

Contribution of Forestry Buffer Areas for Sustainability of Forest Society Community: Case Study in Enclave Lindu National Park Lore Lindu

1st Bambang Hariyanto

*Department of Geography, Faculty of
Social Sciences and Law
Universitas Negeri Surabaya
Surabaya, Indonesia*
bambanghariyanto@unesa.ac.id

2nd Heru Setiawan

*Makassar Research and Development
Centre for Environment and Forestry
Environment and Forestry Research
and Development Institute of Makassar
Makassar, Indonesia*
hiero_81@yahoo.com

3rd Selli Fidi Yani Wardani

*Directorate General of Sustainable
Management of Production Forest
Ministry of Environment and Forestry
Jakarta, Indonesia*
selli.wardani@gmail.com

Abstract— The need for food availability has become a global issue with the inclusion of food security issues or "zero hunger" in a global development agreement called SDGs / Sustainable Development Goals. The government through the Nawacita program (Jokowi's Program) has also raised the issue of food security as one of the priorities of national development. In line with the national priority program, the forest area of the buffer zone has a multifunctional role, one of which is as a source of food reserves for the community surrounding the forest. This study aims to study the contribution of buffer forest in the food supporting of the food security of forest-based communities based on flora and fauna. The method used in this research is a descriptive qualitative method. The data were collected by interview, questionnaire, and field observation. Interviews were conducted in depth with key respondents using question guides, while observation techniques were conducted to identify the types of flora and fauna that could potentially serve as community food reserves based on interview results. The result of the research shows that the forest area of the buffer zone of Lore Lindu National Park (TNLL) located in Enclave Lindu has the potential of 60 (61%) of food reserves (flora), while for fauna that has potential as food reserve 39 species (39%). Plant part that is utilized for food consists of fruit, leaves, umbut, stem, skin, roots, whole parts, and others. Utilization of animals for community food reserves vary widely, including groups of fish, birds, mammals, reptiles, and amphibians.

Keywords— *Forest, buffer zone, food reserve, community*

I. INTRODUCTION

Food security is one of the issues that is a development priority, especially for developing countries. Population growth which is not accompanied by an increase in food production, decreasing purchasing power, limited accessibility and climate change are some of the factors causing food security levels to decline or in other words food insecurity. Forests with all their benefits are a source of biodiversity that can be used by the surrounding community to fulfill their daily needs, including food needs. In this case, the unwise use of forest resources will be a threat to its sustainability, thereby reducing the function of forests as food reserves.

One of the tropical forests that is rich in biodiversity is Lore Lindu National Park (TNLL). The TNLL forest area has been established through a Decree of the Minister of

Forestry and Plantations Number: 464 / kpts-ii / 99 on June 23, 1999 with an area of 217,991.18 ha. TNLL has a fairly complete, unique and specific ecosystem because it is located in the transition zone of the Asian zone and the Australian zone or better known as the Wallacea Zone. Data obtained from the Lore Lindu National Park Office states that in the TNLL area there are approximately 266 species of flora and 200 species of fauna. In addition to biodiversity, the TNLL forest area is also rich in sources of traditional medicines. The TNLL area has approximately 415 types of traditional medicinal materials from 287 types of plants.

The huge resource potential that is owned by Lore Lindu National Park is very unfortunate if everything will be damaged due to uncontrolled use / exploitation. Therefore, various prevention efforts and handling of the dangers of forest destruction must be carried out immediately so that the threat of danger of forest destruction does not occur in TNLL. One way that forest areas in the TNLL are not damaged is by strengthening the use of buffer zones outside the TNLL area. The buffer zone as an area outside the national park area which is directly adjacent to the national park is an area that is very important to protect and reduce pressure on the national park area so as not to be degraded. With the support of a good buffer zone forest, the core forest area in the national park can be maintained.

