



Environmental Protection and Development of Traditional Community: A Case Study of Ngadas Village in Bromo-Tengger Mountain Area

環境保護と伝統農村の開発:

プロモーションが山間地シガダス村の事例研究

Dan Ariel Wahyudi

B2AM9105

Under the supervision of

Professor Hitoshi Yonekura

TOHOKU UNIVERSITY
JAPAN
2014



Abstract

In Indonesia, deforestation has caused serious environmental degradation (15.16 million ha of forest has been lost from 2000 to 2009). Bromo-Tengger National Park (BNP), a conservation area of 50.270 ha, is rich in biodiversity but seriously degraded. Forest fires damaged 1,688 ha of the BNP forest from 2004 to 2011. Up to 2012, at least 475 ha of the forest were occupied by Ngadas villagers, without a permit from the Bromo-Tengger National Park Office (BNPO), for vegetable farming. As Ngadas is an upland isolated village, the environmental impact could spread to downstream areas (sedimentation rose to 11 meters in some nearby downstream locations in 2007), mainly due to farming activities in Ngadas. This study clarifies the reasons why the villagers do not follow the environment protection policy.

Original data were collected from interviews conducted in Ngadas with 50 households from March to April 2014. Other necessary data and information sources were collected from BNPO, the Malang District Government, and Ngadas Village Office.

Vegetable farming has rapidly and widely developed in Ngadas and is highly commercialized. Opening up a large forest land caused serious environmental problems, but it was an unavoidable consequence of expanding vegetable farming to obtain higher income. BNPO did not monitor the most critical cause of deforestation due to inadequate labor resources. Villagers' participation could be a good way of environmental monitoring, particularly monitoring the process and mechanism of opening forest land for farming. The traditional rule of villagers regarding forest use and farming are still maintained and it contributes to community integration and conservation of the forest environment sustains the villagers. Their active participation in or cooperation towards the government programs of forest conservation, however, has not been realized.

BNPO implemented various programs to protect the environment, but villagers do not follow the programs. These programs were not welcomed by the villagers but rather regarded as a means to hide BNPO's ultimate intention of prohibiting farming without a BNPO permit and implementing reforestation. Any program implemented by BNPO merely resulted in a symbolic solution.

There is no scientific justification of the illegality, asserted by BNPO, of the newly opened farming land. There has been no reliable and scientific monitoring about the environmental condition, particularly the impact of extensive vegetable farming in both legal and illegal land. An environmentally feasible and sustainable scale of farming has not been disclosed. Under this condition, ornamental solutions cannot derive the villagers' participation in or cooperation for environment protection and forest conservation. It is impossible to stop extensive commercial vegetable farming without providing profitable business activity alternatives with a lesser damage to the environment.

Keywords: environmental degradation, expansion of farming land, village community's participation



Environmental Protection and Development of Traditional Community: A Case Study of Ngadas Village in Bromo-Tengger Mountain Area

環境保護と伝統農村の開発：

プロモーションゲル山間地ンガダス村の事例研究

Dani Arief Wahyudi

B2AM9105

Contents:

Abstract

1. Introduction

- (1) Background: Forest Conservation and Community
- (2) Research Question and Objectives
- (3) Data Collection

2. Ngadas Village, Living Conditions, Government Policy, and Government Programs for Ngadas Village and Their Perception

- (1) Ngadas Village
- (2) Living Conditions
- (3) Government Policy
- (4) Government Programs for Ngadas Villagers and Their Perception

3. Conflicts between the Government and the Village Community: Conservation or Development

- (1) Conflicts in the Indonesian Forestry Sector
- (2) Conflicts in the BNP Area
- (3) Conflicts in Ngadas

4. Dependency of Forest Resources

- (1) The Use of Forest Resources
- (2) Economic Activities
- (3) Farm Production and Income
- (4) Farming and Environmental Risk
- (5) Dependency on Forest Land



1. Introduction

(1) Background: Forest Conservation and Community

In Indonesia, deforestation has caused serious environmental degradation (Wirendro, Shoelton, Frionny and Isenett, 2011, p. 5-6). At least 15.16 million hectares of forest were deforested from 2000 to 2009. The causes of deforestation were farming land expansion, infrastructure development, and logging. Obidzinski (2005, p.194) proved that illegal logging was the major cause of deforestation in the country. Obidzinski argued that illegal logging increased particularly after 1998, in the post Soeharto era. The illegal logging was done not only by large business entities but also by small and medium sawmills, particularly in Kalimantan. These businesses smuggled timbers to Malaysia and China. In the nineteenth century on Java Island, the Dutch government massively opened forests for coffee plantations. It was the start of serious deforestation (Hefner, 1999, p.64). Farming land expansion and infrastructure development in the 1990s and 2000s have also caused environmental degradation on this island.

The government realized that village communities' contribution in protecting the environment can reduce the governmental cost of monitoring and policy implementation. As the forests in densely populated Java were under high risk of deforestation, strong control of the environment was necessary (Table 1).¹ In 1995, the Forestry Minister launched policy initiatives focusing on community for forest management and rehabilitation.² Incentives were provided to the community, such as permits to villagers to utilize forest resources, e.g., branches, leaves, grasses, fruit, etc. (except for resin and trees).

Many scholars have paid attention to village communities' ability to aid forest conservation and environmental protection. The scholars have proved that village communities are good for monitoring forest resources and protecting the environment. Moira and Elizabeth (2009, p. 237) reported a case where communities in Danau Sentarum National Park (West Kalimantan) were involved in forest management. The park office provided the community members with a micro hydroelectric generator and implemented a project for bee honey processing and marketing. Understanding the link between the natural forest, water supply, and food for the bees has motivated the communities to guard their forest. Bennet (2002, p. 74) studied a community in Baru Pangkalan Village on the border of the Kerinci National Park (Jambi) that played a role in reducing illegal

¹ In the five large islands in Indonesia, forests in Java have been under greater threat of deforestation due to high population pressures.

² Forestry Ministerial Decree No. 622/Kpts-II/1995



logging. Veda (2012, p. 34) explained how a wise group of fishermen in Tomia, Wakatobi National Park managed local marine resources.

The national parks are a very peculiar case of forest conservation and environmental protection, as they became fully ruled and controlled by the governments. However, such mutual cooperation and role sharing between government and existing communities is very essential. Without such collaboration, it is very hard to manage forest conservation and environmental protection. To observe such mutual collaboration and participation of the village community, the Bromo-Tengger National Park (BNP) is ideal as it represents many of the typical problems and conflicts occurring elsewhere.

Table 1. Comparison of the Five Large Islands in Indonesia

No	Name of Island	Area of Island (km ²)	Population (people)	Population Density (people/km ²)	Area of Forest (km ²)	Population of Forest (people/km ²)
1.	Sumatera	483,698.88	50,599,502	105	122,907.89	412
2.	Java	130,521.92	136,594,916	1,047	9,006.01	1,517
3.	Kalimantan	547,040.40	13,778,273	25	280,905.25	49
4.	Sulawesi	190,024.56	17,341,610	91	88,645.46	196
5.	Papua	418,437.92	3,563,351	9	333,160.27	11

Source: BPS, 2012; Wirendro, Shoelton, Frionny and Isentt, 2011.

BNP is under the management of Bromo-Tengger National Park Office (BNPO).³ The park is rich in biodiversity but it has been under serious environmental degradation, particularly after the decentralization era.⁴ The degradation was observed mostly in the northern part of the BNP, where the isolated villages were located. BNPO reported that 475 ha of forest in the park had been seriously damaged by 2012, mainly due to illegal occupation and logging. From 2005 to 2012, at least 248.2 m³ of firewood was seized from illegal loggers. BNPO also reported that for seven years (2004 to 2011), 1,688 ha of the park was degraded by fire. In 2011, serious water contamination and sedimentation in Ranupani lake led to extensive siltation causing the lake to become smaller.⁵ The condition worsened by the proliferation of *Salvinia sp.* an alien species covering the lake's surface and causing the death

³ BNP was established by the Minister of Agriculture (Declaration Letter of Agricultural Minister No 763/Mentan/X/1982) in 1982, covering an area of 58,000 ha. In 1983, the Ministry of Forestry was established, which had been under the Ministry of Agriculture (Presidential Decree No. 15/1984). Then in 1997, this area came under the control of the Ministry of Forestry with 50,276.20 ha (Decree of Forestry Minister No. 273/Kpts-VI/1997).

