previous years, environmental management programs were mainly controlled by government agencies without meaningful community engagement. Currently, some villages have established local environmental groups that monitor natural resource use and coordinate adaptation activities. Although these initiatives are still limited in scale, they have increased public awareness regarding environmental protection and disaster preparedness." (Participant 12, Environmental NGO Facilitator, Maros Regency)*

Despite these positive developments, participants also emphasized that many adaptive governance initiatives continue to face sustainability challenges. In particular, inconsistent funding, limited institutional monitoring, and short-term policy implementation were identified as major barriers affecting the continuity of environmental programs. Several participants argued that adaptive governance requires stronger long-term collaboration among stakeholders rather than temporary intervention-based projects.

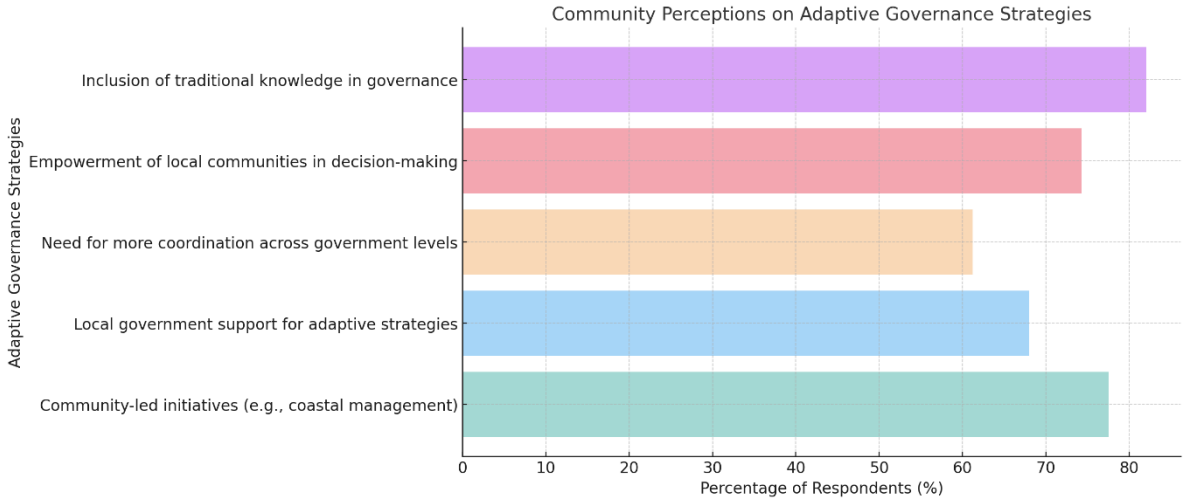


**Figure 2.** Community Perceptions on Adaptive Governance Strategies
*Source: Survey data, 2025*

The study found that participatory governance models, where local communities are involved in monitoring and managing natural resources, have shown positive results in enhancing resilience. These models align with Guttmann (2021) principles for governing the commons, which emphasize the importance of local control and collective action in resource management. In the case of South Sulawesi, community-led initiatives in coastal management and watershed restoration were cited as examples of successful adaptive governance. These initiatives have helped communities reduce their vulnerability to climate impacts by improving the sustainability of local ecosystems.

However, the study also found that there is a significant gap in the implementation of adaptive governance strategies at the provincial and national levels. Local communities often lack the necessary support from higher levels of government in terms of financial resources, technical expertise, and policy integration. This reinforces the findings of Sharma-Wallace et al. (2018), who argued that for adaptive governance to be successful, it must involve all levels of governance and foster collaboration across sectors and scales. Without adequate support from higher levels of government, local adaptive governance efforts are often limited in scope and sustainability.

**Barriers to Effective Adaptive Governance**

The study identified several barriers to the effective implementation of adaptive governance in South Sulawesi. One of the main barriers is political fragmentation, which hinders the creation of a coherent and unified strategy for managing environmental change. Local governments, NGOs, and community organizations often work in isolation, leading to inefficiencies and missed opportunities for collaboration. This fragmentation is compounded by limited resources and competing political interests, which prevent the full implementation of adaptive governance strategies.

