Landscape-based livelihood transformation in addressing climate change impacts in Aunupe Village, South Konawe District, Southeast Sulawesi, Indonesia

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Abstract. Illegal logging and unsustainable land management practices are the biggest challenges to achieve a sustainable development. Economic demands and lack of knowledge of land management have led people to behave instantaneously and destructively. This study aims to explore the landscape-based approaches of livelihood transformation in Aunupe Village, South Konawe District, Southeast Sulawesi as an effort to adapt to climate change. Through a qualitative method using semi-structured interviews, this study found multiple factors contributed to the transformation including people's awareness of the importance of ecosystem sustainability, the increased of knowledge and capacity of the community of eco-friendly agricultural practices, and intervention of both government and non-governmental organization in providing landscape-based land management models and land use schemes for community in forest area. The livelihoods that were transformed into the more landscape-based and eco-friendly ways including illegal logging to organic farming and agroforestry practices, and ordinary farming to non-pesticides agricultural practices.

Keywords: livelihood transformation, climate change, landscape-based management, spatial planning.

1 Introduction

Climate change has a very broad impact on people's lives. The increase in the earth's temperature does not only have an impact on increasing the earth's temperature but also changes the climate system which affects various aspects of changes in nature and human life [21], such as the quality and quantity of water, habitats, forests, health, agricultural land, and coastal ecosystems. In the recent several decades, climate change has gained global attention [12] that resulted in many catastrophic events led to damages and loses. Therefore, eliminating poverty and hunger as part of development goals remains challenging [16].

The Sustainable Development Goals (SDGs) and the Paris Agreement became a foundation of transforming the way of which social, economic, and environmental aspects are taking place [10][21]. Farmers in rural areas often experiencing problem in food production resulted from water scarcity [16] and several hydrometeorological disasters including flooding, land slide,

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and droughts [7]. This situation is worsened by the growing population which occupied land surrounding buffer zone of forest or catchment area [2]. Cases of crop failure due to drought caused by climate change occurred in many areas in Indonesia. The tens of hectares of rice fields are certain to fail due to drought with losses reaching tens of millions of rupiah [2]. The failure due to this drought is expected to hit hundreds of hectares of other rice fields because of drought that is the worst in the last twenty years.

A classic problem that most of area is facing globally including Aunupe Village is the increased of environmental degradation caused by both natural and anthropogenic factors [14][18] including illegal logging [4], land conversion, and destructive practices of land management [5]. Several natural events indicated a mismanaged of land. In addition to that, agricultural lands that were managed conventionally may contribute to the worse environmental degradation. This situation threats the food security [13].

The previous research showed that several contributing factors to the transformation of livelihood. These include awareness, knowledge and capacity, and intervention of external parties [11]. A crucial change in water resource management is shown by a transformation of natural resources management into an integrated approach of biological, physical, and social aspects in a landscape [18]

This study aims to explore the landscape-based approaches of livelihood transformation in Aunupe Village, South Konawe District, Southeast Sulawesi as an effort to adapt to climate change.

2 Methods

2.1 Site description

Aunupe Village is in Wolasi Subdistrict, South Konawe Regency, Southeast Sulawesi covering 2,183.80 ha and consisting of three sub-villages. The village is in the upper stream of the Wanggu Watershed that characterized by a high degree of land use variation, e.g., forest, agriculture, and paddy field. This village is settled by 397 people, 116 households, 201 women, and 187 men [22].

In terms of land use in the village, of the total land area of 707.5 hectares, most of which are used for agricultural practices with distribution of use for farmlands of 70.67%, rice fields 28.27%, settlements 0.35% and yards 0.71 %. Among the total land area, the area of cultivated land for agriculture reaches 471 hectares or 94.20% of the total potential area. Meanwhile, rice fields and horticulture have reached 159 hectares or 79.50% of the total 200 hectares of potential land area [22].

2.2 Data collection

Data collecting of this study took place in June 2019. The first step in this research was selecting the potential informants using snowballing sampling method [17]. Forty informants were selected representing different types of stakeholders including village government, community groups, and farmers.

The data collection for qualitative method was conducted through direct interview techniques to interviewees with open-ended questions. The data collection including interviews records and notes. The semi-structured interview questions were designed to solicit feedback and data on each of these theoretically important concepts. This question guide helped us to reduce bias during the data collection and describe the actual achievements that emerge from this study. The questions were clustered into three main categories including awareness, knowledge and capacity, and intervention of external parties.

