

FOREST CONSERVATION AND JOINT FOREST MANAGEMENT WITH LOCAL COMMUNITY IN UPSTREAM JENEBERANG WATERSHED OF MANIMBAHOI VILLAGE, SOUTH SULAWESI, INDONESIA

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Submitted October 2022; accepted April 2023

Preserving the forest ecosystem in Jeneberang watershed is important for sustainability of the Jeneberang River and to ensure water supply for downstream activities. In order to ensure sustainability, forest conservation in the upstream area is significant and this involves participation of local community. However, their participation is not formal; rather it is voluntary effort to protect the area from further damage. Therefore, this paper examined the benefits received by local communities living in Manimbahoi village through forest conservation efforts. It has two objectives, mainly to describe the benefits for local communities' participation in preserving their forest and to analyse the purpose of local communities' voluntarily engagement in forest conservation. Field research was carried out from May to June 2021. Data collection was carried out by in-depth interviews with several key informants, observation, and through literature review. The results of the study show that local communities are encouraged to maintain forest areas for water conservation for rice fields and plantations. In addition, part of the conserved area has become a local community garden. Hence, forest conservation ensures sustainable livelihood of the local community.

Keywords: Local community, joint forest management, forest conservation, Jeneberang watershed, sustainable livelihood

INTRODUCTION

In Indonesia, the involvement of local communities legally in managing and conserving forest areas is considered novel. The community involvement started after the issuance of Regulation No. 6, 2018 (*Perdirjen KSAE No. 6/2018*) by Director General of Natural Resources and Ecosystem Conservation concerning Technical Guidelines for Conservation Partnerships in Nature Reserves and Nature Conservation Areas, hereafter referred to as Guidelines for Conservation Partnership or GCP. Nevertheless, the implementation of the above formally through a Cooperation Agreement has not been achieved when this research was carried out in 2021 in Manimbahoi village.

Community involvement up until 1990 in conservation activities planned and design by government of Indonesia was limited and most of the conserved areas were still free

from community activities (Purwanto 2017). The protected area management approaches before GCP was implemented showed that local communities do not derive direct economic benefits from the conservation area. Although many local communities living in conservation areas managed their surrounding land, these activities were carried out illegally leading to tenure conflicts. Delicate handling of tenure conflicts is important so that they do not evolve into latent threat to these protected or conserved areas and its biodiversity, which in turn can damage the entire ecosystem structure in the conservation area (Kementerian Lingkungan Hidup dan Kehutanan 2021).

Indonesia has about 22.7% of all forest areas which is about 27.4 million hectares have been designated as conservation areas (MOEF 2022). Rules for managing these conservation areas evolved from strict preservation to conservation

that allows some degree of utilisation to serve human needs. Sahide et al. 2018 argued that the terms preservation and conservation should be differentiated. Preservation implies static maintenance of natural ecological structure (i.e. protection from use) while conservation refers to safeguarding ecological functions (i.e. proper use) opens up the possibility for utilizing natural resources. Therefore, the involvement of local communities in the management of conservation areas is crucial given their dependence on these forest resources. Sunderlin et al (2005) in their case study suggested that the rural poor tend to be disproportionately dependent on forest resources, namely that a higher proportion of their total income comes from forest resources. Therefore, the involvement of local communities is effective in avoiding conflicts (Qodriyatun 2019) that can lead to strengthening of relations between local communities and conservation area managers.

Local communities' involvement in conservation area management, according to Ichsana et al. (2021), may resolve the problem of resource conflicts whereby the latter is driven by the approach and use of the term protection by the government. The authors emphasised that the conflict is partly triggered by the separation of local communities from conservation/protected areas, as implied by the term, and this is even before the forest area has been designated as a conservation area. It has been proven that separating the local communities from conservation areas does not actually make the latter more sustainable or minimise damage. According to Spiteri and Nepal (2008), protected areas can integrate social, economic and ecological goals successfully. Studies have further documented that involving local communities in the management of conservation areas ensures the latter are well maintained. Qodriyatun (2019) noted that that communities living in and around forest areas, on the one hand, have contributed immensely to forest conservation because most of them lived there for many generations and evidently know how to manage the forests without destroying or exploiting them. Local communities in fact are known to have the ecological knowledge and wisdom on how to interact with their environment without destroying it. Mutia et al. (2019) who studied

three tribes in Indonesia, namely Sasak, Bali Aga and Minangkabau, regarding local wisdom in managing their customary forests, concluded that their customary law or local wisdom is effective in preserving the forests and their environment through wise and sustainable use of forest resources. Therefore, Vermeulen and Sheil (2007) recommended that local communities living around conservation forest areas are treated as part of the solution and not part of the problem, when implementing strategies related to forest conservation. Padmanaba and Sheil's (2006) case study of East Kalimantan (Indonesia) concluded that in principle everyone without exception support conservation.