Table 3. Barriers to Effective Adaptive Governance in South Sulawesi

| Barrier | Percentage of Respondents (%) |
|---|---|
| Political Fragmentation | 67.4% |
| Lack of Institutional Capacity | 58.9% |
| Limited Resources for Local Governance | 60.3% |
| Inadequate Coordination Across Sectors | 63.5% |

*Source: Survey data, 2025*

The barriers to effective adaptive governance in South Sulawesi, as highlighted in Table 3, reflect significant challenges that hinder the successful implementation of adaptive governance frameworks in the region. One of the most prominent barriers identified is political fragmentation, with 67.4% of respondents recognizing it as a major issue. Political fragmentation refers to the lack of coordination and cooperation between various levels of government, including local, regional, and national authorities. This fragmentation can lead to inconsistent policies and a fragmented approach to environmental management, where different stakeholders may pursue conflicting goals or fail to work together effectively. This finding aligns with previous studies, such as those by Ogunbanjo et al. (2022), which emphasize the importance of multi-level governance systems to address complex socio-ecological issues. Political fragmentation, therefore, undermines the potential for cohesive and comprehensive governance strategies. Another key barrier is the lack of institutional capacity, with 58.9% of respondents pointing to this issue. Local government institutions often lack the necessary technical expertise, financial resources, and organizational infrastructure to implement adaptive governance strategies effectively.

Adaptive governance requires institutions that are capable of managing complexity, uncertainty, and evolving environmental challenges. The absence of these capabilities can result in poorly executed policies, ineffective monitoring, and a lack of meaningful engagement with local communities. This limitation hinders the ability of local governments to respond adequately to environmental changes and to incorporate adaptive strategies that are both sustainable and contextually relevant. Limited resources for local governance, identified by 60.3% of respondents, exacerbate the challenges of institutional capacity. Insufficient funding, inadequate staffing, and a lack of technological support limit the ability of local governments to manage natural resources, implement adaptation measures, and coordinate with other stakeholders. These resource constraints can prevent the full implementation of adaptive governance frameworks, as critical activities such as capacity-building, community engagement, and monitoring are sidelined due to financial limitations.

Inadequate coordination across sectors, identified by 63.5% of respondents, points to the need for better integration of policies and actions across different sectors such as agriculture, forestry, water management, and disaster risk reduction. Without cross-sectoral coordination, efforts to

address environmental challenges may be fragmented or duplicated, leading to inefficiencies and missed opportunities for synergy. Effective adaptive governance requires a holistic approach that links different sectors and encourages collaboration between diverse stakeholders to address complex socio-ecological issues. These barriers highlight the systemic challenges in implementing adaptive governance in South Sulawesi. Addressing these obstacles will require strengthening institutional capacity, enhancing coordination across government levels and sectors, and ensuring that adequate resources are allocated to support sustainable governance practices.

## Discussion

In recent years, the concept of community resilience has gained significant attention in the context of environmental change, particularly in regions experiencing rapid socio-ecological transformations such as South Sulawesi. This study aimed to explore the role of adaptive governance in building community resilience to environmental change through a socio-ecological approach. The findings underscore the crucial link between governance mechanisms, community involvement, and environmental adaptation. This discussion highlights key insights derived from the research, contextualizes the results within the existing literature, and provides an analysis of the implications for policy and practice.

### *Adaptive Governance and Community Resilience*

Adaptive governance has emerged as a vital framework for managing complex socio-ecological systems, especially in the face of environmental changes that are unpredictable and often beyond the control of local communities. As noted by Ojha et al. (2019), adaptive governance emphasizes flexibility, learning, and collaboration among multiple stakeholders to manage natural resources effectively. The findings of this study align with this notion, demonstrating that adaptive governance structures that include diverse community stakeholders are better equipped to respond to environmental challenges in South Sulawesi. Local communities involved in the governance process were found to exhibit a higher degree of resilience, not only through direct interventions but also by fostering a shared sense of responsibility and collective action.

