The Local Genius of Tengger People in Conserving Forest and Increasing Economic Benefits Using Agroforestry System

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Abstract. The supporting capacity of Bromo-Tengger-Semeru National Park environment, which is inhabited by the Tengger society, is increasingly unbalanced. The local community originally utilized their agricultural land to cultivate food crops in order to meet daily needs as economic activity. These agricultural activities are shifting to commercial crops such as leek, cabbage, carrots, potatoes, etc. The objectives of the research are: (1) To determine Tengger community activity in utilizing forest area for economic improvement (2) To determine Tengger community form of local wisdom in preserving the forest (3) To understand Tengger community forest management using agroforestry system to preserve the environment and improve the community’s economy. This study utilized descriptive qualitative method. The data was obtained by reviewing literature related to agroforestry and Tengger society local wisdom, in-depth interview, field observation, and documentation. The results exhibit Tengger community local wisdom, in preserving the forest, still adhering to rituals on harvest periods and applying Tri Hitna Karana. In applying agroforestry, they are less able to perform optimally, because a huge number of pine trees were cut. These trees are considered blocking sunlight vital for vegetable crops growth. As the agricultural land were used for stalls and homestay, therefore as agricultural activity utilized forests instead, even on steep grounds. In conclusion, Bromo Tengger and Semeru National Park should regularly control Tengger community agricultural activity, especially in enclave areas.

1. Introduction
This research is conducted based on the decreasing of environmental quality caused by the high growth of population, environmental capacity, process of economic growth and the development of science and technology. Although there is an effort from the society to control the growth of population, there is still a situation where the population is larger than the environmental capacity. This problem is commonly faced by people in developing countries, including the Tengger people in Bromo Mountain who most of them are farmers working on a rough topographical surface in the forest area of Taman Nasional Bromo-Tengger-Semeru.

People who live around forest area should be given a special attention because they: (1) are part of the whole forest ecosystem, (2) have right to be put equal because they have been neglected, (3) some of them, around 20%-30% of population, is under the line of poverty [1], [3]. Moreover, Brown and Sunderlin (in [4], [5]) mentioned that around 48.8 million people of Indonesia live in state forest area, 10.2 million people are poor and 6 million people depend their live on the natural resources of forest [2].
The interaction between society and forest can be grouped into three, based on the motivation and interest. First is interaction which is bound by economical factor. People belong to this group interact with the forest because of their poverty. Second is interaction which is bound by economical as well as environmental motivation. People belong to this group have the ability to apply agroforestry system. Third is interaction which is created because the people have lived in and around the forest for a long time and they depend their live on the forest.

If people can make use of forest as well as apply local genius and pay attention to the environmental capacity, forest will be well conserved. However, because of the high growth population, the local genius can gradually fade and the use of new technology will increase in order to fulfil the needs of growing population. Agricultural technology used by Tengger people is agroforestry system.

Based on the background above, the research problems can be derived into: (1) What are the activities of Tengger People in using forest area to get economic benefits? (2) What is the form of local genius of Tengger People in conserving forest? (3) How is forest management done by Tengger People using agroforestry for conserving forest as well as increasing economic benefits to them?

The goals of this research are: (1) Identify the activities of Tengger People in using forest area to get economic benefits, (2) Identify the form of local genius of Tengger People in conserving forest, (3) Identify forest management done by Tengger People using agroforestry for conserving forest as well as increasing economic benefits to them.

Agroforestry is related to land use system in which trees are grown associated with other crops, shrubs or pastureland. This association can be in the dimension of time, such as rotation among trees and other components, or in the dimension of space, where all the components are grown together in the same land. In this system, it is needed to consider both ecological and economic values in the interaction among trees and other components [7], [9].

Based on the function of tree, agroforestry system has two main functions, production or conservation. The productive functions include: food, forage, fuel, rubber, medicine and money. The conservative or preventive functions include: land improvement, protection and spiritual value. Error in forest management will effect greatly to social, economic and environmental condition. Indonesia, actually, has a strong rule related to forest management in the form of Ministerial Decree of Forestry about Societal Forest: (a) Forest management is changed from timber management into resources based management; (b) The right for mastering the forest is changed from private based forest management into community based forest management; (c) Forest conservation orientation is changed from economic aspect (timber production) into social, economic and environmental functions; (d) Forest management is changed from centralistic into decentralist, giving chance to local government in managing its forest democratically, anticipatively and openly; (e) Production era is changed gradually from mainly timber output and soft landing process into rehabilitation era and conservation to relieving everlasting environmental quality [20].

In forest management, each society has its own local genius. Local genius is an act from responsive of interaction between man and his environment, local genius becomes an environmental ethic in human life cycle. In this stage, local genius has become part of implementation of environmental ethic [10]. Indigenous knowledge system which is used by local society to survive from their environment has bound with their belief, norm, culture and expressed in their tradition and myth in a very long time [14].

Agroforestry is an activity of planting trees in farmland in which farmers or society is the subject. Nevertheless, agroforestry study is not only focused on technical problem and biophysical but also social, economic and cultural problems that change through time. So that agroforestry becomes a dynamic branch of science [21].