⁴ BNP covers 21.47% of the total conservation area in East Java Province. It is a sanctuary for at least 1,025 species of flora and 158 species of fauna, some of which were identified as rare, endemic, and protected species such as the Javan Eagle-Hawk (*Nisaetus bartelsi*). The area covered by BNP also serves as a water catchment area of Brantas and Sampayan, the two biggest rivers in the province. Furthermore, it is settled by Tenggerese, an indigenous ethnic group. BNPO reported that by 2011 there were forest degradations in the area.

⁵ The Ranupani lake is located in Ranupani village. In 1988, the area of the lake was 7 ha and the average depth was 10 m. In 2012, the area of the lake was 4 ha and the average depth was 5-6 m.



of animals living in the lake.⁶ BNP alleged that the isolated villagers' living condition and traditional activities caused the environmental degradation.

Ngadas, with the area of 414 ha, is an isolated upland village (1,800–2,200 m above sea level) located inside the BNP area. It is a predominantly Hindu village with a long tradition. The village administration was established in 1774. In the 1910s, Ngadas entered into an era of trade growth (Hefner, 1999, p.105). Demand for agricultural products from outside the village increased as a result of population growth in Java (Furnivall, 1944, p. 212).⁷ This growth brought a direct effect on agriculture in Ngadas. Villagers in Ngadas began deforestation to expand farming land from 1910 to 1925 (Hefner, 1999, p. 95). In 1979, the road from Ngadas to Poncokusumo sub-district was improved by the government, which led to intensive farming activities.

The land of Ngadas was under the control of Perhutani for ten years (from 1972 to 1982), when control over resource use was not strict.⁸ In 1982, the lands were suddenly claimed by the central government (under the control of BNPO) and became part of a conservation area with strict forest management rules. BNPO argued that people did not follow environment protection policies. Community participation was not enough, illegal forest and land use still frequently occurred. As Ngadas is an upland area, the environmental impact could spread to lowland areas and its impacts can currently be observed. It is an ideal area to observe the environmental changes and living conditions generated by the recent economic development. As major government programs are concentrated on forests and environmental conservation, it is appropriate to identify the programs' impacts. The government agencies concerned are limited: namely the BNPO, Division of Agriculture (*Dinas Pertanian*) of Malang District, and Ngadas Village Office. It is easy to investigate the mutual relationships between these government agencies' participation.

(2) Research Question and Objectives

The aim of this research is to clarify the reasons why villagers do not follow the environmental protection policy. The objectives of this study are: 1) to describe the government conservation policies and programs and subsequent village community participation; 2) to identify mutual cooperation and conflicts between government and the village community; 3) to investigate the villagers' living condition and their dependency on forest resources; 4) to investigate traditional rules of forest and land use (customary community rules) and forest conservation; and 5) to analyze

⁶ BNPO alleged the farmers were using excessive chemical fertilizer that triggered the proliferation of *Salvinia* sp, a kind of waterweed.

⁷ In the last half of the nineteenth century, Europe's population in Java increased from 17,200 to 62,447. In the same period, the Chinese population increased from 27,000 to 150,000.

⁸ The lands adjacent to Ngadas were production forests under Perhutani, while lands adjacent to Ranupani were protected forest. Perhutani allowed farmers to grow crops under the trees of their production forest.

the causes of the scarcity of community participation and necessary improvements to forest conservation and environmental protection.

(3) Data Collection

Data and information were obtained through field research on Ngadas households conducted from March 17 to April 5, 2014. Fifty villagers in Ngadas village were randomly selected as respondents (representing 10% of the total households): 37 in Ngadas hamlet and 13 in Jarak Ijo hamlet. The questionnaire contained questions on the following: 1) general household data (age, job, education, etc.); 2) level of welfare (income, access to facilities, etc.); 3) land status; 4) agricultural system (cropping pattern, terracing, fertilizer use); and 5) the villagers' opinion regarding the government policy and programs.

The other primary data were obtained from in-depth interviews with National Park and Malang District officials. Secondary statistical data were obtained from 1) the Central Bureau of Statistics, 2) BNPO, 3) the Malang District Office, 4) the Poncokusumo Sub-district Office, 5) Ngadas Village Office, and 6) the internet.



2. Ngadas Village, Living Conditions, Government Policy, Programs for Ngadas Villagers, and Their Perception

(1) Ngadas Village

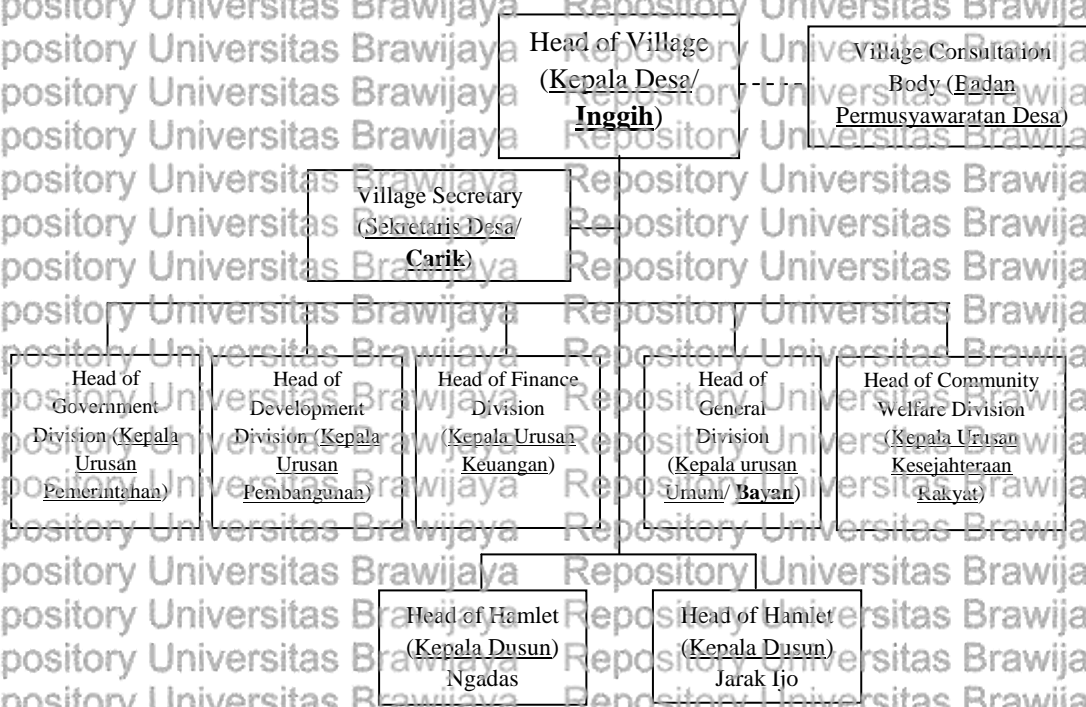
Ngadas is an upland area with an altitude of 1,800–2,000 m above the sea level and is a deeply isolated area in the BNP. It is located in Malang District, East Java Province. The total area of this village is 414 ha (0.81% of the National Park area). Figure 1 shows the location of Ngadas and BNP. Ngadas was established in 1774, consisting of two hamlets: Ngadas and Jarak Ijo, two Rukun Warga (RW), and eight Rukun Tetangga (RT) (The Profile of Ngadas Village, 2013).¹ Tenggerese, the indigenous people, mostly inhabiting the village, had a population of 1,730 people (419 households) in 2013. The villagers are religious people who believe in Islam, Hinduism, or Buddhism.² Since the sixteenth century the major economic activities in this village have been farming, which became more widespread in 1910–1925 and became more intensive in 1979 (Hefner, 1999). After 2007, ecotourism developed. In 2012, the Malang District Government declared Ngadas a tourism village.

¹ RW (Rukun Warga) is a non-governmental administrative territory based on the unity of local society and consisting of some RT. RT (Rukun Tetangga) is a non-governmental administrative unit under RW and consisting of a maximum of 30 households.

² "Buddhism" followed by the Ngadas villagers is "*Budha Kejawan*," and is different from the typical Buddhism practiced in other places. The worship customs are almost similar to Hinduism.