One of the TNLL buffer forests is the Lindu Customary forest area in the Enclave Lindu area. Enclave is a land owned by an individual or legal entity in a forest area based on valid evidence in accordance with the provisions of the legislation. The Lindu customary forest area has been designated as an enclave along with the TNLL inauguration based on the Decree (SK) of the Minister of Forestry and Plantation No. 464 / Kpts-II / 1999, dated June 23, 1999. The lindu customary forest area has a role as a food source for communities around the forest. The lindu enclave community is a native tribe who has local wisdom in utilizing natural resources, especially forests. This is consistent with the statement of Nopandry (2007), traditionally indigenous peoples have local wisdom which is the potential and strength in managing a forest area. This can be seen from their existence which is always accompanied by the existence of forests for hundreds of years which is a proof of civilization in forest conservation.

The utilization of the buffer zone forest to meet the life needs of the community around the conservation area is very important to be done so that the pressure on the conservation area can be reduced. Based on the above thoughts, it is deemed necessary to conduct research on the contribution of forest in the Panyangga area to food security in the surrounding forest communities: a case study in Enclave Lindu Lore Lindu National Park. This study aims to examine the utilization of the buffer zone forest of Lore Lindu National Park in the Enclave Lindu area to support the food security of the surrounding community based on flora and fauna.

II. RESEARCH METHOD

A. Research Location

This research was conducted in TNLL buffer zone located in Anca Village and Tomado Village which is included in Loka Lindu National Park Enclave area. Administratively, Lindu forest is included in Lindu District, Sigi District, Central Sulawesi Province. Geographically, the area lies at the coordinate point $01^{\circ} 18'40''$ south latitude and $120^{\circ} 02'60''$ BT.

B. Data Collection

Method The study was conducted to obtain primary and secondary data. Primary data were obtained by using an in-depth interview method, questionnaire and direct observation on condition and findings during the interview process. The data collection of interviews and questionnaires was conducted on the communities in Anca and Tomado villages with the target of community leaders, indigenous elders and communities daily interacting with forests. In general, communities around the area of livelihood as farmers (rice fields and gardens) and fishermen. Interview method was conducted to identify and inventory the utilization of plants and animals in the area of the buffer zone of TNLL which is utilized by society as a food source. Secondary data are community profile data obtained through the village, sub-district and office offices of the Central Bureau of Statistics.

III. DATA ANALYSIS

Data obtained from interviews and field observations are then analyzed using qualitative analysis using frequency tables, then described and interpreted using descriptive analysis. The qualitative analysis aims to analyze the process of a social phenomenon in the community, obtain a complete picture of the process and analyze the meaning Which is behind the information, data, and processes of a social phenomenon [1]. The analysis of primary and secondary data refers to the opinion of Miles & Huberman (1992) in [2], where data is processed by performing three stages of activity and performed simultaneously, ie data reduction, data presentation and conclusion through data verification. The results of the qualitative data analysis are further supplemented with the results of the interpretation of quantitative data obtained from reports or research activities that have been done previously.

IV. RESULT AND DISCUSSION

A. Characteristics of Society

The TNLL buffer zone located in Enclave Lindu has three types of ecosystems, namely primary forest ecosystems, secondary forests and forest ecosystems around the waters of Lake Lindu. Land use in Enclave Lindu is predominantly forest (82.3%), whereas for settlements only (0.05%) and Lake Lindu 6.28%. Environmental biophysical data measurements were undertaken to illustrate the biophysical and microclimate conditions around the study site.

The total number of respondents is 54 respondents spread in two villages namely Tomado Village Anca Village, Lindu District, Sigi Regency, Central Sulawesi. The lindu enclave area is inhabited by several tribes consisting of the tribe of Lindu, Bugis, Java, Makassar, and Arab. The age composition of most respondents belongs to the productive age (15-64 years). Percentage of respondents belonging to the productive age of 36 people or reaching 67% and 18 persons or 33% included in the nonproductive old (> 64 years) whereas the respondents included in the nonproductive age of young (< 15 years) did not exist. This shows that most of the community is a workforce that can work with optimal energy. The respondent's characteristic is based on the number of family members indicated, mostly in small households (2-4 people), 27 respondents or 50%, middle class (family member 5-7 persons).