The current research examined forest conservation involving the local community in Manimbahoi village, Parigi subdistrict, South Sulawesi. The research found that the forest ecosystem is very significantly important for the villagers as forest dwellers. This is primarily due to the fact that the forest ecosystem has a direct impact on their lives. Yusran and Abdullah (2010) reported that the dominance of shrubs, dry land agriculture and severe topographic conditions do not allow the forest to function as a regulator of the water system.

An earlier study found the loss of forest areas in the upstream part of the Jeneberang watershed is due to massive land conversion into settlements and horticultural agriculture (Tim Terpadu, 2019). Hence, in order to improve forest cover in the Jeneberang watershed, it is important to involve the community in managing the forest area who can gain access to the benefits that exist in the area while keeping the area sustainable. Santika et al (2017) underlined the importance of involving the community in forest management, which they opined is a win-win solution for reducing deforestation while improving the welfare of rural communities in developing countries, including Indonesia.

This paper examines the benefits received by local communities living around the conservation area in Manimbahoi village. The objectives for the study are to describe the benefits local communities gain when they participate in preserving the conservation area and to understand the reasons why local communities are willing to maintain

conservation areas even though their involvement is not formal. Involvement of local communities in managing forest resources, such as in Joint Forest Management (JFM), will no longer make them illegal forest users, instead they are now co-opted as legal users in a formal, regulatory forest governance system (Saito-Jensen 2008).

Joint forest management: a review

One way of involving the community in managing the forest is through Joint Forest Management (JFM) which is a collaboration between the government agency responsible for forestry and the local community. This collaboration also encompasses the following values; co-management, participatory management, joint management, shared management, multi-stakeholder management or round-table management (Kusumanto et al. 2005). The JFM is a participatory management practice in the forest sector. This is intended to maintain the sustainability of the forest and minimise damage. Through JFM, a balance of biodiversity conservation and livelihood improvement for poor local communities is achieved (Persha 2016).

It is hoped through JFM, the government and local community share responsibilities related to forest management and benefits in terms of the proceeds (Kant & Cooke 1999). It means that JFM is based on the principle of co-management between the two main stakeholders, the forest department, and members of the community (SPWD 1992), so that the latter becomes one of the players involved in the management of conserved forest areas (Ballet et al. 2009). Joint forest management also gives an opportunity to local community to participate in managing forest resources around them. Therefore, under JFM village communities are entrusted with the protection and management of nearby forests. Collaborative management approaches such as JFM have emerged as an effort to offer win-win solutions for this on-going conflict (Roviana 2015). Under JFM arrangements, local communities are permitted to collect non-timber forest products (NTFPs) and enjoy the economic benefits (Jana et al. 2009).

Hence, JFM can be understood as co-management approach between government

and local community. According to Carter and Gronow (2005), the parties collaborate because this approach is a rational response to a crisis in forest management and constitutes an acceptance that, under current arrangements, sustainable forest management is unworkable. Carter and Gronow continued that particularly in the case of large, public forest resources, where disaffection or conflict between government forest services and local communities has become the norm, collaboration is seen as a way out of this stalemate. In these circumstances, the rationale for governments to collaborate is to address the social injustices that undermine sustainable forest management.