Figure 2 shows the structure of Ngadas Village administration. This village is headed by the head of the village (*kepala desa/inggih*), responsible for all the village affairs. In discharging his duties, the Inggih is assisted by village officials: the village secretary (*sekretaris desa/carik*), two head of hamlets (*kepala dusun*), and five division heads: 1) a head of government division (*kepala urusan pemerintahan*); 2) head of development division (*kepala urusan pembangunan*); 3) head of finance division (*kepala urusan keuangan*); 4) head of general division (*kepala urusan umum/bayan*); and 5) head of community welfare division (*kepala urusan kesejahteraan rakyat*). Carik assists the village head for administration of the entire village, while kepala dusun in charge of each hamlet. The five division heads assist the *inggih* in technical and specific administration matters. The *inggih* also coordinates with Village Consultation Body (*Badan Permasyarakatan Desa*), particularly for designing village rules. “*Inggih*,” “*carik*,” and “*bayan*” are the Tenggerese terms.

Figure 2. Structure of Ngadas Village Office



Source: The Profile of Ngadas Village, 2014.



(2) Living Condition

Ngadas was fairly difficult to access because of the lack of transportation infrastructure. Roads are very essential for the villagers, particularly for the shipping of agricultural products. In 1979, this village was originally connected to local towns by vehicle access (The Profile of Ngadas Village, 2013). In 2012, BNPO improved the roads within this village territory, but they prioritized the road from Ngadas to Ranupani village for tourism purposes. Ngadas villagers wanted the road to Poncokusumo to be improved, particularly for shipping harvested vegetables.

Table 2 shows the distances from this village to government services. Table 3 shows that Ngadas lacks health and educational facilities. For example, to obtain an ID card, a villager who turns 17 must go to the Poncokusumo Sub-district office, usually accompanied by a village officer. There is no public transportation, such as a bus, so they usually use a motorcycle to get there. It takes a long time (about one hour) and has a high cost (IDR 30,000). Another example is as follows: a pregnant woman who gives birth during the night or a holiday generally has to seek medical services (Puskemas) in the sub-district.³ The average amount of births in Ngadas is 1-2 children/month. The pregnant woman is often transported by jeep. It is expensive (IDR 400,000) to do so and poses a high risk. Furthermore, there is no permanent market in Ngadas. After road improvements in 1979, the villagers now go to market in Poncokusumo to buy agricultural input materials, groceries, clothes, etc.⁴ Schooling is also difficult. There is no senior high school in Ngadas. Approximately 20 high school students from Ngadas stay in Poncokusumo. The cost of education is therefore expensive.

Table 2. Distance from Public Facilities

Hamlet	Distance from (km)						
	Maliang District	Poncokusumo Subdistrict	Puskemas ¹	Market	Education Facilities		
					ES ²	JHS ³	SHS ⁴
Ngadas	42	25	26	25	0	0	25
Jarak Ijo	43	26	27	26	0	3	26

Source: Author's survey in Ngadas Village, 2014

Note : ¹Puskemas is a technical services unit in the health field, under the supervision of district health offices and usually located at the sub-district level; ²ES= Elementary School, ³JHS= Junior High School, ⁴SHS= Senior High School

³ No midwife at night or on holidays.

⁴ Before 1979, villagers bought chemical fertilizer (*swadaya*) in Ngadiwono village, Pasuruan District, which is 16 km away on foot.



Table 3. Religious, Health, and Educational Facilities

(Unit: number of facilities)

Hamlet	Health Facilities			Educational Facilities			Religious Facilities		
	Puskesmas	Polindes ¹	Posyandu ²	ES	JHS	SHS	Mosque ³	Vihara ⁴	Pura ⁵
1. Ngadas	0	1	1	1	1	0	1	1	1
2. Jarak Ijo	0	0	1	1	0	0	2	0	0

Source : Author's survey in Ngadas Village, 2014

Note : ¹Polindes= maternity home; ²Posyandu = village health service ³Mosque= Muslim worship place, ⁴Vihara = Buddhist worship place; ⁵Pura= Hindu worship place.

(3) Government Policy

From 1990 to 2003, the Ministry of Forestry and East Java Governor initiated policies on forestry and its conservation. The policies undertaken included, 1) the establishment of the national park, 2) the definition of forest and the classification of zoning forests, forest use, rehabilitation and conservation; and 3) community participation in conservation. However, no regulation for specifically undertaking environmental monitoring was established. On August 10, 1990, the central government issued a state law on conservation.⁵ On September 30, 1999, the central government released a state law on forestry.⁶ It mandated that conservation be under the central government authorities. This means that there is no decentralization in conservation policy.

Forestry community participation was also acknowledged by the government. At the national level, movements toward this clearly began in 1995 when forestry minister issued a decree.⁷ Under this regulation, forestry communities were granted utilization rights to non-timber forest products. In October 1998, the forestry minister improved this regulation.⁸ Utilization permits were replaced with exploitation permits for cooperatives. In 1999, the decision was improved again.⁹ Exploitation permits were converted back to use permits for all groups including cooperatives. In 2001, the decision was once again changed.¹⁰ The head of the district was authorized to issue permits and facilitate the formation of community institutions.¹¹

Overall, these policy changes have led to the improvement of communities' rights. Unfortunately, these were not applied in Ngadas. BNPO regards these regulations as more appropriate for production forests and not in conservation areas. The only activity BNPO undertook that involved

⁵ Law No. 5 of 1990 on Conservation of Natural Resources and its Ecosystem.

⁶ Law No. 41 of 1999 on Forestry.

⁷ Forestry Ministerial Decree No. 622/Kpts-II/1995

⁸ Forestry Ministerial Decree No. 677/Kpts-II/1998

⁹ Forestry Ministerial Decree No. 865/Kpts-II/1999

¹⁰ Forestry Ministerial Decree No. 31/Kpts-I/2001

¹¹ <http://www.cifor.org/acn/download/pub/wk/warta09.pdf>

the villagers' participation was the reestablishment of community organizations for forest fire prevention (Masyarakat Peduli Api, or MPA) in 2010. MPA's role is effective in reducing the number of forest fires in the BNP area.¹²

The community's role in state forest management was also regulated by the East Java Province Government on October 13, 2003.¹³ It mandates the provincial government to organize rehabilitation activities with a participatory approach to empower forestry communities. On May 4, 1998, the Director General of Forest Protection and Natural Conservation of Forestry Ministry released a decree governing the zoning system of the BNP. Under this regulation, forest communities were authorized to apply their customary rules in the traditional zone. The community has a traditional way to prevent forest fires by making insulation trenches, so that the fire does not spread.

(4) Government Programs for Ngadas Villagers and Their Perceptions

Various government agencies have released many programs regarding villagers as the final recipients of the programs. The aim of the programs was to involve villagers in implementing environmental protection. Table 4 shows the programs released by the ministries. In 2008, the Ministry of Agriculture provided fertilizer making assistance in Ngadas. The aim was to train villagers to produce their own fertilizer, because the organic fertilizer supply was then a problem in this village. In 2010, they also implemented a farming land terracing program. This program aimed to solve the frequent land erosion problem in Ngadas. In 2010, the Ministry of Energy and Mineral Resource provided Liquefied Petroleum Gas (LPG) stove assistance to the villagers in Ngadas. This national program was also implemented in other areas. The goal was to convert fuel energy from kerosene to LPG because of the increasing of domestic oil subsidies.

Table 4. The Central Government Program for Ngadas Village

No.	Year	Institution	Programs	Objectives of programs
1.	2008	Ministry of Agriculture	Organic fertilizer making assistance	To improve the availability of organic fertilizers
2.	2010	Ministry of Agriculture	Farming land terracing	To prevent erosion and landslides
3.	2010	Ministry of Energy and Mineral Resources	LPG stove assistance	To provide an alternative energy source

Source: The Profile of Ngadas Village, 2013; interview with head of Ngadas Village, 2014.

¹² BNPO Statistical Yearbook, 2013: from 2007 to 2011, 61 forest fires have occurred in 1,688.05 ha area of the park. However, only one case of forest fire was successfully mitigated by the community in 2013.

¹³ Regulation of East Java Province No. 4/2003 on Forest Management in East Java Province



Table 5 shows the programs applied in Ngadas by the Malang District Government. The local government implemented an agricultural guidance program for farmers from 2006 to 2010. The aim was to broaden their knowledge and improve the farming techniques of the farmers. In 2008, the local government also improved the road from Ngadas to Poncokusumo Sub-district to facilitate the marketing of agricultural products to Malang and Surabaya.