The results showed that the income level of most of the people is low, that is between Rp 150.000, - to Rp 500.000, - / month as many as 24 respondents or with a percentage of 45%, the number of respondents belonging to medium income is between Rp 500.000, - to Rp 1,000 19, or 19% of respondents or as many as 11 or 20% are included in high-income families above Rp 1.000.000, - / month. Under these conditions need to be further improved programs Poverty alleviation by the government and related parties so that the level of welfare of the people who mostly work as farmers is increasing. The education level of most people is low. The highest percentage of community education is elementary school graduation and does not pass elementary school as much as 40 respondents or equal to 74%, then junior high as 6 respondents or equal to 11 %,

The result of this research indicate that the distance between the community and the forest is mostly (≤ 1 km), that is 35 respondents or with percentage of 65%, medium distance (1-2,5 km) as many as 11 respondents or with percentage of 20% And that are classified as far (> 2.5 km) as many as 8 respondents or with a percentage of 15%. As community access to forests increases the community's interaction with forests and the higher the level of community dependence on forest areas [3]. Most societies work as farmers (gardens and rice fields). Besides as a farmer also has a side job as a fisherman and towing ojek. The number of respondents who livelihood as farmers as much as 46 respondents or by 85 %, The most important garden yields are coffee and cocoa [4]. The average price of coffee per bleg reached Rp.25.000, -, with an average harvest period every 3 weeks once harvest. The price of cocoa per kg reaches Rp.17.000, -, with the average harvest

period every 2 weeks once harvest. The price of rice per kg reaches Rp 5,000, - with an average harvest period of 6 months, and the maize price per kg reaches Rp.1,300, with an average harvest period of 4 months

B. Utilization of Flora and Fauna

The TNLL forest area and surrounding buffer forests are forest areas with high biodiversity. The high level of biodiversity in forest ecosystems shows the level of stability of a forest community. The higher the level of diversity, the higher the level of stability of a community. Plants are a source of food, board, clothing, medicine, crafts, social activities and so on. The types of flora found in TNLL are very diverse. Based on data from the Lore Lindu National Park Office, the dominant tree species in the region are palm or wanga (*Piqafetta elata* and *Arenga* sp). Wanga (*Piqafetta elata*) is not found at altitudes above 1000 m above sea level. Trees that are often found include; Uru (*Elmerillia* sp), *Casuarina* sp, *Duabanga moluccana*, *Vatica* sp, *Pangium edule*, and *Eucalyptus deglupta*. *Eucalyptus deglupta* trees are in the form of pure stands. In the lower mountain forests found *Litsea* sp, *Agathis philippinensis*, various types of bamboo and *Ficus sumatrana*. For areas with elevations above 2000 m above sea level, *Castanea acuminatissima*, *Tristania* sp, *Pandanus* sp, *Phillocladus* sp and various ferns were found. Various types of fauna are also found in the TNLL area. Some types include endemic fauna protected by law such as anoa (*Bubalus* sp), babirusa (*Babyrousa babyrussa*), black monkeys (*Macaca tonkeana*) tarsiers (*Tarsius spectrum*), cuscus (*Palanger* sp), monitor lizards (*Varanus* sp), Maleo bird (*Macrocephalon maleo*), hornbill (*Rhyticeros cassidix*) and other birds.

Expansion and improvement of transportation facilities has greatly influenced development in all fields. One of them is the social and cultural change of society. Social change involves changes in social processes or about the composition of society. Social change in society is influenced by many things, among others due to the advancement of science, technology, communication systems, transportation, urbanization, changes in human expectations and demands and others. Lake Lindu enclave area is one of the isolated areas with limited transportation access. Transportation to the Lake Lindu area can only be reached by motorbike (ojek). The Lake Lindu enclave is administratively included in Lindu District, Sigi Regency. Lindu District consists of four villages, Puro Village, Langko Village, Tomado Village and Anca Village, with Tomado Village as the capital of the sub-district. The research location was focused on the Tomado and Anca villages because there were still many people who used the forest to meet their food needs. The characteristics of traditional communities are that they still maintain the traditions of their ancestors, both in terms of the rules of relations between humans and with the natural surroundings that prioritize harmony and harmony. The results of the study show that there are still many local communities around the forest area of TNLL that use several types of forest plants and hunt for animals as alternative food sources. The number of forest plant species that can be used for community food sources is 60 species or 61% and for

animals used for community food sources as many as 39 species or 39%.

