

# Resilience of the samin community in the face of climate change in Java Island, Indonesia

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**Abstract.** The Samin Community has a rich traditional knowledge system which plays an important role in maintaining social and ecological resilience. Climate change has a significant impact on indigenous communities worldwide. This research aims to understand how the Samin community maintains and strengthens resilience amidst extreme climate change, and how local wisdom can be integrated with modern knowledge and technology to achieve long-term sustainability. The research uses a qualitative method with a case study strategy and ethnography, to describe and explore the resilience of the Samin community. The target of a qualitative approach is a comprehensive description of social life. The analysis combines the stages of data reduction, data presentation, and drawing of a conclusion in a repetitive, cyclic way. The research results show that a holistic approach combining local wisdom, modern technology, and policy is the key to sustainability of the Samin community in the face of climate change

**Keywords:** climate change, local wisdom, Samin community, strategy, sustainability

## 1 Introduction

Global climate change is one of the greatest challenges faced by communities all over the world [1–3], especially indigenous communities that live in harmony with nature, such as the Samin community, which is found in the rural, mountain region of Central Java. This community is spread over a number of areas in the Regencies of Blora, Pati, and Kudus. The Samin people have continued to maintain a traditional lifestyle that is highly dependent on natural conditions [4–7]. However, with the changes in climate that are causing extreme weather, changes in rainfall patterns, and a rise in temperatures, the Samin community is facing significant challenges in the sustainability of its livelihood. Nevertheless, the Samin people also display extraordinary resilience in dealing with these challenges, through the integration of local wisdom, community solidarity, and adaptation to change [8].

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As a religious code of conduct, Saminism does not allow much room for growth, because it is a doctrine which excludes the possibility of growth in the institutional sense, in terms of both its teachings and organization. However, as a scientific code of conduct, Saminism can be highly productive due to a number of its special aspects, such as the pattern known as *sikep rabi*. *Sikep rabi* is a formula which claims that individuals do not play a dominant position in society. There is no separate self, only *sikep rabi*, connections, and strong ties [9]. People rely on nature, and nature relies on people, who in turn adopt the pattern of *sikep rabi*. The Samin community have a life philosophy which emphasizes simplicity, honesty, and harmony with nature. They reject modernization, which is seen as going against their values, and choose to live in a traditional way [10,11]. Their dependence on nature makes them highly vulnerable to climate change, but also enables them to develop a strong adaptation ability through practices that have been passed down from generation to generation, to deal with various environmental challenges.

Climate change brings with it various impacts that affect the daily life of the Samin community, in particular its agricultural activities, water availability, and environmental stability. Altered rainfall patterns: climate change leads to uncertain rainfall patterns, with shorter rainy seasons and longer dry seasons [12-15]. This interferes with the traditional planting patterns that the Samin community has always relied on, and leads to a decline in crop yields, and difficulty maintaining food security. Rising air temperatures: an increase in air temperature affects crop growth and increases pressure on water availability. Crops that usually thrive in this region are more vulnerable to drought and pests [16,17]. Extreme weather events: climate change also increases the frequency of extreme weather events such as floods and strong winds, which can damage agricultural land and basic infrastructure such as roads and waterways [18, 19].

In a social-ecological context, resilience theory refers to the ability of social systems and ecosystems to face, adapt, and recover from pressure or change that threatens their stability [20–22]. According to [23–25], resilience not only includes the ability to survive but also the ability to transform when confronted with significant changes. In the context of the Samin community, resilience includes the way people maintain social and ecological balance amidst the increasingly uncertain environmental changes taking place. Community resilience depends on a number of factors, such as the ability to learn and innovate, connectivity in social networks, and access to resources [26,27]. Resilience is also associated with the concept of vulnerability, where communities with high resilience are more able to overcome and recover from the negative effects of environmental change [28,29].

Local wisdom is the knowledge, practices, and beliefs that develop in local communities as a result of prolonged interaction with their natural environment [30,31]. The results of research by [32,33] show that indigenous communities have rich traditional knowledge systems which play an important role in safeguarding social and ecological resilience. In Indonesia, local wisdom has long been a foundation for the adaptation strategies of indigenous communities in facing environmental changes. A study by [34] on the *subak* irrigation system in Bali shows how local wisdom can function as a mechanism for the sustainable management of resources. In the context of the Samin community, local wisdom encompasses traditional farming practices, water management, and social values such as *gotong royong* (communal work), which help the community to survive in the midst of climate change.