Table 5. The Malang District's Local Government Programs for Ngadas Village

No.	Year	Programs	Objectives of programs
1.	2006,2007, 2008, 2010	Agricultural guidance	To increase agricultural knowledge
2.	2008	Road improvement from Ngadas to Poncokusumo	To improve accessibility to Poncokusumo for vegetable shipping (to Malang and Surabaya).

Source: The Profile of Ngadas Village, 2013; interview with head of Ngadas Village, 2014.

Table 6 shows the programs started by BNPO for the villagers. In 1997, BNPO introduced green belt programs. The "green belt" is a natural line of approximately ten meters in width, created along the border between BNP area and Ngadas village, planted with mountain pine, acasia, and elephant grass. The aim of this program was to meet the needs of firewood and livestock feed for the villagers. In 2009, BNPO began to provide biogas assistance. Three units of biogas were provided to the villagers. This program aimed to provide an alternative energy source for the villagers. Moreover, in 2012, BNPO improved the road from Ngadas to Ranupani along six kilometers. It aimed to facilitate tourism to Mt. Semeru.

Table 6. BNPO's (Ministry of Forestry) Programs for Ngadas Village

No.	Year	Programs	Objectives of programs
1.	1997	Greenbelt	To supply firewood and livestock feed
2.	2009	Biogas assistance	To reduce dependency on firewood
3.	2012	Road Improvement	To facilitate tourism to Mt. Semeru

Source: BNPO Statistical Yearbook, 2013; interview with BNPO officials, 2013, interview with head of Ngadas Village, 2014

The programs implemented by BNPO generated various responses from the villagers. Table 7 shows the villagers' perceptions about the green belt program. The villagers regarded this program as beneficial because of proper location (23 respondents) and appropriate selected plants (28 respondents). On the other hand, the villagers regarded the biogas assistance as non-beneficial. They regarded the program as applied at an inappropriate location (26 respondents) and that the capacity of the biogas units was low (15 respondents).

Table 7. The Villagers' Perception of Green Belt

(unit: number of respondents)

Reason	Appropriateness of location	Selection of appropriate plants
Choice Yes	23	28
Choice No	11	6
Total	34	34

Source: Author's survey in Ngadas Village, 2014

Note: The question was asked to those who were aware about the program.

The villagers regarded that the government policy and programs were unilateral services, which were intended only to repress the villagers' claim on forest resource use. In this sense, the programs were regarded not necessarily as an interest based approach but rather a power based approach.¹⁴ They were perceived as ornamental solutions and not welcomed by the villagers. The villagers were not satisfied because the programs lacked coordination between BNPO and the villagers.¹⁵ They regarded the government's programs as insufficient (biogas), inconsistent and non-sustainable, implemented at an inappropriate location (biogas, road improvement), low capacity (biogas), and difficult to be applied. The government failed to involve the villagers and lost their support. As a result, it became difficult to induce the positive participation of the villagers for environmental protection.

¹⁴ Bouffe categorized approaches for conflict resolution as follows: power-based, rights-based, and interest-based (Bouffe 1996, p. 350). Power based approach means that the conflicting parties try to resolve their conflict through a contest of strength, including tactics such as lobbying, appealing to political influence, demonstrations, and physical force in some cases (Nicholson 2009, p. 4). Rights-based approach means that the conflicts are arbitrated by third parties such as an authoritative institutions or individuals, for example a court and tribunal agency. Interest-based approach means mediation or negotiation, with or without third party assistance, aimed at reaching a voluntary settlement amenable to conflicting parties' interests.

¹⁵ No consultation with villagers' request, improper location (biogas and road improvement), and no coordination between government priority and villagers needs (road improvement).



3. Conflicts between Government and Village Community: Conservation or Development

(1) Conflicts in the Indonesian Forestry Sector

Serious conflicts have ensued among governments, companies, and people in the forestry sector of Indonesia. Center for International Forestry Research (CIFOR) has identified at least 359 conflicts (Yuliana, Yurdi, Christian and Wollenbergh, 2004). The conflicts occurred frequently in plantation forests (39%), followed by conservation areas (34%), and concession forests (27%).¹ In general, the causes of conflicts were the problems related to forest boundaries, illegal land occupation, illegal logging, environmental degradation, and land conversion. Conflicts in conservation areas were mainly caused by illegal occupation and illegal logging.

Any problems occurring in the forests of Indonesia seem to be linked to environmental problems. Libiszweski emphasized that environmental degradation induced the more serious conflicts in forest resource use (Libiszweski, 1992, p.6-7). The conflicts occurred frequently because of inequitable resource distribution among governments, private business, and local people.

(2) Conflicts in the BNP area

Conflicts have occurred between BNPO and the isolated villages (Ngadas and Ranupani). The causes of conflicts were illegal occupation, illegal logging, and environmental degradation. BNPO reported that illegal cases have caused environmental problems. The villagers argue that they are just maintaining their traditional ways of living and merely attempting to survive. Conflicts occurred more frequently between BNPO and Ngadas villagers (12 cases) than with Ranupani villagers (3 cases).

(3) Conflicts in Ngadas

Three serious conflicts occurred between BNPO and Ngadas villagers. The first occurred in 2008 as a result of road improvement. At that time, the Malang District Government and the villagers improved the road from Ngadas to Poncokusumo. They did not coordinate with BNPO prior to the

¹The term "plantation forests" means planted forests for production where activities such as seeding, planting, maintenance, harvesting, and marketing are pursued; The term "concessions forests" refers to natural forests in production forests where business activities such as logging, hauling, and processing are conducted in addition to planting, maintenance, and marketing. The term "conservation areas" refers to forests for preserving the diversity of flora, fauna, and their ecosystems.



project's commencement. They cut down 94 trees to widen the road. BNPO regarded this activity as illegal and opposed the local government and the villagers. The second serious conflict occurred in 2009. Four villagers obtained 395 kg of charcoal by cutting trees illegally, and BNPO pursued criminal prosecution. The most serious conflict occurred in August 2012. The incident began when four traders from Ngadas occupied land in the BNP area wilderness zone and built semi-permanent stalls. BNPO's forest rangers raided the traders and dismantled the buildings. The traders then mobilized all Ngadas villagers and conducted a demonstration. They kidnapped the forest rangers and burnt the official car. Until now, the criminal prosecution has not reached its conclusion and is still under investigation.

For 10 years (from 1972 to 1982), land in Ngadas was controlled by Perhutani. During this period, rules on forest resource use were not strict. In 1979, road from Ngadas to Poncokusumo was improved by Malang District Government. Access to urban cities became easier, particularly for shipping the harvested vegetables. The increased demand for vegetables accelerated the reclamation of farming land. Since 1982, the land in Ngadas came under the control of BNPO. Rules on forest resource use became strict for environmental protection. On May 4 1998, BNPO defined a traditional zone where the villagers were allowed to live according to their traditional methods. Forest resource use rights of the villagers were limited to non-timber in the traditional zone and newly opened farming lands were considered illegal. Due to this situation, the participation of the villagers in protecting the environment has reduced. People do not want to follow the environmental policy of BNPO.



4. Dependency on Forest Resources

(1) The Use of Forest Resources

The villagers' dependency on forest resources is very high. They consume firewood at approximately 12 m³/year (BNPO Statistical Yearbook, 2013). They use 35 species of plants for food, medicine, and bio-pesticides (Seryo and Luchman, 2014). Furthermore, they use water for daily household needs and farming, with an average consumption of 180 m³/year (Fitri and Handoyo, 2007).

In 1998, the central government regulated the zoning of BNP territory. Based on this regulation, villagers are allowed to use non-timber resources in 2,630 ha of the traditional zone. However, no written contract on forest use has been created between the villagers and BNPO.

Villagers have their own rules regarding forest resource use. A verbal instead of a written consensus exists among the villagers. Water use from the forest is regulated by the village administration, and the water use rate in this village is IDR 3,000/month. When villagers cut one tree, they are obligated to plant two sapling trees. Furthermore, the customary rule prohibits the villagers from selling land except to other village members.