The purpose of involving local communities is to improve their welfare and increase forest sustainability. Through JFM, local communities have the access to benefit from forest resources, especially non-timber forest products (Kashwan 2003, Murali et al. 2002, Prasad 1999) and utilise the forest floor by planting cash crops like coffee (Veriasa et al. 2020), without fear of being arrested by forestry officials who are assigned the task of managing state forest areas. Access to forest or tree resources around local community can also help rural households to diversify their livelihood base (Arnold 2001). Majalia (2019) opined that participatory in this regard implies the involvement of local communities belonging to forest user groups who are part of the management and conservation of forests team. By involving local communities in the management of forest resources, it is hoped that their welfare is improved on the one hand and forest sustainability maintained on the other while minimising forest degradation. Nanang and Inoue (2000) noted that most of the locals have their own systems and practices for managing the forest.

India is an example of a nation which has successfully implemented JFM. Introduced in 1990 (Saito-Jensen 2008), the concept of JFM was successfully implemented here and in Nepal where tens of thousands of forests are currently co-managed in India as well as Nepal (Borrini-Feyerabend 2010). This programme was supported by various international donors, such as World Bank, Department for International Development United Kingdom and Overseas Economic Cooperation Fund Japan (Khare et al. 2000). Ghate (2000) explained that in

Buldhana District, India, JFM became popular in many villages because of the successful cooperation between the forest department and the local communities. The author described five factors that contributed to the wide acceptance of JFM in Buldhana; taking up of activities generating income in the short term, freedom given to the locals to take decisions according to their priorities, co-ordination between various developmental agencies working in the area, devolution of authority with the forest department and introducing the element of flexibility and continuous learning. Therefore, through JFM, India is returning to the concept of community management.

In Indonesia, JFM is implemented through community-based forest management such as Forest Village Community Development (*Pembinaan Masyarakat Desa Hutan/PMDH*) (Rachmawan et al. 2021). However, Joint Community Forest Management (*Pengelolaan Hutan Bersama Masyarakat/PHBM*) (Veriasa et al. 2020) in conservation forest area is still rare as it is a new initiative and only introduced in 2018. Forest management studies involving local communities are mostly carried out in production forests (Oktalina et al. 2022, Santika et al. 2017, Nanang & Inoue 2000, Rachmawan et al. 2021, Veriasa et al., 2020) and protected forests (Utami & Ratnaningsih 2018). As for the management of conservation forests in collaboration with local communities before *Perdirjen KSAE No. 6/2018* was issued, activities were carried out outside the areas with the aim of shifting the local community's dependence on conservation areas. Although a few collaborations had been carried out in conservation forests, such as

national parks (Desmiwati & Christian 2019), those collaborations were not conservation partnerships as defined by JFM or a similar definition linked to *Perdirjen KSAE No. 6/2018*. Therefore, this paper aims to add knowledge on conservation of forests in Indonesia via the adoption of JFM.

MATERIALS AND METHODS

Research area description

Manimbahoi village in Jeneberang watershed upstream is also a part of Parigi subdistrict, Gowa regency, South Sulawesi province (Figure 1). The village is located upstream of Jeneberang river is about 120 km in length and ends in the sea of Makassar. The topography of the land in Manimbahoi is wavy and hilly with relatively narrow flat land surface. The altitude of Manimbahoi village reaches from 1000 to 1500 meters above sea level (Cruz 2018).

The distance from Manimbahoi village to Bawakaraeng mountain is around five kilometres and is close to the foot of Mount Bawakaraeng, an inactive volcano. Mount Bawakaraeng has been in news since the landslide in 2004. The volume of landslide material in the form of rock and sand reached about 232 million m³ (Hasnawir & Kubota 2008), and covered the valley with a depth of 500 meters (Irmawati 2004). In recent years, the stone and sand from the landslide became a source of income for some villagers through mining activities in the Jeneberang river.

The Manimbahoi village covers an area of 427,700 ha or 32.2% of Parigi subs district area with total area of 1,327,600 ha (BPS 2020).



Figure 1 Manimbahoi village in Jeneberang upstream

The village is divided into five hamlets, such as Borongkopi, Kalolo, Bawakaraeng, Balleanging and Pattiro. According to BPS (2020), land use in Manimbahoi village can be divided as follows: conservation forest (426,160 ha (99.64%)), paddy fields (281 ha (0.07%)), garden (1064 ha (0.25%)) and settlement (195 ha (0.05%)). The dominance of conserved forest areas indicates the Manimbahoi villagers are not able to freely expand their settlements and agricultural land. Additionally, Manimbahoi village is situated on highland and hilly areas with an altitude of ± 900 m above sea level. Its population in 2020 was at 3065. Their main source of livelihood is paddy farming, horticultural crops and non-timber forest products. They also use the forest floor to grow coffee plants.