Climate change has a significant impact on indigenous communities all over the world. Climate change causes a rise in temperatures, changes in rainfall patterns, and an increase in the frequency of extreme weather events, all of which will affect ecosystems and livelihoods that are dependent on nature [35,36]. Indigenous communities that depend on farming and other natural resources are highly vulnerable to these changes. According to [37,38], the impacts of climate change on indigenous communities include a decline in agricultural yield,

an increase in food vulnerability, and the loss of biodiversity that provides a source of food and medicine [38,39]. In Indonesia, indigenous communities in inland regions, such as the Dayak and Baduy communities, face enormous challenges in preserving their livelihoods due to the effects of climate change [40].

The adaptation strategies used by indigenous communities to tackle climate change are quite varied, depending on their local context and the wisdom they possess [41-43]. Nelson et al. (2007) show that adaptation strategies frequently include the diversification of livelihoods, changes in planting patterns, and more adaptive natural resource management. In Indonesia, a study by [44] shows that indigenous communities like the Dayak in Kalimantan adopt an agroforestry system to tackle climate change. This system not only helps to deal with climate uncertainty, but also increases food security and boosts community economy. Likewise, indigenous communities in Papua have developed sustainable forest management strategies as a response to climate change and environmental degradation [45].

Research on the Samin community is still relatively limited, but a number of studies have explored some of the important aspects of Samin life, including local wisdom, the social system, and the challenges faced by the Samin people. Studies by [46,47] discuss the teachings of Saminism and the way these values shape the life patterns of the Samin community. Research by [48-50] describes the interaction of the Samin community with the environment, in particular in the context of traditional farming. Studies by [10, 51, 52] highlight the way the Samin community preserves its identity amidst the current of modernization and globalization. Based on this background, the current research aims to understand in greater depth how the Samin community is able to preserve and strengthen its resilience in the midst of increasingly extreme climate change, and how its local wisdom can be integrated with modern knowledge and technology to achieve long-term sustainability.

## 2 Research Method

This article is the result of qualitative research using an ethnographic approach. The qualitative research method was felt to be most suitable for describing and exploring in depth the issue of resilience in the Samin community, bearing in mind that the primary data obtained in the research were in the form of words, the results of field observations, and did not involve the testing of numeric variables. The techniques used for collecting data were participative observation, in-depth interviews, and a document study. Qualitative research is a type of investigation that produces descriptive information in the form of spoken or written words and actions of the subject studied [53-55]. The utterances, writings, and behavior of individuals, groups, communities, or organizations that are observed in a special setting, and examined from a full, comprehensive, and holistic perspective, can be described in detail using a qualitative technique.

The in-depth interviews and direct observations were carried out in the research location in Blora Regency, in an area that included: Kemantren Village in Kedungtuban District, Klopoduwur Village in Banjarejo District, Sambongrejo Village in Sambong District, Mendenrejo Village in Kradenan District. The research was conducted between May and August 2024. The intention of the activities was to gain direct knowledge about the lives of the Samin community, focusing on the specific purpose of the research. The data collection was also done through in-depth interviews, a technique which aimed to obtain a picture of the phenomena studied and gain a deep understanding of the facts collected. In addition, the researcher gathered information from a number of key informants from the Samin community in Blora, who were chosen through snowball sampling. The informants included guides or cultural experts, local residents and newcomers, educators at related educational units, and Samin youth. To complete the data, the research also included the collection of cultural data from documents in Blora Regency, obtained from village and district offices, and the archives

of members of the local Samin community. The data collected were then analyzed using an interactive approach which included four main stages: data reduction, data display, drawing of a conclusion, and verification [56].

### 3 Research Results and Discussion

#### 3.1. Resilience Strategies of the Samin Community in the Face of Climate Change

In spite of the various challenges faced, the Samin community has managed to develop a number of resilience strategies which have enabled it to survive and even grow in the midst of climate change. These strategies include: utilization of local wisdom and traditional technology, use of climate resistant varieties, efficient water resource management, social solidarity and communal work, fair distribution of resources, and education and passing down of traditional knowledge, as seen in Table 1.

The resilience strategies implemented by the Samin community in the face of climate change reflect its ability to preserve a traditional lifestyle while adapting to modern challenges. This is in line with the research of [47, 57, 58], which shows that by relying on local wisdom, social solidarity, and flexible adaptation, the Samin community has managed to maintain its resilience. Nevertheless, in the midst of increasingly extreme climate change, the Samin people also require support in the form of access to information, appropriate technology, and supporting policies, to ensure the continuity of their resilience strategies in the future.