(2) Economic Activities

The economy of Ngadas mostly depends on its agricultural sector. The major occupation of the villagers is farming (82%) (The Profile of Ngadas Village, 2013). Vegetable farming has developed rapidly, particularly since 1979. The main agricultural products are potatoes, cabbages, and green onions. The vegetables were highly commercialized and sold to large urban cities. In 2012, Ngadas was declared as an agricultural center by the Malang District Government. After 2007, tourism was also developed in this village.¹

The improved living conditions indicate the rapid economic development of Ngadas. Table 8 shows the housing condition in Ngadas. The houses are mostly permanently built by wood and brick. Their sizes are more than 36 m². Table 9 shows household facilities in Ngadas. Houses generally consist of a bedroom, a bathroom, and a toilet. All houses have tap water and electricity facilities. The water is obtained from several water springs in the national park. The water supply has been managed by the village office since 1987. Electricity became available in 2002.

¹ Now the villagers own 46 homestay facilities and 32 jeeps. The jeeps are used to transport tourists to Bromo.

Table 8. Housing Conditions of the Villagers

(Unit: number of respondents)

Hamlet	Housing Condition		Size of the House ¹		Wall		Floor	
	Permanent	Non-permanent	< 36 m ²	≥ 36 m ²	Wood	Brick/plastered	Ground	Plastered/tiled
1. Ngadas	37	0	0	37	9	28	11	26
2. Jarak Ijo	13	0	0	13	4	9	1	12

Source: Author's survey in Ngadas Village, 2014

Note: Regulation of Public Housing Minister, No. 14, year 2011 on Guidelines for the implementation of self-help housing stimulus assistance for low income people, Article 4 point 3, states that appropriate housing is a minimum area of 36 m².

Table 9. Basic Household Facilities, Tap Water, and Electricity

(unit: number of respondents)

Hamlet	Basic Facilities ¹			Tap Water	Electricity
	Bedroom	Bathroom	Toilet		
1. Ngadas	37	37	37	37	37
2. Jarak Ijo	13	13	13	13	13

Source: Author's survey in Ngadas Village, 2014

Note: Regulation of Public Housing Minister No. 14 year 2011 set down the guidelines for the implementation of "self-help housing" assistance for low income people. The appropriate housing should has as basic facilities: a bedroom, a bathroom, and a toilet.

Table 10 shows the villagers' main occupations, according to their education levels. The figures in this table show the enrolled numbers at each school, but these do not indicate the graduation rates. The majority of respondents are farmers (41 out of 50). The farmers joined elementary school (31 respondents), but most of them (>60%) did not graduate. The farmers in Ngadas generally have low education levels.

Table 10. Villagers' Main Occupations According to Education Level

(unit: number of respondents)

Main Occupation	Education level					Total
	No school	ES	JHS	SHS	University	
Farmer	1	31	8	1		41
Agricultural Laborer	1	1				2
Gov. Officer			2	3	1	6
Trader		1				1
Total	2	33	10	4	1	50

Source: Author's survey in Ngadas Village, 2014

Table 11 shows the villagers' main occupations and income levels. Eighty two percent of the respondents (41) are farmers. Others are government officers, agricultural wage laborers, and traders. The job structure of the village is not yet diversified. Stratification in income level, however, is wide. 40% of the villagers constitute the rich people (≥ IDR 2.5 million/month). Most of them (13



out of 19) are farmers. There are 19 farmers whose income is less than IDR 2 million/month. Development of vegetable farming seems to have progressed. The government officials and traders have also taken up farming as a side job. Government officials who have good access to government services are among the rich in this village.

Table 11. Villagers' Main Occupations and Income Levels

(unit: number of respondents)

Income level (IDR 000)	Main Occupation				Total
	Farmer	Gov. Officer	Agr. Laborer	Trader	
500 ≤ < 1,000	0	0	2	0	2
1,000 ≤ < 1,500	6	0	0	0	6
1,500 ≤ < 2,000	13	0	0	0	13
2,000 ≤ < 2,500	9	0	0	1	10
≥ 2,500	13	6	0	0	19
Total	41	6	2	1	50

Source: Author's survey in Ngadas Village, 2014

Note: Income is roughly estimated by the added value of harvested crops, wage, salary and net benefit of others

Table 12 shows the villagers' incomes according to their education levels. Stratification of income seems to be linked with education. The higher educated villagers obtain higher incomes. Yet, about 50% of the rich respondents (income ≥ IDR 2.5 million/month) just graduated or did not graduate from elementary school. On the other hand, low income respondents (income < IDR 1.5 million/month) are mostly non-school or elementary school educated (6 out of 8).

Table 12. Villagers' Income by Education Level

(unit: number of respondents)

Income level (IDR 000)	Education level					Total
	No school	ES	JHS	SHS	University	
500 ≤ < 1,000	1	1	0	0	0	2
1,000 ≤ < 1,500	1	3	2	0	0	6
1,500 ≤ < 2,000	0	10	2	1	0	13
2,000 ≤ < 2,500	0	10	0	0	0	10
≥ 2,500	9	0	6	3	1	19
Total	2	33	10	4	1	50

Source: Author's survey in Ngadas Village, 2014

(3) Farming Production and Income

Farming is the most important economic sector in Ngadas. Table 13 shows the number of farmers. Table 14, 15, and 16 shows the production of potatoes (278 tons/48 farmers), cabbages (340



tons/48 farmers), and green onions (289 tons/48 farmers). The rich farmers with 1 ha land or more (11 out of 48, income > IDR 2.5 million/month) own 56%, 63%, and 57% of the production of potato, cabbage, and green onion crops, respectively. The lucrative share of the farm crops is concentrated with certain rich farmers, who comprise about 20% of all farmers.

Table 17, 18, and 19 show the productivity of vegetable farming of potatoes, cabbages, and green onions in this village. The villagers produce these three crops to obtain higher incomes. Farming activities are stratified according to farming scale and consequent income levels. Higher income and larger land-size farmers tend to perform intensive farming with larger amounts of fertilizer application. Larger scale farmers realize high productivity per hectare and their income levels are relatively higher. Most farmers with income ≥ IDR 2.5 million/month or more show 9–15 ton/ ha potato, 5–25 ton/ ha cabbage and 7–15 ton/ ha green onion production. Table 20 shows the unit price/ton of the three major crops. Potato and green onion crops have high unit prices, and production per hectare is also high; these two crops show high gross revenues. The gross revenue of cabbage is relatively lower. Under farming land constraints, potato and green onion are the most important and lucrative crops.

Table 13. Number of Farmers

(unit: number of respondents)

Income level (IDR 000)	Farming land size (ha)				Total
	0	0 < - ≤ 0.5	0.5 < - ≤ 1	1 < - ≤ 2	
500 ≤ - < 1,000	2				2
1,000 ≤ - < 1,500		5	1		6
1,500 ≤ - < 2,000		9	3	1	13
2,000 ≤ - < 2,500		3	4	3	10
≥ 2,500		2	6	9	17
Total	2	19	14	13	50

Source: Author's survey in Ngadas Village, 2014

Table 14. Production of Potatoes

Income Level (IDR 000)	Farming land size (ha)				Total (ton/ 48 farmers)
	0	0 < - ≤ 0.5	0.5 < - ≤ 1	1 < - ≤ 2	
500 ≤ - < 1,000	0				0
1,000 ≤ - < 1,500		13	3		16
1,500 ≤ - < 2,000		27	14	10	51
2,000 ≤ - < 2,500		7	20	23	50
≥ 2,500		5	37	88	161
Total (ton/ 48 farmers)	0	52	74	121	278

Source: Author's survey in Ngadas Village, 2014



Table 15. Production of Cabbage

Income Level (IDR 000)	Farming land size (ha)				Total (ton/ 48 farmers)
	0	0 < - ≤ 0.5	0.5 < - ≤ 1	1 < - ≤ 2	
500 ≤ - < 1,000	0				
1,000 ≤ - < 1,500		8	6		14
1,500 ≤ - < 2,000		11	22	0	33
2,000 ≤ - < 2,500		5	30	40	75
≥ 2,500		5	33	130	50
Total (ton/ 48 farmers)	0	29	91	170	50

Source: Author's survey in Ngadas Village, 2014

Table 16. Production of Green Onions

Income Level (IDR 000)	Farming land size (ha)				Total (ton/ 48 farmers)
	0	0 < - ≤ 0.5	0.5 < - ≤ 1	1 < - ≤ 2	
500 ≤ - < 1,000	0				0
1,000 ≤ - < 1,500		11	0		11
1,500 ≤ - < 2,000		26	21	5	52
2,000 ≤ - < 2,500		10	20	20	50
≥ 2,500		10	46	90	30
Total (ton/ 48 farmers)	0	57	87	115	30