Data collection and analysis

Qualitative research was conducted in Manimbahoi village and its surrounding areas in South Sulawesi between May and June 2021. Data was collected through in-depth interviews with key informants in Manimbahoi village, Tinggimoncong subdistrict and Gowa regency. Those informants were village heads and staff, local community leaders, farmers, NGO activists, academics in Hasanuddin University, members of forum of DAS, and officials from Ministry of Forestry in Malino and Makassar. They were interviewed at their homes, office, forest, NGO office and campus. A total of 13 people was interviewed with each session lasting between one and two hours. The author also visited the forests and plantation as well as farms. The primary data were supported by secondary data and information collected from literature review. Both qualitative and descriptive approach were employed in this research.

RESULTS

Livelihood of villagers from illegal logging to horticulture farming

The land in Manimbahoi village in particular and the Jeneberang upper watershed in general is fertile. This can be seen from the thriving plants such as horticultural crops, rice, and plantation crops such as coffee. Around 59.92 hectares are planted with coffee (Sumartini 2014). The fertile land is supported

by the inactive Bawakaraeng volcano. The complex geological history of Sulawesi has also contributed to the formation of a range of soil types, with important implications for coffee cultivation (Neilson 2004).

Although forest conservation efforts forbid cultivation of plants in protected areas, the local community is allowed to utilise the forest floor to plant coffee trees. Coffee has been planted for hundreds of years from the Dutch colonial period; they were known as Dutch coffee and the Netherlands supported the commercial planting of coffee. Coffee cultivation by Dutch colonials in the area around Makassar (South Sulawesi) began in 1750 (Neilson 2004). The villagers informed the authors that woven bamboo container called salarat was used to carry the coffee beans.

Coffee is a favoured plantation crop due to its low maintenance and does not require special care while fetching a high price market value. The coffee commodity is a mainstay for the villagers. According Ibrahim (2022), coffee is not just a trading commodity for the indigenous people of Manimbahoi, it is part of their cultural identity due to its historicity. Coffee is served at every ritual and feasts. Neilson (2004) reported that Manimbahoi village is located is one of the four Arabica coffee producing districts (Toraja, Enrekang, Mamasa and Gowa) in South Sulawesi; although farmers in Manimbahoi grow more robusta coffee (Cruz 2018).

Before the issuance of Law Number 11 Year 2020 concerning Creation of Work (*Cipta Kerja*), and Government Regulation No. 23 Year 2021 concerning Forest Management, planting of coffee in conserved areas was deemed illegal and its farmers always go into hiding when the staff of the Natural Resource Conservation Center (NRCC) in Malino execute their routine patrol operations. Nevertheless, after the issuance of the *Cipta Kerja* law, the local communities were allowed to cultivate coffee as long as the activity does not damage the function of the conserved areas. With the legalisation of community activities in forest areas, including coffee plantation, the locals no longer hesitate to make known their coffee lands in forest areas. Therefore, the community's concern for the protection of their forests has increased because they have assets in the forest. When a forest fire occurs, for example, the community works together to extinguish the fire hazard.

The local community was introduced to horticulture farming in 2015. Before then, they felled trees to be sold to woodworking or furniture companies around Gowa regency. At that time, it was difficult to stop illegal logging activities in the forest as the community did not have an alternative source of livelihood and they were not aware of the environmental impacts of damaged forests.

The introduction of horticultural agricultural knowledge from a Sundanese (Bandung) immigrant who came to Tinggimoncong sub-district helped stem the problem of illegal logging. The immigrants cultivated the land leased from local people. He hired the locals to help cultivate the land. The work inspired the locals to start horticulture farming and adopt its practices. The horticulture farming knowledge was passed on to the local community. Some of the locals grow rice but this is rotated among family members who inherit the rice fields. The rice fields in Manimbahoi village are not big and each family gets an opportunity to work in their paddy field after eight to 10 years.

Benefits of forests for local community

Manimbahoi village is located in a mountainous region and local trees act as an important barrier or protection against landslides. A few years ago, before horticultural farming was introduced in the village, trees were felled indiscriminately due to high demand for timber coupled with the fact the community did not have an alternate source of income.

