

Bamboo and Balinese in Bangli: The Local Wisdoms of Balinese in Managing Bamboo for Sustainable Bamboo Forest and Rural Economic Development

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Abstract

Bamboo forest management is one of efforts towards sustainable forest management. Bamboo forest management in Bangli, Bali is managed by the society, which really influenced by Balinese local wisdoms. Balinese local wisdoms placed bamboo in a precious place. Bamboo is a part of three pillars of Balinese culture, which always there in rituals and ceremonies and plays important role in rural economic development. Balinese use bamboo for agriculture, architecture, furniture, food, and handicrafts. The local wisdoms of Balinese in maintain the harmony between human and the environment formed the practices and customs on how to manage bamboo forest properly. The example is that the Balinese believe that every living creature has a soul, so we have to respect them and do not disturb or destroy them because they also have the right to live. These local wisdoms are the lesson for us in the other side of the world, on how to build a harmonious relationship between human and environment and we must keep in order to sustainability.

Keywords: Bamboo forest management, local wisdoms, Balinese culture

Background

Forest management nowadays has moved towards sustainable forest management. Sustainable management means sustainable use and conservation of multiple forest values with the environmentally appropriate, socially beneficial, and economically viable management for present and future generations (Forestry - FAO). Multiple forest values means there are non-timber forest products (NTFPs) and environmental services which can be collected aside from timber product. Non-timber forest products contribute 90 %, while timber products only contribute 10%. Paradigm about forest resource management in Indonesia has shifted from one single forest product into multiple forest products. The paradigm of single forest product which has lasted for many years has led to the excessive exploitation of timber beyond its capacity to regenerate back (Hasanu, 2008). In Indonesia the policies on NTFPs management are regulated through *UU. No. 41 tahun 1999 pasal 26 and pasal 28* and *Permenhut P 19 tahun 2009* about strategy of NTFPs development. Various projects of NTFPs development was developed in areas such as cluster with the main NTFPs. There are six Indonesia's main NTFPs, namely bamboo, honey, silkworm, rattan, eaglewood, and *Calophyllum inophyllum*.

Bamboo has been developed in Bangli Regency, Bali Province as a national cluster of bamboo development in Indonesia. This policy is supported by the Working Group Assignment of Bamboo Development in Bangli. There are many factors that influence the project, two of them are the acceptance of public and community participation. These two are important because the bamboo forest management involve society around the forest. When the public accepts the program and there is willingness to participate in the program, which would be a sign of the success of the program.

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Picture 1.

Bamboo has a privilege place in Balinese society. For Balinese, which majority 95% is Hindus, bamboo is one of the three plants which are always used in Balinese rituals and ceremonies. The need of bamboo for ritual and ceremonies are about 34 million stems of bamboo per year. These needs are not fulfilled by local supply but also from other region in Bali. In Bangli Regency bamboos have been grown within and around the village areas where the clumps belong and managed by local people alongside tree and food crops in the yard or forest hills. Some of them belong and managed by the indigenous village (*Desa Adat*). The management also based on the customary law and the local wisdom.

Picture 2.

Furthermore, bamboo has the important role in the rural economic development in Bali. The utilization of bamboo by Balinese is vast. Bamboo used for agriculture, architecture, furniture, food, and handicrafts. The most commonly used are *tiing tali* (*Gigantocloa apus*) and *tiing petung* (*Dendrocalamus asper*). These species are dominant among the seventeen species found in the forest and private properties (Arinasa, 2010). *Tiing tali* mostly processed into handicrafts and souvenirs, offering tools, and export market. One stem of bamboo about IDR 50.000 which becomes weaving bamboo craft is priced about IDR 150.000 in three days process by women in their home. While *tiing petung* mostly uses for construction and furniture, they sell about IDR 35.000 per stem. Most of Balinese in Bangli Regency depend their life on bamboo, both cultivation and processing bamboo products.

Balinese communities co-exist in harmony with bamboo forest. Beside the high utilization, the Balinese respect bamboo as a part of their culture. Bamboo forest management by Balinese in Bangli is really influenced by their culture. Measuring the success of the project in bamboo program development can be found by re-explore the local culture of the community and the potential of the organization known as the local wisdoms. The local wisdoms can be understood as the ideas of local that are thoughtful, full of wisdom, good-value, which is embedded and followed by people of the society (Awang, 2007). The local wisdoms lead the society to protect the sustainable bamboo forest and indirectly support the rural economic development where most of society depended their life on bamboo (Nasendi, 1996). The practices of local wisdom can be the representative of the public acceptance and the community participation.

The local wisdom of society in forest management become interesting topic to be discussed in the depletion of natural resources and the significance role of the people around the forest towards sustainable forest management. The local wisdom is one defining element of the success of human/society resources development and natural resources development.

Objectives

This paper is aimed to reviewing the local wisdoms of Balinese in supporting sustainable forest management and rural economic development through bamboo forest management project in Bangli, Bali. The objectives of this paper are (1) to assess and inventory the information of the local wisdom of the Balinese in managing bamboo forest, (2) to describe the implementations of the local wisdom of Balinese and its impacts on the bamboo state, and (3) to discuss what we can take from the Balinese local wisdom for the greener future.