Source: Author's survey in Ngadas Village, 2014

Table 17. Productivity of Potato Farming

Income Level (IDR 000)	Farming land size (ha)				Average (ton/ household)
	0	0 < - ≤ 0.5	0.5 < - ≤ 1	1 < - ≤ 2	
500 ≤ - < 1,000	0.00				0.00
1,000 ≤ - < 1,500		2.60	3.00		2.67
1,500 ≤ - < 2,000		3.00	4.67	10.00	3.92
2,000 ≤ - < 2,500		2.33	5.00	7.67	3.00
≥ 2,500		2.50	6.17	9.78	13.50
Average (ton/ household)	0.00	2.74	5.29	9.31	15.50

Source: Author's survey in Ngadas Village, 2014

Table 18. Productivity of Cabbage Farming

Income Level (IDR 000)	Farming land size (ha)					Average (ton/ household)
	0	0 < ≤ 0.5	0.5 < ≤ 1	1 < ≤ 2	> 2	
500 ≤ < 1,000	0.00					0.00
1,000 ≤ < 1,500		1.60	6.00			2.33
1,500 ≤ < 2,000		1.22	7.33	0.00		2.54
2,000 ≤ < 2,500		1.67	7.50	13.33		7.50
≥ 2,500		2.50	5.50	14.44	25.00	11.47
Average (ton/ household)	0.00	1.53	6.50	13.08	25.00	6.80

Source: Author's survey in Ngadas Village, 2014

Table 19. Productivity of Green Onion Farming

Income Level (IDR 000)	Farming land size (ha)					Grand Total
	0	0 < ≤ 0.5	0.5 < ≤ 1	1 < ≤ 2	> 2	
500 ≤ < 1,000	0.00					0.00
1,000 ≤ < 1,500		2.20	0.00			1.85
1,500 ≤ < 2,000		3.25	7.00	5.00		4.35
2,000 ≤ < 2,500		3.33	5.00	5.67		5.00
≥ 2,500		5.00	7.57	10.00	15.00	9.26
Average (ton/ household)	0.00	3.17	6.21	3.85	15.00	5.90

Source: Author's survey in Ngadas Village, 2014

Table 20. Comparison of Production, Price, and Total Revenue of Agricultural Products

Agricultural Products	Production (ton/ ha)	Price (ton (IDR 000))	Total (IDR 000/ ha)
Potato	19.30	6,800	131,240
Cabbage	26.98	1,600	43,168
Green Onion	32.11	5,500	176,605

Source: Author's survey in Ngadas Village, 2014

Farmers in this village have been familiar with techniques of farming for a long time. Intercropping of vegetables, for example, was known to the villagers since the end of nineteenth century (Hefner (1999, p.91–102). Figure 3 shows cropping patterns applied by farmers in Ngadas. They usually plant potato seeds twice a year, in January and in May. In October, they usually leave the farming land empty, or plant cabbage or green onion. In some plots, cabbage and green onion are planted throughout the year.

Figure 5. Cropping Pattern in Ngadas



Source: Author's survey in Ngadas, 2014

Note: Total farming land of 50 respondents were potato = 14.4 ha; cabbage = 12.6 ha; and green onion = 9 ha in 2013 to 2014.

(4) Farming and Environmental Risk

Land erosion has long been the most serious problem in Java's upland farming. The land conservation of the upland areas became a governmental priority (Hefner, 2009, p.177–178). Hefner pointed out that Ngadas is a high risk area for land erosion, and the government applied terraces for vegetable farming to protect against land erosion. Historically, this was first applied from 1870 to 1910 by the Dutch colonial government. The policy was rejected by the villagers due to the high cost and the time and labor involved. It also needed massive landscaping arrangements. In the 1970s, the Indonesian Government tried to re-introduce terrace farming, but it was again rejected by the villagers. In 2010, it was re-applied by the Ministry of Agriculture and approved by the villagers. The villagers appreciated that extension workers directly instructed them on the farming technology and posed no threat of governmental land acquisition. Now, most farmers in Ngadas apply terrace farming. Only a few farmers still reject it, arguing that their land is not so steep (6 respondents) and that the terracing system requires more time (1 respondent).

Farmers in Ngadas intensively utilize fertilizer. They use organic fertilizers more than chemical fertilizers, with the ratio being 11:1. They regard organic fertilizers as more profitable than chemical ones.⁴ The production is increased by using organic fertilizers, particularly in potato

² BNPC Statistical Yearbook, 2013. Situation in Ngadas: average rainfall: 1,992 mm/year; average rainy days : 9.3 days/month; type of soil: regosol and litosol, intermediates of volcanic ash and sand, reduce viscosity and erode soil; and topography: up to 40 degrees of slope. Ngadas is high risk of land erosion: 6 locations in 2013.

³ 1 ha; 2 farmers, ±30 days/ more.

⁴ Price of organic fertilizer: IDR 370,000/ton, while chemical fertilizer: IDR 2,200,000/ton.



farming.⁵ Table 21 shows providing nutrients to the soil improve yield substantially. The total organic fertilizers used by the farmers is 272.30 tons, while its average application per hectare is 5.57 tons. Nineteen out of 48 rich farmers (income \geq IDR 2.5 million/month) used more than 44.25% (120.5/272.3 tons) of organic fertilizers.

Table 21. Application of Organic Fertilizers by Farming Land Size and Income Level

Income Level (IDR 000)	Farming land size (ha)				Total
	0	0 < - < 0.5	0.5 < - < 1	1 < - < 2	
500 ≤ - < 1,000					
1,000 ≤ - < 1,500		22.00	10.00		32.00
1,500 ≤ - < 2,000		25.20	8.60	15.00	48.80
2,000 ≤ - < 2,500		12.50	17.50	41.00	71.00
≥ 2,500		4.00	30.50	67.00	19.00
Total		63.70	66.600	123.00	19.00
					272.30

Source: Author's survey in Ngadas Village, 2014

Chemical fertilizers have been applied since the colonial era (Hefner, 1999, p. 98-99). Its use became more intensive in the 1970s (Hefner, 1999, p. 100). Before 1979, farmers bought chemical fertilizer in Ngadiwono Village, Pasuruan District, 16 km from Ngadas. The villagers went to Ngadiwono on foot. At present, they go to Poncolusumo, the sub-district capital, for the purchase.

Table 22 shows chemical fertilizer application. The total amount of chemical fertilizers used by the farmers is 23.28 tons, and the average is 0.43 ton/ha. The rich farmers tend to use it intensively and account for more than 48% (11.20 ton) of the chemical fertilizer use. Fertilizers can cause environmental problems. Chemical fertilizers and pesticides from upstream are regarded as the cause of water pollution in Brantas river (Raymont, 2014, p.5). The stream from Ngadas is a branch of this river.

⁵ Nutrients to the crop improving crop yields substantially. Example: Chicken manure can increase potassium levels in the soil and thereby increase the growth of potatoes (Nurul, 2011). Improving soil health reduces soil borne disease (FAO, 2009). Potatoes need large amounts of organic manure, farmyard made as well as factory made.



Table 22. Application of Chemical Fertilizers According to Farming Land Size and Income Level

Income Level (IDR 000)	Column Labels				Total
	0	0 < ≤ 0.5	0.5 < ≤ 1	1 < ≤ 2	
500 ≤ < 1,000					
1,000 ≤ < 1,500		2.08	1.00		3.08
1,500 ≤ < 2,000		2.30	0.80	1.00	4.10
2,000 ≤ < 2,500		1.25	1.75	1.90	4.90
≥ 2,500		0.40	2.80	6.70	11.20
Total		6.03	6.35	9.60	23.28

Source : Author's survey in Ngadas Village, 2014

Table 23 shows the labor source of farming in Ngadas. Farmers in this village work by helping their family or hiring workers from Ngadas (mainly close relatives or neighbors).⁶ Only one farmer hired outside laborers, relying solely on non-family workers; eleven farmers employed both family and hired labor. Farmers with greater land (size > 1 ha) account for about 70% of outside hires. The majority, however, depends only on family labor. Large scale farmers owning more than 2 hectare mainly depend on hired labor.