**Table 1.** Implementation of Resilience Strategies of the Samin Community in the Face of Climate Change

Resilience Strategy	Implementation in the face of climate change	Impact
Utilization of local wisdom and traditional technology	The Samin community practices sustainable farming by utilizing traditional techniques such as crop rotation, use of organic fertilizer, and soil conservation.	These techniques help the community to maintain fertile soil and reduce dependence on uncertain rainfall.
Use of climate resistant varieties	The Samin community has also started using plant varieties that are more resistant to extreme climate conditions.	Crops such as cassava and nuts that are more resistant to drought have become a part of crop diversification.
Efficient water resource management	Building of reservoirs or ponds to collect rainwater, to anticipate uncertainty of rainfall. Working together to dig wells to provide a water source when surface water dries up.	The reservoirs are used for the irrigation of farmland and as a water supply for the dry season.
Social solidarity and communal work	In difficult situations such as drought or other natural disasters, members of the Samin community work together to help one another, whether in providing water, repairing infrastructure, or providing food.	Communal work, as an integral part of Samin culture, plays an important role in strengthening community resilience.
Fair distribution of resources	Water and food distribution systems are managed fairly.	All members of the Samin community get a sufficient part, regardless of their social or economic status.

Education and passing down of traditional knowledge	Knowledge about ways to deal with climate change are passed down from generation to generation through informal education, including traditional farming methods, water management, and environmental protection.	The Samin community lives simply, without greed, and maintains a balance with the environment in its adaptation to climate change.
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Data source: Analysis of primary data through in-depth interviews 2024

### 3.2. Challenges in Maintaining Resilience for the Samin Community in the Face of Climate Change

The main challenge faced by the Samin community is to preserve its local wisdom amidst the current of modernization and globalization. Although modern technology can bring benefits such as increased efficiency and productivity, without adequate knowledge about its proper utilization, this technology may give rise to new problems. For instance, modern farming technology that is not suitable for the conditions of the local ecosystem may cause environmental degradation, such as soil erosion, a decrease in water quality, or the loss of biodiversity. In addition, dependence on technology that is expensive or difficult to maintain may weaken the autonomy of the Samin community, reduce its ability to survive independently, and damage the social equilibrium that has been preserved through the practice of communal work and solidarity.

**Table 2** Challenges in Maintaining Resilience of the Samin Community in the Face of Climate Change

Challenge Maintaining Resilience	Effort to Strengthen Resilience	Implication
The pressure of modernization and globalization can erase the local wisdom that serves as a foundation for resilience.	Increase in access to information and technology.	Extension programs and training about climate change and traditional technology-based adaptation to increase the Samin community’s understanding of climate change and adaptation technology, and enable the development of more effective strategies.
	Strengthening of social and cultural systems	Cooperation with government and non-government institutions in the provision of technology that suits the community values and local needs. Maintaining and strengthening social capital in the community as a way of dealing with climate change. Preservation of local wisdom to face future challenges.
The Samin community has limited access to information and modern adaptation technology.	Increase in access to resources	Development of infrastructure that supports more efficient management of water resources and land. Strengthening of government support in the form of policies that protect the rights of traditional communities over land and natural resources.
	Development of infrastructure	Investment of infrastructure development to support more efficient water and land resource management.

Data source: Analysis of primary data through in-depth interviews 2024.

The climate conditions that are becoming increasingly extreme and more difficult to predict make adaptation more challenging. For instance, if rainfall decreases drastically or temperatures increase to a level that exceeds crop tolerance, existing adaptation strategies may no longer be adequate. This is in line with the research of [10, 59], which explains that the Samin community lives in isolated areas, far from centers of information and technology. This causes limited access to the latest information about climate change and modern

adaptation technology. Without this access, the Samin people may not be aware of the changes that are taking place or the new technology that can help them to adapt. Even though certain information is available, the lack of formal education and language barriers may serve as an obstacle for the Samin people to properly understand and implement complex technology or adaptation strategies.

Limited resources, such as water and fertile land, present a significant challenge for the Samin community. These resources are becoming increasingly scarce due to climate change, which causes long droughts or uncertain rainfall patterns. When fertile farmland becomes more difficult to find, and access to clean water for irrigation is limited, the ability to maintain agricultural productivity is disrupted. This can lead to a decline in crop yield, which has a direct impact on the food security and economy of the community. Therefore, it is important for the Samin community to accept technology in a way that is appropriate for its values and local needs [60, 61], while continuing to preserve the local wisdom that has been proven effective in supporting its resilience and sustainability. This involves education and training, community monitoring of the adoption of new technology, and collaborations with outside parties that respect and support the local values of the Samin community.