Method

This paper uses qualitative approach. Qualitative approach is a research method which produces descriptive data and informations. This research has been held in Panglipuran Village, Bangli Regency, Bali, Indonesia in November 2014. The respondents are the bamboo farmers and traditional leaders (adat leaders) choosed by purposive sampling. Data were collected through indepth interview, observation, and literature review. Data were processed and analyzed by qualitative approach. The data is then interpreted to obtain a model of understanding the values of local wisdom in establishing the environmentally responsible behavior of Balinese people.

Discussion

An Overview of Bangli Regency, Bali

Bangli Regency is placed in the volcanic cone to the upper slopes of Batur Volcano. Bangli is a recharge area for the underlying groundwater system. These conditions put Bangli in an important position in the context of water resources. Bangli hydrological continuity is crucial role for water availability in the surrounding area in Bali. Bamboo cultivation in Bangli is the largest in the province of Bali.

Picture 3.

Bamboo development program in Bangli Regency has strategic role in the economic, environmental and socio-cultural. The fact shows that the bamboo development is one effective option for community empowerment and employment in Bangli. Department of Industry and Trade of Bangli Regency show data that bamboo development contributes 40 percent to the Gross Domestic Income and absorb more than 45 percent of the workforce. Upstream activities (cultivation), middle (processing of products), and downstream (marketing). The number of business units in bamboo crafts about 4.732 units and involving about 9.530 workforces. The investment value is about IDR 306 million and IDR 27 billion of production (Department of Industry and Trade of Bangli Regency, 2014). The total demand about 34.804.682 bamboo stems in various types. While Bali itself has 12.681,77 hectare of bamboo forest and produce 11.412.900 bamboo stems.

Even though the bamboo demand is high, there is a local community which still hold their local wisdoms in managing bamboo. The do not exploit bamboo to fulfill demand and try to conserve the bamboo forest in order to sustainability for the future, they are Balinese people in Panglipuran Village. They lived in indigenous village with customary law. Based on history, their established since 11th century in Bali Kingdom Period. Todays,they have 75 ha bamboo forest within 112 ha of village area and has 7 varieties of bamboo.

Table 1.

The Local Wisdoms of the Balinese in Managing Bamboo

Bamboo and Balinese is unseparable. Bamboo has privileged position in Balinese life, include in society, economic, and culture. Bamboo has been grown within and around village areas. Bamboo is an item which is always used in rituals and ceremonies of Balinese culture. Each family at least has one clump of bamboo in the garden or around their home for daily rituals, it means if the population growing so bamboo population also growing.

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Picture 4.

The local wisdoms are the power and real potential of the society that encourage rural development. Furthermore in the attempt to build the rural economy, it needs the empowerment of local and indigenous culture to support the development strategy. The local wisdom could be a shield to strengthen the community in facing the globalization and modernization. The local wisdoms need to be exhumed and revitalized in order to align with the development and changes while maintaining environmental sustainability.

Bamboo is a part of Three Pillars of Balinese Culture.

Bamboo for Balinese, which majority 95% is Hindus, is one of the three plants which always used in Balinese rituals and ceremonies beside banana (*Musa paradisiaca*) and coconut (*Cocos nucifera*) (Eisman, 1992). Bamboo is symbolizes of welfare and safety. Therefore, bamboo always there in rituals and ceremonies of Balinese culture. They hope for welfare and safety by offering bamboo in their rituals.

Picture 5.

In rituals and ceremonies, bamboo used for offering tools (*banten*) ranging from the simple to sophisticated forms (Arinasa and Peneng, 2006). The simplest offering tools is *semat* and *katikan*, which its simply sewing together, then temporary temple construction (*sanggah*), *penjor*, the complex instrumental rituals such as *sokasi*, *pancak*, *tempek*, the flute from bamboo (*sunari*), gamelan bamboo and as a central part of the most sophisticated cremation ceremony (*ngaben*) (Sumantera, 1996). The Balinese ceremonies are held in several cycles: daily, and every three, five, seven, and fifteen days, monthly, six months, annually, etc (Arinasa, 2010). Therefore the demand of bamboo for ceremonies is high. Since the growth of people and the continuity of the ceremonies, hence it is necessary to cultivate and conserves bamboo for the future.

Tri Hita Karana (Three sources of welfare)

Tri Hita Karana means the three sources of welfare, they are the harmony relationship between human and the God (*Parahyangan*), the harmony relationship between human and the society (*Pawongan*), and the harmony relationship between human and the environment (*Palemahan*). The last is the principle that guide human conduct themselves with the environment. They believe when they can keep the harmony relationship with environment, it will brings welfare for them.

Manik Ring Cacupu : Like a baby in the womb

Human and the environment is like a baby in the womb, if the womb is not well maintained, it will harm the baby as well. Similarly if human cannot well maintain the environment, it will harm the human itself. We must take care of the environment properly, so they can provide good conditions for us. They also believe that the bamboo shoots are like the babies who are nursing to her mom (bamboo stem stand). This will influence the way they harvest the bamboo, they use the selective cutting method in harvesting rather than clear cutting method. This way is accordance with recommendation for sustainability bamboo forest.