Table 23. Labor According to Farming Land Size

(Unit : number of respondents)

Labor source	Farming land size (ha)				Total
	0 < ≤ 0.5	0.5 < ≤ 1	1 < ≤ 2	> 2	
Family	18	1	7		36
Family & hired worker	1	3	6	1	11
Hired worker				1	1
Total	19	14	13	2	50

Source : Author's survey in Ngadas Village, 2014

Livestock is a side activity in Ngadas. A total of 24 villagers (48%) raise cows, and 14 villagers (28%) raise pigs. As many farmers are Hindus, they do not have taboos regarding pig raising. The livestock owners get feed from both the farming land and forest. It seems that feed from their farming land alone does not suffice to raise all the village livestock.

⁶ The non-family labor is used only in certain conditions. Example: the head of village has no time to work his farming land, such that he needs hired labor. No farmer who hired labor did so outside the village, because the laborers wages were much more expensive. Laborers' wages outside the village were IDR 35,000/day, while wages within the village were only IDR 20,000/day.



(5) Dependency on Forest Land

Vegetable farming in Ngadas is fully developed and profitable. It is highly commercialized, with products being sold to large urban cities, particularly to Malang and Surabaya. The farming activities intensively use chemical and organic fertilizers, particularly large land-owning and rich farmers. It has caused water and soil contamination and high levels of environmental risk.⁷ Large forest lands were illegally developed for vegetable farming without BNPO permission. Opening forest, however, is not avoidable for the villagers' survival. Large vegetable farmers have become rich and stratified according to their income level. Rich farmers extended the area of farmable land, but their methods were not scientifically investigated. Farming activities and forest resource usages have not been precisely monitored up to now.

⁷ Brantas river: 12 liters/second (2007) and 2 liters/second (2014); sedimentation in downstream up to 11 meter in 2007, mainly caused by farming activity in upstream area (Tempo, 2014).



5. Forest and Land Use

(1) Land Ownership and Expansion of Farming Land

Villagers have used timber and non-timber resources since the end of the fifteenth century based on their own customary rules. Dutch policy allowed villagers to open forest land up to 414 ha for farming from 1910 to 1925 after road development and population growth. The land that was legally allowed to be used by the villagers for agriculture was 410 ha (99%), a settlement of 3 ha (0.7 ha), and public facilities (road, place of worship, etc.) of 1 ha (0.3%). In 1927, the average household in Ngadas had 1.29 hectares of farming land (Hefner, 1999, p. 94-95). The evidence of land holding has only been the Pethok D (tax payment receipt). Since 1982, the management of forest and environment came under BNPO control.

Under BNPO, the villagers are allowed to use only the traditional zone where land had already been opened due to customary rules and colonial regulation.¹ Although they are allowed to use non-timber forest resources, villagers (illegally) opened new farming land due to high vegetable demands. The villagers using this farming land opened 475 ha (up to 2012) and 3.54 ha in 2013. The total farming land in Ngadas is 888.5 ha. With only 419 households, the average land used is more than 2 ha/household.

Table 23 shows villagers' income level by farming land size. In the 1980s, the stratification of income level and farming land size in Ngadas was already wide: the top rich 6% of villagers owned 25% of farming land in this village (Hefner, 1999, p. 197). Now, the recent stratification is caused particularly by village government officials and larger farmers. Ten percent of very rich villagers (income \geq IDR 4 million/month) own 33% of the farming land. Two farmers who are very rich villagers own > 2 ha of farming land. The disparity among the villagers could become wider and it could potentially cause an internal conflict among them. It would induce the loss of their customary rules and eventually reduce the integration of the village community. Without the villagers' integration, it could be even more difficult to implement government programs.

¹From 1910 to 1925 the villagers jointly opened forest for farming (Hefner, 1999, p.94-95).

Table 24. Household Income Level According to Farming Land Size
(unit: number of households)

Income Level (IDR 000)	Farming land size (ha)				Total	
	0	0 < - ≤ 0.5	0.5 < - ≤ 1	1 < - ≤ 2		
500 < - < 1,000	2				2	
1,000 ≤ - < 1,500		5	1		6	
1,500 ≤ - < 2,000		9	3	1	13	
2,000 ≤ - < 2,500		3	4	3	10	
2,500 ≤ - < 3,000		1	2	1	4	
3,000 ≤ - < 4,000		1	3	6	10	
4,000 ≤ - < 5,000			1	1	1	
≥ 5,000			1	2	4	
Total	2	19	14	13	2	50

Source: Author's survey in Ngadas Village, 2014

Note: Income is roughly estimated by added value of harvested crops, wages, salaries, and net benefit of others. The estimated values are wrapped up 8 income levels.

(2) Traditional Rules of Forest and Land Use

The Ngadas villagers' life style has been heavily affected by their customary rules. Religion and customs strongly influence their beliefs about water, land, and forests as their source of livelihood. Though they believe in three different religions, Islam, Buddhism, or Hinduism, they still adhere to the customs of the Tengger. The villagers retain the customary rules on opening land, land transaction, inheritance, night watches, and so on.

The average farming land owned in Ngadas is 2.12 ha/household, much larger than the average across Java (0.43 ha/household). Approximately 50% of land in the village is technically not allowed for use by villagers by the government. However, the villagers maintain their rules on land use and transaction. Selling and buying land is limited to village community members and occurs less frequently.² The transaction is authorized by the "dukun" (traditional and religious leader of a Tenggerese village). Their land plot does not have a land title yet. Land tenure is not regulated under the land law, but only under customary rule. Regarding village land use for residence, places of worship, farming land, and other uses, the community decides under the leadership of the "dukun." Furthermore, the community still maintains a traditional farming agricultural calendar (*pranoto mongso*). Based on this rule, farmers jointly work to plant and harvest vegetables.

The other traditional rules regarding land in Ngadas are *the tanah bengkok*, *tanah warisan*, *gono-gini*, and land rent. *Tanah bengkok* is village land provided to the current head of the village or officials, and it is usually the most fertile land in the village. The *tanah bengkok* cannot be sold, but it

² Compared to other Tenggerese villages such as Ranupani, in which traditional values have begun to shift. Now, some land in Ranupani is owned by people outside the village.



can be rented to other villagers. The area of *tanah bengkok* in Ngadas is 16.4 ha (4% of total farming land). *Tanah Warisan* (land inheritance) is inherited from villagers' parents to villagers after their parents' death. The ratio of *tanah warisan* between son and daughter is 1:1. *Gono-gini* is the dividing rule of assets obtained by husband and wife. It is evenly allocated as 1:1 in case of divorce.

The other traditional farming rule is share-cropping. It is not fixed rent but harvest sharing in monetary terms after selling crops. The harvest ratio of share croppers and land owners is 1:1, usually known as *maron* (a Javanese term meaning divided into two). The exemption of ratio occurs during bad harvest, for example 2:1. Actually, share-cropping is a rare case in Ngadas. Large land owners sometimes use share-cropping, for example *tanah bengkok*, of the village head or other village officers. Most share-croppers are relatives or neighbors. In share-cropping, role sharing is applied by the villagers. The land owner usually provides fertilizers, lunch, and a cigarette (once per day, and cigarettes for males only). Meanwhile, the share-cropper provides seed, fertilizer, and labor.

Vegetable farming in Ngadas is largely developed and benefits the villagers. They are strongly motivated by such beneficial opportunities. Although land transactions have been regulated and coordinated by such customary rules as described above, recent transactions could risk the loosening of customary rules or of cause some villagers to defy the customary rules. The loosening of customary rules could also generate higher risk of outsiders' buying forest or farming land for development. Fortunately, villagers' customary rules on land transaction, land use, and traditional leadership are well maintained. This contributes to the overall system of living in Ngadas, which is also useful in maintaining environmental conditions. Even though farming areas have been expanded about 100% over the zone permitted by BNPO, if villagers' traditional rules are not maintained, the environment could be affected negatively.

(3) Causes of the Governance Problems

Farming land development has caused environmental degradation in Ngadas. Four hundred seventy five hectares of forest were opened up in 2012, and 3.54 ha in 2013. Soil erosion frequently occurs in the village, with 6 locations experiencing land erosion in 2013. Moreover, 1,688.05 ha of forest fire from 2004 to 2011. Contamination and sedimentation have occurred in the lake in Ranupani as well, causing siltation (depth from 10 m to 5 m) shrinking the lake from 7 ha to 4 ha over a 14-year period (1988–2012).