Degradation of forest began as a result and it was conspicuous during the dry season because of drastic reduction in water flow from the forest. According to an informant, supplied water from forest to Manimbahoi village was low even during the rainy season.

The water source flows from two mountains, namely Bawakaraeng and Lompobattang, and it is not only used for irrigation but also for producing bottled drinking water. Bottled drinking water business is carried out by BUMDes (Village Owned Enterprises) Manimbahoi and the profit is considered as a source of income for the villagers as a whole. The commercial capital for building the bottled drinking water business came from the Manimbahoi village fund allocation in 2017

(KPPN Makassar II 2018). Using the trademark Tanralili Raya (TR) and it is distributed around Parigi subdistrict.

Although the forests surrounding their village constitute conservation areas, the local community is not aware of the borders of the protected forest, conservation forest, or production forest. Their knowledge therefore, about conservation efforts is minimal.

The community in Manimbahoi village have been accessing forest reserves. Accessing the forest to utilise wood, rattan, honey, palm sugar and grazing their livestock in the forest is also carried out by the community in the upper reaches of the Jeneberang watershed, namely Borisallo village (Yusran & Abdullah, 2007). They also collect twigs and harvest timber from trees. The cutting of branches and trees is carried out once a week when they visit their cattles which were released in the protected forest area.

The other environmental services enjoyed by the local community is ecotourism. The ecotourism in Manimbahoi village was unofficially started by Adnan Purichta Ichsan, the regent of Gowa from 18 November–19 November 2016. Known as Camping Day, the regent spent the night at Lake Tanralili (Figure 2). After the event, public facilities such as toilets were built around Lake Tanralili to accommodate visitors.

Ecotourism in Lake Tanralili is known as Lengkesse Tour and this has brought income for the villagers in the form of entrance tickets, parking sites for vehicles and groceries stalls sales in the Bawakaraeng hamlet. Lake Tanralili, which was formed after the landslide, has emerged as one of the major tourist camping destinations for young people. Visitors access Lake Tanralili via Manimbahoi village which leads to the entrance of the lake (Figure 3). Each visitor to Lake Tanralili has to observe 15 rules and participate in protecting the forest from damage as part of their responsibility to help the local community manage the forest resources.

The number of visitors to Lengkesse Tour before the COVID-19 pandemic reached 2000 per month and during the pandemic, it declined to 1000 per month. Visitors come from Makassar, Sungguminasa, Sinjai, and regency around Bawakaraeng mountains. Before the

pandemic, income from Lengkesse Tour reached more than IDR 10 million, obtained from the entrance fee of IDR 5000 per person. The income is then distributed to the village treasury for the maintenance of facilities and staff salary. Table 1 describes the tourist attraction spots and income derived from that by the villagers.

Figure 4 shows the transformation of the community in terms of their source of livelihood, from illegal logging previously to legal sources

of income, such as coffee farming, horticultural cultivation, sandstone mining, nature tourism and bottled drinking water business. Currently their main source of livelihood is coffee and horticulture cultivation, and sandstone mining along Jeneberang river. They have abandoned illegal logging. Environmental services from forests in the form of bottled drinking water and nature tourism are now additional source of livelihood. This transformation occurred in



Figure 2 Lake Tanralili was created after a large landslide at Mount Bawakaraeng in 2004 to form an inward basin

Source: <https://www.celebrities.id/read/danau-tanralili-eksotisme-dari-kaki-gunung-bawakaraeng-terbentuk-dari-longsor-besar-e5K08>.



Figure 3 Visitors to Lake Tanralili pay an entrance ticket of IDR 5.000 per person

line with public awareness of the importance of preserving forests and the environmental services people can access from well-maintained forest areas.

Local values to protect forests

The villagers of Manimbahoi have lived there for many generations. An informant, a community leader in Manimbahoi, said that his grandmother who lived in Manimbahoi village was the seventh descendant. This means the people who lived there have been accessing the forest resources as a source of livelihood for at least the past two centuries. The informant’s first ancestor came from Sinjai, a district in South Sulawesi today. Bawakaraeng mountain borders Sinjai district in the east side (Pabbajah 2012). The informant was 50 years old in 2021 and if one generation is assumed to be 25 years old, then the Manimbahoi villagers have been living

there for about 200 years. The local people who lived in Manimbahoi were no longer migrants and they have developed local wisdom according to the environment they lived in. Local wisdom refers to adaptation instrument to environment where one lives. The local leaders were unable to convince the villages to stop felling the trees as they were unable to offer alternative sources of livelihood. Thus, before horticultural agriculture developed in Manimbahoi, forest destruction in the village was unavoidable.