Statistical data and documents from the informants were collected to support dan to validate claims from the interview stage.

2.3 Data Analysis

During the process of analysis, the data including interviews records and notes, printed documents, and government statistics data was organized and broken down into manageable units, categorized and organized by research concept/question [8]. The interview records will be transcribed and translated into English for further analysis [17][19]. The next step is clustering similar codes to construct a smaller number of categories then defining pattern codes [17]. Researchers coded all the interview notes, and the results were checked to ensure reasonable inter-code reliability. Coding was reviewed by at least two members of the research team to ensure consistency and theoretical coherence. Where possible, data that was gained from participants and interpretations derived from the data was shared with key participants to ensure accurate capture of their comments [2].

Transcription of interviews were organized and categorized [8] for further analysis [17]. The similar codes were clustered to construct the top categories then defining pattern codes [17]. During the analysis, NVivo software was used to help organize the multiple themes found during this analysis. The three clustered question groups then became unit analysis of this study to examine the findings of previous studies.

3 Result and Discussion

Through analysis of interview transcripts, researcher identified three principal themes that were drew from literatures in which influenced the way of people in the study area managing their lands. These include level of awareness, adequacy of knowledge and capacity, and contribution of external stakeholders that become factors of switching people's livelihoods. The interviewees responses were varied and distributed in each theme as shown in Table 1.

Table 1. Number of respondents citing positive and negative examples of contributing factors

Key themes	Sub-themes	Number of respondents
Contributing factors	Awareness	
	-Positive	36
	-Negative	4
	Knowledge and capacity	
	-Positive	38
	-Negative	2
	Intervention of external parties	
	-Positive	40
	-Negative	-

3.1 Awareness

First, regarding awareness, most of the people are aware of the existence of forest area as a buffer zone to protect the village. Undisputable, the forest provides multiple benefits for the people in the shape of environmental services such as fresh water, good quality of air, and non-timber forest products. The awareness of the importance of ecosystem sustainability may change the farmer to practice more sustainable [10]. An informant stated that:

> "…forest area should be protected as the sources of our livelihoods…"

By contrast, some people were taking for granted. They used to run a destructive practice i.e., illegal logging. At the end of the day, they realized that such activity may harm their lives, especially the midst uncertain weather patterns. A supporting quote for this claim was:

> "…illegal logging contributed to flooding and landslides events in extreme rainy season…"

The previous literature showed the occurrence of disaster events may increase awareness of local actors [23][9]. Good understanding and adequate information are not sufficient to make stakeholders aware of and to develop a better collaboration [20]. Nevertheless, experiencing natural events such as droughts and floods can improve awareness of the people [9]. Organic agricultural practice is the main activity of Aunupe villagers to fulfil their day-to-day needs. In addition to that, this livelihood is a part of protecting surrounding forest as a buffer zone, lands, and water sources. Among other things, the people expect to improve their economy through fresh products they can sell in and outside the village [21].

3.2 Knowledge and capacity

Second, nearly ninety percent of respondents confirmed that Knowledge and capacity of the community effect on the increased of sustainable agricultural practices. Knowledge and capacity of community in water and land management issues are essential, this affects the way of people to take a decision and to behave [9]. Several cases demonstrated that villagers succeeded to implement community-based natural resources management.

Some supporting statements are:

> "…mixing crops and trees through agroforestry is more beneficial…"

> "…organic farming is good for human health and environment…"

The choice of an organic farming approach was motivated by the expansion of the Aunupe Village community's planting area which leads into the forest that surrounds the village. This is threatening considering the position of the Wolasi area as a buffer zone of the Wanggu watershed. Through organic farming, the communities can continue managing the land sustainably with lower rate of soil saturation that prevent them to exploit the forest to replace their agricultural land [20]. Furthermore, transforming monoculture crops to polyculture methods and agroforestry practices is an appropriate way to increase community resiliency toward climate change impacts. The forest area in Aunupe Village is a buffer area to produce clean water and prevent flooding in the Kendari City and South Konawe Districts. By maintaining and utilizing forest areas organically, this means that forest can properly function in absorbing rainwater [12]. The good condition of the forest area in Aunupe Village can

continue to be one of the producers of clean water and keep the area of South Konawe Regency and parts of Kendari City safe from the risk of flooding.