The vested interest of the villagers is farming land rather than explicit land conservation. In addition to 414 ha of allowed land, they occupied more than 400 ha by opening forest. BNPO prohibits land use and is requesting them to reforest the land. This has caused direct conflict between the villagers and BNPO.



The environmental problems caused by villagers' daily activities consequently increases the vulnerability of village life and living conditions. It is very difficult to induce villagers to decrease their farming efforts. Village income stratification also has the potential to become larger due to lucrative vegetable farming. Only villagers with ties to the government get benefits, particularly village officers, who become rich (income \geq IDR 2.5 million/month). Disparity inside the community could cause critical problems for the sustainability of the community and execution of environment conservation and protection.

Ornamental and symbolic conservation efforts do not need to be continued. Governmental environmental protection programs need to be sufficient, consistent, and sustainable. As discussed above, the program implemented in Ngadas did not satisfy these conditions. The villagers received governmental services, but they did not receive an incentive to cooperate with the government, particularly BNPO. On the contrary, forest rangers were kidnapped and an official car was burnt. The villagers have something close to hostility towards the government. The government needs a credible justification for environmental degradation through scientific research, which can increase villagers' concern for environmental protection; otherwise, the government cannot gain positive support from the villagers and also from other governmental institutions. Environmental monitoring could effectively be carried out with cooperation between the government and villagers.



6) Conclusion

The aim of this paper is to find the answer to why villagers do not follow the environment protection policy. The reasons are explained in greater detail below.

It is contended that government policy does not necessarily secure the villagers' living condition. It is merely a continuation of the colonial policy established by Dutch colonial government without scientific research or rational justification. The government is acting as an apologist to colonial rules regarding forest conservation. The programs undertaken were insufficient, inconsistent, and non-sustainable. The programs were also applied at inappropriate locations and with very limited supply capacity. Conventional government programs implemented in Ngadas were regarded as ornament solutions. There was no consultation nor coordination between the priorities of the government and the needs of the villagers.

BNPO did not conduct scientific research on environmental degradation. This has resulted in a lack of information about environmental degradation, and consequently the villagers hardly understand the seriousness of the environmental risk in the BNP territory. This led to them hindering forest conservation efforts. Without the villagers' understanding and commitment, any BNPO programs for the villagers would be continuously regarded as merely ornamental solutions.

As the villagers have huge role in monitoring environmental degradation, the collaboration between the government and villagers is essential, particularly for monitoring land opening, farming, and villagers' living conditions. However, it seems to be difficult to induce the villagers' participation in monitoring the environment, because the government programs were meant to conceal BNPO's real intention of reducing farming land and controlling villagers. It is of little surprise that such programs are not welcomed by the villagers.

There is no effective mutual cooperation and coordination among the various government organizations in the BNP. Various BNPO programs, Malang District Government, and Ministry of Agriculture programs were implemented without planning or coordination. Several programs could not meet both the priorities of each government and the needs of the villagers. The cooperation among the villagers and the government organizations is essential for environmental protection.

There is no scientific justification for the villagers' "illegality," asserted by BNPO, regarding the newly opened farming land. No reliable and scientific monitoring has been established for the environmental condition, particularly the impact of extensive vegetable farming in both "legal" and "illegal land." The environmentally feasible and sustainable scale of farming is not revealed. Under this condition, any ornamental solution cannot successfully gain the villagers' participation or cooperation for environmental protection and forest conservation. It is impossible for BNPO to stop extensive commercial farming of vegetables without understanding the real living conditions of the villagers or to formulate ways of inducing villagers' participation in forest conservation. Providing

References

- Badan Pusat Statistik (2012). *Statistic Indonesia 2012*. Jakarta: Badan Pusat Statistik (Central Body of Statistic) Indonesia.
- Badan Pusat Statistik Kabupaten Malang (2012). *Kabupaten Malang dalam Angka (Statistical Yearbook of Malang District)*. Kepanjen (Kabupaten Malang): Badan Pusat Statistik (Central Body of Statistic) Kabupaten Malang (Malang District).
- Balai Besar Taman Nasional Bromo Tengger Semeru (2013). *Statistik Balai Besar Taman Nasional Bromo Tengger Semeru (Statistical Yearbook of Institution of Bromo Tengger Semeru National Park)*. Malang: BBTNBTS.
- Bennet, Christ, P.A. (2002). "Responsibility, Accountability, and National Unity in Village Governance." In Colfer, Carol J. Pierce and Ida Aju Pradnja Resosudarmo. (eds.), *Which Way Forward? People, Forests, and Policy Making in Indonesia*. Washington D.C.: Resources for the Future, 60-80.
- Boulle, L. (1996). *Mediation: Principles, Process, Practice*. Sidney: Butterworths.
- Fitri N. and Handoyo. (2007). "Nilai Ekonomi Manfaat Hidrologis Hutan di DAS Brantas Hulu untuk Pemanfaatan Non Komersial (Economic Value of Forest Hydrological Benefits in the Upper Brantas Watershed for Non-Commercial Use)." *Info Sosial Ekonomi*, Vol. 7 No. 3, 193-214.
- Furnivall, J.S. (1944). *Netherland India: A Study of Plural Economy*. Cambridge: Cambridge University Press.
- Hefner, R. (1999). *Geger Tengger: Perubahan Sosial dan Perkelahian Politik (Conflicts of Tengger: Social Change and Political Fight)*. Yogyakarta: LKiS, xxxviii+444.
- Libiszweski, S. (1992). "What is an Environmental Conflict?", Occasional paper, Bern. Swiss Peace Foundation and Zurich: centre for Security Studies and Conflict Research, Swiss Federal Institute of Technology, 1992, 6-7.
- Moira, M., and Elizabeth, L. (2009). "My Rights, Your Obligations: Questions of Equity in Indonesia's Protected Areas". In Campese, J.; Sunderland, T.; Greiber, T.; and Oviedo G. (eds.), *Rights-based Approaches: Exploring Issues and Opportunities for Conservation*. Bogor: Center for International Forestry Research, 233-250.
- Ngadas Village Office (2013). *Profil Desa Ngadas 2013 (The Profile of Ngadas Village 2013)*. Ngadas (Kabupaten Malang): Desa Ngadas (Ngadas Village Office).
- Nicholson, D. (2009). *Environmental Conflict Resolution in Indonesia*. Singapore: ISEAS, xvii-325.
- Raymont, V. (2014). "Tantangan dalam Pengelolaan Sumberdaya Air untuk Mencapai Lingkungan Lestari Berkelanjutan: Potret Daerah Aliran Sungai (DAS) Brantas (Challenges in Water Resource Management for Achieving Sustainable Environment: Portrait of Brantas Watershed)". *Paper on Seminar Pekan DAS Brantas 2014*.



Setyo, A., and Luchman, H. (2014). "Pengetahuan Masyarakat Desa Ranupani terhadap Pohon di Hutan Tropis Pegunungan Tengger-Ranupani (Knowledge of Ranupani Villagers on Tropical Forest Trees in Tengger Mountain)". *Jurnal Biotropika*, Vol. 2 No.1, 1-7.

Veda, S. (2012). "Terobosan Masyarakat Wakatobi yang Mendunia (Worldwide Breakthrough by Wakatobi Community)". In Eghenter, C.; Hermayani, P. and Israr, A. (eds.), *Masyarakat dan Konservasi: 50 Kisah yang Menginspirasi dari WWF untuk Indonesia (Community and Conservation the Fifty Inspiring Stories from WWF for Indonesia)*. Jakarta: WWF Indonesia, 34-35.

Wirendro, S., Shoelton, G., Frionny, A., and Isnenti, A. (2011). *Portret Keadaan Hutan Indonesia Periode tahun 2000 - 2009 (Portrait of Indonesian Forest Situation 2000 - 2009)*. Jakarta: Forest Watch Indonesia, vii+54.

Yuliana, C., Yurdi, Y., Christian, P., & Wollenbergh, E. (2004). *Analisa Konflik Sektor Kehutanan di Indonesia 1997 - 2003 (Analysis of Conflicts in Indonesia's Forestry Sector 1997 - 2003)*. Jakarta: Center for International Forestry Research, ix+79.