The study revealed that governance processes in South Sulawesi are often influenced by both local knowledge systems and external policy frameworks. This dynamic relationship underscores the importance of incorporating indigenous knowledge alongside modern governance practices, the role of traditional ecological knowledge in adaptive management. In South Sulawesi, local communities' understanding of their environment has allowed them to develop context-specific strategies for resilience, such as sustainable land management practices and community-based disaster risk reduction efforts. These strategies align with the principles of adaptive governance, where local knowledge serves as a critical tool for anticipating and mitigating environmental risks.

A central theme in the study was the interconnectedness of social and ecological systems in shaping community resilience to environmental change (Faulkner et al., 2018; Ungar, 2018). Socio-ecological systems are complex and dynamic, where the interactions between human and ecological components can either enhance or undermine resilience. In South Sulawesi, the resilience of communities is deeply intertwined with the health of local ecosystems, such as mangroves, forests, and agricultural lands. The degradation of these ecosystems, often caused by unsustainable practices and external pressures, has significantly impacted the ability of communities to adapt to climate change and other environmental stresses (Fischer, 2018; Ekka et al., 2023; Smith et al., 2020; Talukder et al., 2021).

The research findings indicate that environmental degradation, particularly deforestation and the depletion of water resources, has weakened the resilience of several communities in South Sulawesi. That environmental degradation exacerbates vulnerability to climate change and reduces the capacity of communities to respond effectively. The study also highlights examples of community-led restoration projects, where local communities, empowered through adaptive governance structures, have taken the lead in rehabilitating degraded ecosystems. These initiatives are in line with the socio-ecological resilience framework, which posits that social and ecological resilience must be viewed as two sides of the same coin.

### *The Role of Institutional Frameworks and Stakeholder Collaboration*

Institutional frameworks play a pivotal role in shaping the capacity of communities to adapt to environmental change. The study revealed that adaptive governance in South Sulawesi is heavily influenced by both formal institutions, such as government agencies and NGOs, and informal institutions, such as local community groups and traditional leaders. The interaction between these institutional levels is crucial for fostering effective responses to environmental challenges. As Contipelli (2018) notes, polycentric governance systems, which involve multiple levels of authority, are particularly effective in managing complex, multi-scale environmental problems.

The findings underscore the importance of stakeholder collaboration in enhancing adaptive governance. Successful resilience-building efforts in South Sulawesi were often characterized by strong partnerships between local communities, governmental bodies, and external organizations. These partnerships facilitated the exchange of resources, knowledge, and support, enabling communities to address challenges more effectively. Adaptive governance requires continuous dialogue and collaboration between stakeholders to address uncertainties and evolving environmental conditions. In South Sulawesi, such collaborative efforts were instrumental in implementing community-based adaptation strategies, such as early warning systems, sustainable agricultural practices, and ecosystem-based disaster risk reduction.

While the study highlights the potential of adaptive governance in building community resilience, it also identifies several challenges that hinder the full realization of its benefits. One of the key barriers is the limited capacity of local institutions to manage and coordinate adaptive governance efforts effectively. This challenge is compounded by issues such as political instability, lack of resources, and insufficient technical expertise. The success of adaptive governance relies heavily on the capacity of local institutions to manage change and facilitate collaboration (Sharma-Wallace et al., 2018; Castro-Arce & Vanclay, 2020). In South Sulawesi, many local governments struggle to provide the necessary support for adaptive governance processes, particularly in remote areas where access to resources and information is limited.

Another challenge identified in the study is the resistance to change among some community members, particularly those who are deeply entrenched in traditional practices that may not be aligned with modern environmental governance approaches. The effectiveness of adaptive governance initiatives if not addressed through inclusive and participatory processes. In South Sulawesi, the involvement of traditional leaders and respected community figures has been critical in overcoming this barrier, as they have helped to bridge the gap between modern governance structures and local cultural practices.