Local genius concept or indigenous knowledge system which is used for forest management can really be a continuous forest management [16]. The continuous forest management in the 21 agenda which is produced by Lembaga Ekolabel Indonesia (LEI) is: “Continuous forest management as a form of forest management which has characteristic of “everlasting result”, is shown by the continuity
of forest production, forest ecology and social-economy-culture forest functions for local society”. The global awareness toward natural conservation, by giving an award to the product of ‘green’ agriculture (including agroforestry) is increasing [8].

The development of agroforestry in Indonesia has wide opportunity because of several reasons, including: (a) There is a changing paradigm about forest conservation which considers natural resources management and the willingness to improve the welfare of the society who live around the forest, (b) The increasing of local farmers’ awareness towards agroforestry, (c) The vast area of degradation (such as grassland and depredated forest) gives opportunity for agroforestry system as part of rehabilitation program and natural resource management, (d) Global awareness in reducing concentration of CO\textsubscript{2} in the atmosphere by increasing reserved of carbon, (e) Agroforestry system has several advantages such as in ecological environment, economics, social-economy-culture and politics [6].

Agroforestry is one of land management which has productive and protective functions (conserving biological diversity, healthy ecosystem, water and land conservation, deep pool C land), so that it is commonly used as one of the example of continuous land management system. In fact, agroforestry system which is applied by society by planting trees in their own land is commonly put aside during discussion about continues forest management. Agroforestry is considered not part of forest plantation, which in fact it did. On the other hand, agroforestry has a big potential in the succession of re-greening revolution done by farmers [20].

If the advantages mentioned above still cannot be felt perfectly by society, so agroforestry system development much more to be failed. The output of agroforestry should be able to increase the society welfare as well as conserve the environment, so that the society welfare can increase and environmental condition can be improved continuously for a very long time [17].

The development of agroforestry is the right choice especially for the transition area between conservation area and production area, which is now still developed as timber production forest. Agroforestry has ecological, economic and socio culture advantages. The development of agroforestry has to be matched with the land condition; plant type, economical and socio culture condition of the society around the forest, so that what is developed will really give economic benefits to local people and environmental condition which is mastered by them.

2. Methodology
The research is using qualitative descriptive method. Data is gathered by analyzing literature related to agroforestry and local genius of Tengger People, interview, site observation and documentation. This research’s goal is to identify local genius of Tengger People in Kecamatan Sukapura Kabupaten Probolinggo. This research will be focused on local genius in managing farmland around forest area using agroforestry system. Data analysis used in this research is Triangular Analysis.

3. Results and discussion
The result of this research can be described as follow: (1) The activities of Tengger People to make use of forest area are in order to increase their economic condition. They commonly live in colonies on the hillsides near their farmland. They live by planting corps in the field using rain fed irrigation. At first, the planted only corns, but now they change the plants. During rainy season, they plant vegetables such as potatoes, cabbages, shallots and carrots as commercial plants. At the end of rainy season, they plant corns as their staple food.

The agricultural system of Tengger People has changed from subsistent to commercial system. It automatically causes changes in labour system, from accidental payment to wages. Wages system (for hiring labours) is usually needed for farmers who have a vast area of farmland.

Since Majapahit era, the population growth of Tengger People had slowed. However, by the changing of economic system into commercial, its population has grown faster. The economic condition has been changing because of the commercial plants they have grown massively. The economic changes of Tengger People caused by: (1) The increasing accessibility of this area so that it
is easier for the labours to commute. Even, many of Tengger People have renting company (renting horses, home stays and Hard Top Jeep as transportation vehicles and opening food stalls), which begins since Bromo Mountain become a tourism place. (2) The need of labour has increased because of the changing of agricultural system into commercial. (3) Farmers who have narrow farmland tend to be economically low, so that they are opening forest area and change it into farmland. (2) The form of local genius of Tengger People in managing the forest is through Belief which is based on their religion and culture about positive consequences towards their environment. Tengger People in Probolinggo are mostly Hindus, they consider pure and danyang are sacred. For Tengger People, traditional ceremony is one form to show gratefulness to God. There are several traditional ceremonies held by Tengger People and each of them has different purpose such as asking for mercy of God, keeping away from disaster and showing gratefulness to God. One of the traditional ceremonies is called Kasada. Its purpose is to celebrate the sacrifice of Raden Rahman, son of Jaka Seger and Lara Anteng. Tengger People hold this ceremony for asking salvation and blessing. It is held on the 14th to 16th of Kasada Month or when the full moon is fully appears in the sky once a year. The language spoken by Tengger People is ancient Javanese. They speak two levels of Javanese language, ngoko as the everyday (informal) language and krama as the language spoken to older or respected people. There is no caste difference applied, so they are all considered equal. They tend to hold their rituals as well as traditions and apply them in their agricultural activities.

The relationship among people based on Tengger Philosophical System, related to their way of live as contained in Sesanti Panca Setia, that: (1) Setya budaya means loyal, diligent, independent, (2) Setya wacana means keeping utterances, (3) Setya semya means keeping promises, (4) Setya laksana means obedient, consistent, loyal, (5) Setya mitra means faithful to other people [15]. Harmony of their society can be seen when they work together in doing everyday activities such as farming, building houses and fixing roads. They are aware about clean environment. If their environment looks dirty, they will clean it without order.