In order to overcome these challenges, there is a need for a collaborative effort from several parties to: (1) increase access to information: extension and community-based training programs can help raise awareness and understanding about climate change and relevant adaptation strategies. The use of communication media that is appropriate for the needs and ability of the community, such as local radio or direct training, may be a solution; (2) efficient technology: introducing adaptation technology that is simple, affordable, and easy to use can help the Samin community to increase its agricultural productivity without having to rely on complex or expensive technology; (3) effective resource management: water and land conservation programs, and collective resource management can help overcome the problem of limited resources. This also includes the initiative to preserve and utilize local plant varieties that are more resistant to changing climate conditions.

### 3.3. Integration of Local Wisdom with Modern Technology in the Samin Community in the Face of Climate Change

The integration of local wisdom with modern technology in the Samin community requires a careful and contextual approach, bearing in mind that this community has a system of values and practices that are closely bound to tradition and the natural environment. Below are some of the mechanisms that can be applied to integrate local wisdom with modern technology in the Samin community.

**Table 3.** Integration of Local Wisdom and Modern Technology in the Samin Community in the Face of Climate Change

Integration Mechanism	Steps	Implementation
Mapping of local wisdom and technology needs	Identification of local wisdom	Identification of traditional knowledge that is relevant to agriculture, natural resource management, and social systems.
	Analysis of technology needs and potential	Identification of modern technology that can support and strengthen local wisdom.
Education and mentoring	Education and introduction of technology	Education and training programs that are suited to the needs of the Samin community, to introduce new technology in stages.
	Mentoring and sustainable collaborations	Involvement of experts and local practitioners to work together with the Samin community in the implementation of relevant technology.

Development of sustainable innovation systems	Development of integrated farming systems	Development of farming systems that combine traditional practices with modern innovations to increase productivity and sustainability.
	Increased market access	Use of modern technology to increase market access for the Samin community’s agricultural products.
Network strengthening and partnerships	Establishment of networks and partnerships	Establishment of collaborative networks with government, NGOs, universities, and the private sector to support the integration of technology and local wisdom.
	Capacity strengthening and local leadership	Development of leadership capacity in the Samin community to manage change and the adoption of technology. Strong local leadership is important for ensuring sustainability and independence of the community.

Data source: Analysis of primary data through in-depth interviews 2024

In accordance with the research results of [59, 60], the integration of environmentally friendly modern technology, strengthening of local institutions, and increased access to information and resources enable the Samin community to more effectively maintain its resilience to climate change. These efforts are adapted to suit the community’s values and local wisdom to ensure the sustainability and prosperity of the community. The mechanisms of integration of local wisdom and modern technology in the Samin community are designed while taking into consideration the traditional values and local conditions of the community. The process is participative, showing respect for local wisdom, and focusing on strengthening community capacity to achieve sustainability in agricultural development. With the right approach, the Samin community will be able to preserve its identity and local wisdom while making use of modern technology to increase prosperity and resilience to climate change.

## 4 Conclusion

The Samin community has shown extraordinary resilience in the face of climate change through the utilization of local wisdom, social solidarity, and sustainable adaptation. However, in order to maintain and strengthen this resilience amidst the increasingly complex challenges of climate change, there is a need for sustainable support, both from within the community itself and from outside. By integrating traditional values with appropriate modern technology and information, the Samin community will continue to survive and thrive in the face of climate change challenges. The resilience of the Samin community not only depends on its adaptation strategies but also on external support which enables people to access the resources and information needed to deal with the rapid environmental changes taking place. Therefore, a holistic approach which combines local wisdom with the support of modern technology and policies is the key to sustainability in the life of the Samin community in the face of climate change. The resilience strategies of the Samin community, which enable them to survive and thrive in the midst of climate change include: utilization of local wisdom and traditional technology, use of climate resistant varieties, efficient water resource management, social solidarity and communal work, fair distribution of resources, and education and passing down of traditional knowledge. The challenges faced in maintaining resilience include the pressure of modernization and globalization, and the limited access of the Samin community to information and modern adaptation technology. The mechanisms of integration of local wisdom and modern technology in the Samin community in the face of climate change include the mapping of local wisdom and technology needs, education and

mentoring, development of sustainable innovation systems, and strengthening of networks and partnerships.

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