The findings of this study have important implications for policy and practice, both within South Sulawesi and in other regions facing similar challenges. Policymakers should prioritize the integration of adaptive governance mechanisms into environmental policy frameworks, ensuring that local communities are central to the decision-making process. This approach is consistent with the recommendations of the Intergovernmental Panel on Climate Change (IPCC), which calls for governance systems that are flexible, inclusive, and capable of responding to the complexities of environmental change.

There is a need for greater investment in capacity-building initiatives that strengthen the abilities of local institutions to manage adaptive governance processes. This includes providing technical training, fostering leadership skills, and enhancing access to information and resources. By building the capacity of local institutions, policymakers can help ensure that adaptive governance mechanisms are more effective and sustainable in the long term.

The study emphasizes the importance of fostering a culture of collaboration and knowledge exchange among stakeholders. Policy initiatives should support the creation of platforms that facilitate communication and cooperation between local communities, government agencies, and external organizations. These platforms can play a critical role in sharing best practices, coordinating actions, and leveraging resources to address environmental challenges.

## CONCLUSION

This study explored the role of adaptive governance in building community resilience to environmental change in South Sulawesi, emphasizing the integration of socio-ecological systems in governance processes. The findings reveal that adaptive governance, which incorporates local knowledge, flexible decision-making, and stakeholder collaboration, is vital for enhancing resilience in the face of environmental degradation and climate change. Community participation and multi-level governance structures were found to be critical in addressing local challenges and ensuring effective responses to environmental threats. The study identified key barriers to the implementation of adaptive governance, including limited institutional capacity, political fragmentation, and resistance to change among some community members. However, it also highlighted the positive impact of community-led initiatives, particularly in coastal management and ecosystem restoration, which demonstrated the potential for local adaptation. The findings contribute to the broader understanding of how adaptive governance frameworks can be applied in regions with complex socio-ecological dynamics, such as South Sulawesi. By incorporating indigenous knowledge and fostering collaboration across various governance levels, adaptive governance provides a viable solution to the challenges posed by environmental change. Future research should focus on expanding the implementation of adaptive governance frameworks in other regions with similar socio-ecological conditions. Investigating the long-term sustainability of community-led adaptation projects and exploring the integration of digital tools for governance could further enhance the effectiveness of adaptive governance strategies.

## REFERENCES


Adebayo, W. G. (2025). Resilience in the face of ecological challenges: Strategies for integrating environmental considerations into social policy planning in Africa. *Sustainable Development*, *33*(1), 203-220. https://doi.org/10.1002/sd.3113

Ames, H., Glenton, C., & Lewin, S. (2019). Purposive sampling in a qualitative evidence synthesis: A worked example from a synthesis on parental perceptions of vaccination communication. *BMC medical research methodology*, *19*(1), 26. https://doi.org/10.1186/s12874-019-0665-4

Annamalah, S. (2024). The value of case study research in practice: A methodological review with practical insights from organisational studies. *Journal of Applied Economic Sciences (JAES)*, *19*(4 (86)), 485-498.

Berkes, F. (2017). Environmental governance for the anthropocene? Social-ecological systems, resilience, and collaborative learning. *Sustainability*, *9*(7), 1232. https://doi.org/10.1007/978-3-031-69812-5_12

Biswas, S., & Nautiyal, S. (2023). A review of socio-economic vulnerability: The emergence of its theoretical concepts, models and methodologies. *Natural Hazards Research*, *3*(3), 563-571. https://doi.org/10.1016/j.nhres.2023.05.005

Bolarinwa, O. A. (2020). Sample size estimation for health and social science researchers: The principles and considerations for different study designs. *Nigerian Postgraduate Medical Journal*, *27*(2), 67-75. https://doi.org/10.4103/npmj.npmj_19_20

Burch, S., Shaw, A., Dale, A., & Robinson, J. (2014). Triggering transformative change: a development path approach to climate change response in communities. *Climate policy*, *14*(4), 467-487. https://doi.org/10.1080/14693062.2014.876342

Castro-Arce, K., & Vanclay, F. (2020). Transformative social innovation for sustainable rural development: An analytical framework to assist community-based initiatives. *Journal of Rural Studies*, *74*, 45-54. https://doi.org/10.1016/j.jrurstud.2019.11.010

Chaffin, B. C., Gosnell, H., & Cosens, B. A. (2014). A decade of adaptive governance scholarship: synthesis and future directions. *Ecology and society*, *19*(3).