When the local community became engaged in horticultural cultivation, they began to appreciate the importance of preserving the forests and its valuable resources. The forest is also water source for their horticultural agriculture and hence needs to be protected. If they need to cut down trees to meet their needs, they are asked to fell trees that grows on their own land. If they want to access trees in forest conservation areas, then they must obtain a

Table 1 Utilisation of forest environmental services in Manimbahoi Village

No.	Types of environmental services	Activity
1.	Water utilisation	Bottled drinking water Paddy irrigation Household water consumption
2.	Eco tourism	Tanralili lake Bidadari waterfall Langkese waterfall Bontopudung camping ground Muncua hill photography Bulubarea (top of Mount Lompobatang)
3.	Forest stands as a landslide barrier	The community actively protects by agroforestry activities

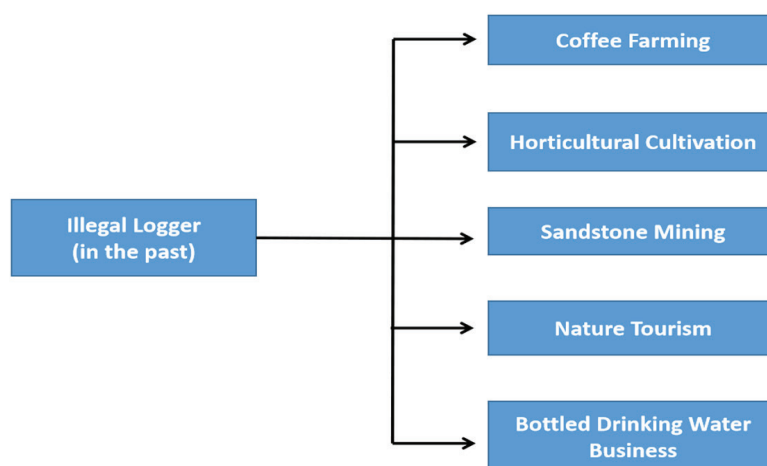


Figure 4 The transformation of Manimbahoi community's livelihood

permit from Ministry of Forestry through the NRCC beforehand and the trees must be solely for the purpose of building houses. However, the villagers are requested to plant as many as 10 trees each time one large tree is cut down. Additionally, residents or villagers who are getting married are obliged to plant 10 trees in the Manimbahoi area.

As indigenous people, they must protect the customary forests and it cannot be destroyed or wasted (called *tattakang na tukumbang* in the local language). According to local wisdom, those caught felling the trees are allowed to be beaten and immersed in water at in the early morning. The villagers practise 12 related customs known as *Adat 12*. One of which is called *Anrong Pa’rasangeng*, namely to protect and preserve the environment. According to the customary law, if a member of the community cuts a tree, they must plant a replacement tree.

DISCUSSION

Joint forest management and fundamental changes

There has been a fundamental change in community empowerment in forest conservation with the issuance of *Perdirjen KSAE No. 6/2018*. These regulations are derivatives of Ministry Regulation of Environment and Forestry No. P.83/MENLHK/SETJEN/KUM.1/10/2016 concerning Social Forestry; Ministry Regulation of Environment and Forestry No. P.43/MENLHK/SETJEN/KUM.1/6/2017 concerning Community Empowerment Around Nature Reserve Areas and Nature Conservation Areas; and Ministry Regulation of Environment and Forestry No. P.44/MENLHK/SETJEN/