The highest utilization of plant part up to the lowest is the fruit with 28 types of plants (42.42%), leaves with 14 types of plants (21.21%), umbut with 8 types of plants (12.12%), 4 types of plants (6.06%), other parts (flowers, nira, bamboo shoots, fruit buds) as many as 4 types of plants (6.06%), skin parts with 3 types of plants (4.55%), With 2 types of plants (3.03%) and the utilization of the whole as much as 3 types of plants (4.55%), dominated by the type of mushroom [5]. In this study, the meaning of the umbut is the tip of the stems of the tree (usually from the type of coconut and palm) is still young and soft so it can be eaten. This is slightly different from the results of research conducted by Anggana (2011) also mentioned that the most widely used plant parts by the people around Gunung Merapi National Park is the leaf part of 47 species and the least is the root part that is 1 type of plant. This is also in line with [6] which states that, from 292 species of plants utilized by Kampung Adat Dukuh community in Garut, West Java, as many as 110 species (37.67%) are the highest percentage of leaves.

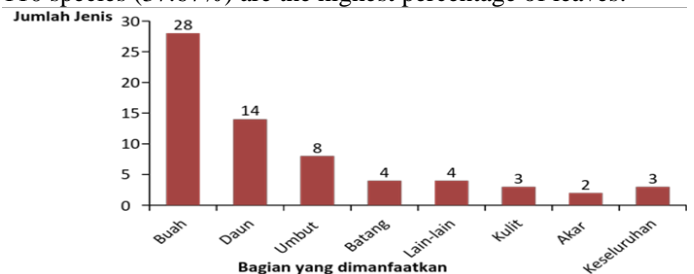


Figure 1. Utilization of plants for community food reserves in Enclave Lindu

Utilization of forest plant as a food source can be divided into three parts, namely food substitute food staple (carbohydrate), food sources in the form of vegetables and food sources in the form of fruits. The forest plant used as a food substitute for sour food is sago (*Metroxylon sago* Rottb). Some types of forest plants used for vegetables are gonato leaves, cashew, ketapu, melinjo, miowa, forest nails, tombu, walionco and wioya while the whole mushroom is cooked as a vegetable. Forest plants used for fruits such as anca fruit, baloli, dengen, kompu, munte, palosa, walalaoe and others [7].

Utilization of animals / animals for the needs vary widely ranging species of fish, birds, mammals, reptiles and amphibians. Some of the species of fish consumed by the community such as tilapia fish, cork fish, carp, tawes, janggut, massapi, tawes, and shrimp. Most of the fish is the catch from Lake Lindu [8]. Tilapia fish most consumed by the community. In addition to consuming this type of fish are sold and become the main income of the community. Some of the animals belonging to the reptile group include lizard and phyton snake, from the amphibious group of forest toads, from the mammal group of anoa, wild boar, cuscus, deer, bats and forest rats. The aves / birds are the most numerous species. Some types of birds consumed by the community include allo, forest chicken, stork, lowe, grouse, quail, hornbill, and dove.

IV. CONCLUSION AND RECOMMENDATIONS

The forest area of the Lore Lindu National Park buffer zone within the Enclave Lindu area has a high diversity of flora and fauna. The abundant potential of flora and fauna has a big role in supporting the life of surrounding communities, especially in the field of food. The buffer forest area located in Enclave Lindu has 60 species (61%) of food reserves (flora), while for fauna (fauna) which has the potential to provide food reserves of 39 species (39%). Plant part that is utilized for food consists of fruit, leaves, stem, skin, roots, whole parts, and others. Utilization of animals for community food reserves vary widely, including groups of fish, birds, mammals, reptiles, and amphibians.

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