Contipelli, E. (2018). Multi-level climate Governance: Polycentricity and local innovation. *Revista Catalana de Dret Ambiental*, *9*(2).

de Farias, B. G., Dutra-Thomé, L., Koller, S. H., & de Castro, T. G. (2021). Formulation of themes in qualitative research: Logical procedures and analytical paths. *Trends in Psychology*, *29*(1), 155-166. https://doi.org/10.1007/s43076-020-00052-0

Delgado-Serrano, M. D. M., Oteros-Rozas, E., Ruiz-Mallén, I., Calvo-Boyero, D., Ortiz-Guerrero, C. E., Escalante-Semerena, R. I., & Corbera, E. (2018). Influence of community-based natural resource management strategies in the resilience of social-ecological systems. *Regional environmental change*, *18*(2), 581-592. https://doi.org/10.1007/s10113-017-1223-4

Dushkova, D., & Ivlieva, O. (2024). Empowering communities to act for a change: A review of the community empowerment programs towards sustainability and resilience. *Sustainability*, *16*(19), 8700. https://doi.org/10.3390/su16198700

Ekka, P., Patra, S., Upreti, M., Kumar, G., Kumar, A., & Saikia, P. (2023). Land degradation and its impacts on biodiversity and ecosystem services. *Land and environmental management through forestry*, 77-101. https://doi.org/10.1002/9781119910527.ch4

Faulkner, L., Brown, K., & Quinn, T. (2018). Analyzing community resilience as an emergent property of dynamic social-ecological systems. *Ecology and Society*, *23*(1). https://doi.org/10.5751/ES-09784-230124

Fischer, A. P. (2018). Pathways of adaptation to external stressors in coastal natural-resource-dependent communities: Implications for climate change. *World Development*, *108*, 235-248. https://doi.org/10.1016/j.worlddev.2017.12.007

Foxon, T. J., Reed, M. S., & Stringer, L. C. (2009). Governing long-term social–ecological change: what can the adaptive management and transition management approaches learn from each other?. *Environmental Policy and Governance*, *19*(1), 3-20. https://doi.org/10.1002/eet.496

Glaser, M., & Glaeser, B. (2014). Towards a framework for cross-scale and multi-level analysis of coastal and marine social-ecological systems dynamics. *Regional Environmental Change*, *14*(6), 2039-2052. https://doi.org/10.1007/s10113-014-0637-5

Guttmann, A. (2021). Commons and cooperatives: A new governance of collective action. *Annals of Public and Cooperative Economics*, *92*(1), 33-53. https://doi.org/10.1111/apce.12291

Haque, C. E., & Doberstein, B. (2021). Adaptive governance and community resilience to cyclones in coastal Bangladesh: Addressing the problem of fit, social learning, and institutional collaboration. *Environmental Science & Policy*, *124*, 580-592. https://doi.org/10.1016/j.envsci.2021.08.007

Imperiale, A. J., & Vanclay, F. (2021). Conceptualizing community resilience and the social dimensions of risk to overcome barriers to disaster risk reduction and sustainable development. *Sustainable Development*, *29*(5), 891-905. https://doi.org/10.1002/sd.2182

Jörgensen, K., Jogesh, A., & Mishra, A. (2015). Multi-level climate governance and the role of the subnational level. *Journal of Integrative Environmental Sciences*, *12*(4), 235-245. https://doi.org/10.1080/1943815X.2015.1096797

Klenk, N., Fiume, A., Meehan, K., & Gibbes, C. (2017). Local knowledge in climate adaptation research: moving knowledge frameworks from extraction to co-production. *Wiley Interdisciplinary Reviews: Climate Change*, *8*(5), e475. https://doi.org/10.1002/wcc.475