KUM.1/6/2017 concerning Amendments to the Regulation of the Ministry of Forestry No. P.85/Menhut-II/2014 concerning Procedures for Cooperation in the Implementation of Nature Reserves and Nature Conservation Areas. These regulations aimed at encouraging independence and creating a prosperous community to participate in forest management and conservation (Prayitno 2020). The policy of forest management with the community has strengthened with the issuance of Law No. 11 of 2020 concerning Job Creation where this regulation provides wider opportunities for communities to manage forests. The derivatives of the job creation law are Government Regulations (*Peraturan Pemerintah/PP No. 23 of 2021 concerning the Implementation of Forestry and Regulation of the Ministry of Environment and Forestry (Peraturan Menteri Lingkungan Hidup dan Kehutanan/Permen LHK) No. 9 of 2021 concerning Management of Social Forestry.*

The joint forest management in Manimbahoi village is functioning smoothly not because of encouragement from government programs alone, but due to the ecological benefits of the forest contributing to people’s livelihood. The villagers’ awareness on the importance of protecting the forest was a gradual process after they began to realise the ecological benefits of the forest translated into in monetary value. These benefits together with changes in government policy to provide space for communities to be involved in forest management both have contributed to the success of joint forest management in the village of Manimbahoi (Table 2).

Manimbahoi village is in a mountainous area and forest vegetation is important to

Table 2 Changes in forest management

No.	Before joint forest management	After joint forest management
1.	Communities are considered forest destroyers	Communities became partners in forest management
2.	The orientation of the utilisation of forest products only focuses on timber	There is a shift in the orientation of the community by utilising non-timber forest products
3.	Forest fire are often ignored	Communities are moved to actively participate in extinguishing forest fires
4.	Trees are only valued for economic benefits (cut down for sale)	Trees in the forest are vital in preventing landslides. Felling the trees are stopped

avoid landslides. A few years ago, before the development of horticultural farming, villagers resorted to cutting forest trees due to the high demand for timber. Furthermore, they did not have alternate sources of income. Even when the community leader prohibited the villagers from cutting the trees to sell to logging operators, there was retaliation from the community who stated they had to resort logging to provide daily needs to their families. The leader could only advise them on the impact caused by damaged forests.

The felling of forest trees led to forest degradation and extended dry season which resulted in reduced water flow from the forest. One informant of this study related that water supply to the villagers was affected when they were indiscriminately felling the trees. An informant in Pattalang village said that drought during the dry season was uncommon before the felling of the trees. The forest area around Pattalang village was used as agricultural land, even though it was a conservation area.

Water sources from two mountains in the village of Manimbahoi, namely Bawakaraeng and Lompobatang are not only used for irrigation but also packaged and sold as bottled drinking water. The bottled water business is carried out by BUMDes, a village own enterprise of Manimbahoi, so income from the sales is considered shared income. The bottled water with the trademark Tanralili Raya (TR) is distributed around Parigi subdistrict. During the COVID-19 pandemic, demand for TR water plunged due to the no-crowd policy and physical distancing in Parigi sub-district and surrounding areas, including the village of Manimbahoi.

Although the forests surrounding their village constitute conservation areas, the local community is not aware of this concept whether it is a protected forest, conservation forest or production forest. This shows that the local community's knowledge about the forest, its utility and preservation is minimal.

Forest catchment area later emerged as an important concept when the villagers stopped felling the trees and began horticultural farming. Water supplied by the forest is needed to irrigate their farmland and paddy field. If this area is damaged, the water supply for the villagers will not be met. This has emerged as

a threat to seven regencies: Makassar, Gowa, Takalar, Jeneponto, Bantaeng, Bulukumba and Sinjai because the Jeneberang watershed upstream where Bawakaraeng mountain is located is the main source of water supply for those regencies (Pasapan et al. 2021).

Collaboration between natural resources conservation agency and local community

The concept of joint forest management (JFM) emerged in India in early 1970s with the aim of conserving forests and improving people's livelihoods through collaboration between the state and civil society. The JFM pilot programme included managing several forest areas where the villagers live and to utilise it as a model for countering the trend of forest degradation through its active protection by the villagers (Sundar 2000, Bhattacharya et al. 2010). The JFM in Manimbahoi village is unique because of the current villagers' awareness of the ecological benefits of the forest. The landslide disaster in 2004 was an invaluable lesson and warning to the surrounding communities to avoid cutting down trees randomly and indiscriminately. The results of research in India suggested that JFM can be effective when communities are smaller and forest resources are scarce (Behera et al. 2009).