3.3 Intervention of external parties

Third, all respondents agreed that the existence of collaboration of both government and non-governmental organization programs accelerated transformation of community livelihood [3]. The involvement of multi-stakeholders including government agencies, communities [15], private sectors, NGOs, and academia may achieve a better results of resources management [1]. Multiple interviewees indicated that:

> "…Forestry agency provided us assistances in managing land to be more sustainable and adaptive to climate change and disaster risks"

> "…International project developed a land management model as a reference for us"

Collective actions of relevant stakeholders lead to achieve a more successful natural resources management including lands for living [18]. Integrated planning, implementation, and monitoring of multi-stakeholder is an effective model that led to successful management in many countries around the world [6]. Most of the interviewees stated that in the past decade, there were multiple collaborated programs that were supported by both local governments, NGOs, and international donor including CIFOR and Australian Consulate General, Makassar.

3.4 Transformation of livelihood

Along with the increase in population, community demands are getting higher for arable land as a source of livelihood [2]. The limited agricultural land around the forest encourages the community to expand the land for agricultural activities which often enter the forest area. On the one hand, part of the forest area is in a non-forested condition and has sufficient potential for agricultural or agroforestry activities that can provide socio-economic benefits for the community and the environment [21]. On the other hand, efforts to utilize it optimally are still constrained due to unclear roles of the community and property rights [1]. Whereas clear property rights are an important factor for all parties, including the community and family as the smallest unit of society, to manage resources better. The growth of population is one of the factors driving the increasing need for land as a source of livelihood. When the land is no longer sufficient to be managed and meet the basic needs of life, then a farmer will look for other land to meet the shortage. As a result, new land was opened to expand agricultural land. Land clearing does not only occur around the village area but extends to the surrounding forest area which in many cases gives rise to land conflicts. Fundamentally, the community views the importance of land security as a need for natural resource management rights [1].

Despite the challenges above, this study found several types of livelihoods that were transformed into the more landscape-based and eco-friendly ways to address the climatic changes [10] based on the contributing factors. The transformed livelihoods including illegal logging to organic farming and agroforestry practices, and ordinary farming to non-pesticides agricultural practices as shown in Figure 1.

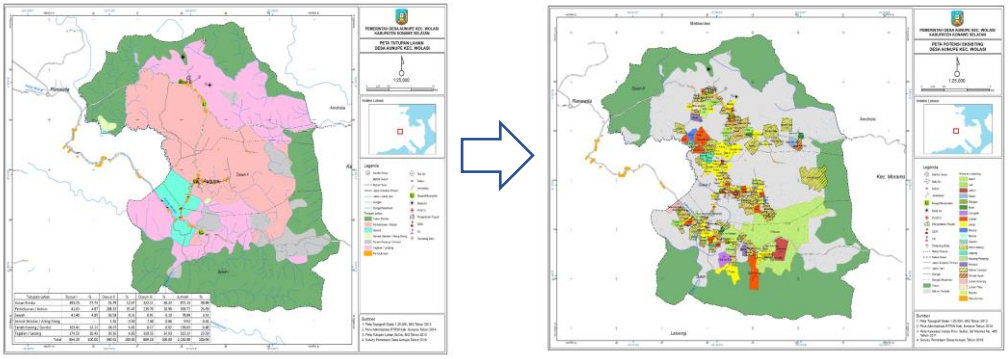

Fig. 1. Map of distribution of variety of land use and transformation agricultural lands (Source: Komunitas Teras)

4 Conclusion

Some take away conclusions of this research are the availability of resources influences the way of people to behave and govern their land, knowledge and capacity of community attributed to the willingness of community to transform their livelihood, intervention of government and non-governmental institution accelerate the processes of transformation.

This research found a few transformations of livelihoods that take place because of several contributing factors. People quitted to practice illegal logging and turned it into organic farming and agroforestry because the occurrence of natural disasters that improved their awareness of environment sustainability. Moreover, the farming practices also changed to more eco-friendly method, whereas the use of chemical pesticides were abandoned because the people already have awareness and good knowledge of land management to protect surrounding environment, specifically water sources and at the same time, they could generate income from adding value of agriculture products by providing healthier commodities.

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