Moore, J. W., & Schindler, D. E. (2022). Getting ahead of climate change for ecological adaptation and resilience. *Science*, *376*(6600), 1421-1426. https://doi.org/10.1126/science.abo3608

Nagendra, H., & Ostrom, E. (2012). Polycentric governance of multifunctional forested landscapes. *International Journal of the Commons*, *6*(2). https://doi.org/10.18352/ijc.321

Ogunbanjo, M. A., Oyedokun, D. M., & Oladipupo, A. O. (2022). Global governance and sustainable development: a discussion from the socio-political and socioecological perspectives. *Abraka Humanities Review*, *12*(1), 24-36.

Ojha, H. R., Bhusal, P., Paudel, N. S., Thompson, P. M., & Sultana, P. (2019). Turning conflicts into cooperation? The role of adaptive learning and deliberation in managing natural resources conflicts in Nepal. *Climate Policy*, *19*(sup1), S107-S120. https://doi.org/10.1080/14693062.2018.1556240

Ouyang, J., Zhang, K., Wen, B., & Lu, Y. (2020). Top-down and bottom-up approaches to environmental governance in China: Evidence from the River Chief System (RCS). *International journal of environmental research and public health*, *17*(19), 7058. https://doi.org/10.3390/ijerph17197058

Pacoma, A. J., Pearson, L., & Wungaeo, S. (2025). An ecosystem-based adaptation and adaptive governance framework for addressing governance challenges in tropical peatland restoration. *Ambio*, 1-14. https://doi.org/10.1007/s13280-025-02196-8

Rabbi, M. F. (2025). A Dynamic Systems Approach to Integrated Sustainability: Synthesizing Theory and Modeling Through the Synergistic Resilience Framework. *Sustainability*, *17*(11), 4878. https://doi.org/10.3390/su17114878

Schlüter, M., Müller, B., & Frank, K. (2019). The potential of models and modeling for social-ecological systems research. *Ecology and Society*, *24*(1).

Sharma-Wallace, L., Velarde, S. J., & Wreford, A. (2018). Adaptive governance good practice: Show me the evidence!. *Journal of Environmental Management*, *222*, 174-184. https://doi.org/10.1016/j.jenvman.2018.05.067

Sharma-Wallace, L., Velarde, S. J., & Wreford, A. (2018). Adaptive governance good practice: Show me the evidence!. *Journal of Environmental Management*, *222*, 174-184. https://doi.org/10.1016/j.jenvman.2018.05.067

Shinn, J. E. (2016). Adaptive environmental governance of changing social-ecological systems: Empirical insights from the Okavango Delta, Botswana. *Global Environmental Change*, *40*, 50-59. https://doi.org/10.1016/j.gloenvcha.2016.06.011

Smith, P., Calvin, K., Nkem, J., Campbell, D., Cherubini, F., Grassi, G., ... & Arneth, A. (2020). Which practices co-deliver food security, climate change mitigation and adaptation, and combat land degradation and desertification?. *Global change biology*, *26*(3), 1532-1575. https://doi.org/10.1111/gcb.14878

Talukder, B., Ganguli, N., Matthew, R., VanLoon, G. W., Hipel, K. W., & Orbinski, J. (2021). Climate change-triggered land degradation and planetary health: A review. *Land Degradation & Development*, *32*(16), 4509-4522. https://doi.org/10.1002/ldr.4056

Twinomuhangi, R., Sseviiri, H., & Kato, A. M. (2023). Contextualising environmental and climate change migration in Uganda. *Local Environment*, *28*(5), 580-601. https://doi.org/10.1080/13549839.2023.2165641

Ungar, M. (2018). Systemic resilience. *Ecology and society*, *23*(4). https://doi.org/10.5751/ES-10385-230434

Wilson, G. A. (2014). Community resilience: path dependency, lock-in effects and transitional ruptures. *Journal of Environmental Planning and Management*, *57*(1), 1-26. https://doi.org/10.1080/09640568.2012.741519