Community participation in protecting the forest in Manimbahoi village is also not initiated by a particular project, but learning from natural disasters and the decrease in domestic tourists due to COVID-19 pandemic. These prompted the communities to protect their environmental sources of income from nature tourism and water sources. The Natural Resource Conservation Center only gives permission to the village authorities to utilise environmental resources and forestry services. The conservation partnership programme is expected to consolidate the joint effort between government and local communities' bodies to enhance joint forest management.

Individuals are able to apply for business permits which allow them to offer nature tourism services (*Izin Usaha Penyediaan Jasa Wisata Alam / IUPJWA*). State-owned enterprises, regionally-selected business entities, privately owned enterprises, and cooperatives are also encouraged to apply for the business permits.

Individual business permits are prioritised for communities living in forest areas. The IUPJWA holders have obligations such as paying of levies on business proceeds, to participate in preserving nature, to carry out security for the area, to ensure security for every visitor, to repair the damage caused by the implementation of its business activities, to keep the environment clean and submit a business activity report to the IUPJWA provider (*Permenhut* No. P48/Menhut-II/2010). The forest area manager or the government cooperates with the community by providing technical consultations and construction of natural tourism facilities. Even though the application for a permit is still in progress, good cooperation has been established between Natural Resources Conservation Agency and the community.

The three necessary conditions for co-management are to have a secure and well-defined property rights, to have a proper and adequate transfer of authority to communities and to make sure local institutions that are represented and downwardly accountable (Ribot 2002, Larson & Ribot 2004). The JFM in India encountered problems due to unclear and ambiguous transfer of rights, information asymmetries and lack of accountability (Behera & Engel 2006). The situation in Manimbahoi village is progressing towards meeting the above conditions for co-management of conserved forest areas.

CONCLUSION

The paradigm shifts towards the conservation area occurred after villagers in Manimbahoi village stopped harvesting timber in their area as their source of livelihood and instead turned to horticultural farming. The water sources from the conserved areas ensure sustainability of their agricultural farming. In addition, the forest floor is used for plantation crops, especially coffee plants. Therefore, damage to the forest ecosystem is minimised and sustainability emerges as the key theme of their livelihood.

The forest areas surrounding Manimbahoi village are part of Jeneberang watershed which is vital to guarantee water supply to Jeneberang River and provide irrigation to horticultural cultivation. Nevertheless, the Jeneberang watershed upstream has suffered damages due

to land conversion, especially for horticultural cultivation. On the other hand, the forest in the village of Manimbahoi is relatively well preserved. The villagers are dedicated in maintaining the sustainability of the forest around them due to economic gains such as being able to plant coffee on the forest floor in addition to its prevailing environmental services.

Steady water supply is vital for the villagers. A few years earlier, when the villagers had resorted to felling trees which resulted in a significant decrease in the water resources they needed, especially during the dry season. They later realised the importance of water supply to support their economic activity. They ceased felling the forest trees and instead planted coffee in conservation forest area although it was categorised illegal action at that time before the introduction of Law Number 11/2020. They took on the responsibility to protect the forest such as from forest fires and other natural disasters. Any man made or natural disasters would destroy their coffee plantation.

Based on Law Number 11/2020, they are allowed to legally conduct economic activity in the conserved forest areas as long as their activity does not damage the function of the forest or its ecosystem. Additionally, the local communities in Manimbahoi village are also allowed to manage ecotourism at Tanralili Lake through partnerships with relevant parties. This suggests that joint forest management has had positive impacts. Other than maintaining the sustainability of the forest, the community is allowed to access the forest resources, guaranteed via the joint forest management agreement between Manimbahoi villagers and Forest Agency in South Sulawesi province to manage Malino conservation area. The Malino conservation area had not yet been created during the period of this research. This social forestry programme between the government and local communities can be an effective partnership scheme that benefits both stakeholders. Hence, the government of Indonesia has recently announced an ambitious plan to allocate some 12.7 million hectares of forest land to marginalised communities in the surroundings of their forest areas (Santika et al. 2017), as a mechanism to increase their participation in forest management activities.

ACKNOWLEDGEMENT

Robert Siburian, Laely Nurhidayah, Herman Hidayat, Dicky Rachmawan and Sulistya Ekawati contributed equally to this paper. All authors read and approved its final version.

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