Pillars and walls of Tengger People’s houses are made of wood and the roofs are made of bamboo. When those kinds of resources are rare, they change them using iron sheeting, wood plank and tile for roofs. Traditional furniture which is still in the front of almost every house is balai-balai, a kind of cots made from bamboo. Inside the house, they even have a traditional fireplace called prapen, made of rocks and cement. Its length is ¼ of the room’s. Near prapen, there are short wooden stools called dingklik, they fill almost half of the room. If a guess comes, he is seated respectively on dingklik, it symbolizes that the guess is welcomed and respected. Besides being used for warming tool, prapen is also used for drying corns or other food which needs to be preserved by smoking it. Near prapen, there are also kitchen tools, lesung and wooden portable stairs.

(3) Forest management that is done by Tengger People is agroforestry for conserving forest as well as increasing economic benefits to them. Their houses are built on a land near water sources, or a vast land for terraces which is far and free from wind destruction. Their houses are close to each other or form a colony in certain area which can be entered from many directions and connected by narrow roads to other colonies (villages). The building processes of a house is started with selamatan, thanksgiving party, and ended also with selamatan. In every new built house, there is sesajen, food offerings, which are hung on the pillars in the form of rice cakes, lepet, bananas and etc. The size of the house is big and wide because it accommodates more than one family.

The relationships between man and his environment for Tengger People have a special meaning that environment should be kept and should not be destroyed. It is also applied to flora and fauna. Tengger People plant seasonal vegetables such as leeks (bawang prei), cabbages, potatoes and corns. Dusun Cemoro Lawang is one of dry lands whose irrigation system depends on rain and water supply from other villages. They do not see Bromo Mountain eruption as a disaster and none of them is flee when it happens because they believe that it will not harm them. If there is a landslide on the main road, they will contact the government.

In order to increase the income for the higher living cost, so when the policy about community based forest is applied and the development of agricultural technology of agroforestry, increasing area
or farmland is needed and fulfilled by forest area even where the topography is rough [22]. This kind of agricultural activity is narrowing forest area into critical condition. The community used to follow mangsa (consist of 12 mangsa: Bhaga, Ansu, Arivama, Mitra, Waruna, Sawitri, Dhatri, Wiwaswat, Twashtri, Pusha, Indra, Whisnu) [18] in doing farming activities. But now, they tend to not follow it because the increasing living cost.

Uncontrolled exploitation of natural resources will give negative effects to the ecosystem. One of the emerging problems is the increasing economy that destroys the environment, especially forest area. The damage of the forest area is caused by the increasing of population and the failure to balance forest functions as conservation and production area, and the economic income of the society and the country. To solve that problem, agroforestry is one of the best solutions that need to be made policy. Reference [19] mentions similar thing as above that the changing forest area into farmland causes many problems such as deprivation of land, erosion, extinction of flora and fauna, flood, drought and even global environmental changing. These problems are getting worse in addition to the decreasing forest area. Agroforestry is one of land use system which is highly possible to be able to solve the problem as well as to increase the economic benefits.

However, Tengger People is still unsuccessful in applying agroforestry. It is seen by the gradually decreasing number of pines trees which under them grows vegetables. This case was also found in Muspida’s research in 2008 about Management of Candlenut Forest with Agroforestry Pattern which has several steps as follow: Land preparation, Nurturing candlenut plants and other seasonal plants, Collecting land products. The thing that threatening the continuity of the candlenut forest management in Kabupaten Maros is the tendency of the farmers to converse candlenut plants into other commodity because they are facing difficulty in rejuvenating old candlenut plants based on TGHK criteria in forest area.

In order to keep the number of trees, the society should follow local genius like the result of Maruapey’s research in Maluku Tengah. The participation of the society includes: (a) optima of enforcing and usage patterns of farmers toward state and local forest area; (b) increasing society participation in conserving and managing state and local forest; (c) enforcement of law and traditional organization (sasi and kewang) [11].

The research result [12] proved that motivation to conserve environment and farmer’s knowledge of green farming are influenced by local genius and locus of control. Those two exogenous variables also give interest influence toward farmer’s behaviour. This discovery shows that local genius, locus control and motivation to conserve environment are important factors that influence farmers to do green farming. And, the society around farm area is often in the critical economic condition so that they need to be enforced [15].

4. Conclusion
Tengger People were planting only corns, now they combine them with commercial plants such as leeks, cabbages, carrots and potatoes. Besides that, they also do commercial activities such as opening food stalls, home stays, renting horsed and car. The local genius of Tengger People in conserving forest is done when they are about to harvest the crops, they do a ritual, and they still following traditional values of Tri Hita Karana about good relationships between human and God, among human, and between human and environment. However, because of the increasing of population, they are advancing the farmland by using pine forest area to be planted crops under the trees, which is called agroforestry system. But, they do not follow the rules of the system which made the number of the pine trees is decreasing, and even they also plant crops on the steep contour.

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