Atma Cradha: The belief of *atman* or soul in every living creature

Atma Cradha is the belief that every living creature has an *atman* or a soul. They have to be respected, we can use or take advantage of them but do not disturb or destroy them. They belief when the bamboo tree felt hurt, the bamboo would not growing up well. Vice versa, when they treat them properly, the bamboo felt pleased and could growing well.

Wana Kerti: Forest Sustainability

Wana Kerti or forest sustainability is an effort to protect the sustainable forest as the lungs of the world and bank of water. This local wisdom is a part of *Jagat Kerti* or maintain the welfare of the universe. The increasing human activities in order to meet their needs tend to cause destruction of

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natural resources and biodiversity. Declining environmental quality caused various countries around the world began to make policies and regulations to monitor the utilization of natural resources in purpose do not damage the environment.

Tri Semaya: Three times, past, present, future

The Balinese believe on the causality of three times in the past, the present, and the future. They belief what they do today will affect the future. Every human hopes the best for the future generations, they want their children and grandchildren to live in a good environment. Therefore they should keep their current environment. This shows us the concept of the environmental responsibility for future generation of Balinese people.

Tumpek Bubuh: The attitude of giving before enjoying

Tumpek Bubuh is the philosophy based on the attitude of giving before enjoying. In the context of natural resource conservation, before people enjoying or using plants for their needs, they have to plant and maintain the plants properly. Balinese believe that human who exploit the natural resources without action to cultivate or maintain them is a thief. Taking without giving, enjoying without working, using without maintaining same as the thief or the robber. The implementation of this local wisdom is people have to cultivate and maintain the clumps of bamboo properly before they cut the bamboo and use them for their needs.

Bamboo Forest Management Implementation based on Balinese Local Wisdoms

The implementation of Balinese local wisdoms in managing bamboo forest can be seen by the way how they manage and treat the bamboo clump. The bamboo management include in *awig-awig adat* (customary law). Some of the implementations that have been done are:

1. Zonation of village area

There is zonation in Panglipuran Village, Bangli. This zonation is purposed as the effort of optimization land used in order to maintain, to conserve, and to strengthen the area and its function. The village area is divided into six zones, namely traditional residential zone, development zone, agricultural area zone, tourism development zone, conservation zone for ancient and historical buildings, and protected zone. They provide protected zone for bamboo forest. This area is about 75 ha or half of the village area. This area is protected and can not be reduced or take over to other utilization such as residential. They protect the bamboo forest because they know that the bamboo forest could protect them as well. This is the combination implementation of *tri hita kirana*, *manik ring capupu*, *wana kerti*, *atma crada* and *tumpek bubuh*. From the map, we can see that the bamboo forest is surrounding the residential area, like the baby in the womb. So they protected the bamboo forest from destroy. Then the bamboo forest can protect them from the wind, erosion, drought, and provide its stem for life.

Picture 6.

2. The Community Forest and Holly Forest (*Hutan Due*)

Forest is divided into community forest and conservation forest. The community forest is the forest where community can harvest the bamboo, woods, and other forest product for their life. While, *Hutan Due* or Holly Forest or conservation forest, is the forest where the forest products are used only for *yadnya* or ceremonial tools. If there are people use the forest products for private need without permit from *adat* officer, they would be punished accordance with *awig-awig adat* rules. This is the implementation of *wana kerti* in forest management based on its purposes. The dividing based on the function is purposed to preserve and conserve the forest from exploitation. With holly forest we can conserve the forest and with community forest people around the forest

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can take advantage of the forest for rural economics development. So they did conservation and economic development in sustainable way at once.

3. Land System

The *awig-awig adat* (customary law) ruled that the land within village areas are forbidden to be traded with people outside Panglipuran Village. The lands have to be owned by the people who lived in Panglipuran Village, Bangli Region. The function of land also forbidden to be changed from its original function. The reason is that if the land traded with people who do not understand the local wisdoms or changed to other function such as to larger the residential area, so there would be changing in ecosystem. The change of ecosystem would influence the understanding, behavior, and the local wisdoms itself. As we know in globalization period, it could be impossible to do not trading with people outside our local environment. But that is not the point, the point is we have to maintain the land as its function and protect them from the people with no understanding about sustainability and local wisdoms.

4. Selective Cutting System in Harvesting

In harvesting bamboo, the Balinese use the selective cutting system which only cut the age ready stems of bamboo and leave the young stems life stand in the clump. The age ready for *tiing tali* (small bamboo) is about 3 year and for *tiing petung* (big bamboo) is about 5 year. So when they harvesting the *tiing tali*, they will do it in the 3rd year. They will only cut the bamboo with 3 years old and leave the bamboo with one year and two years old. They already knew that when they cutting all stems in a bamboo clump, the clump may be death or if the clump still life they have to wait until 3 years later to harvest the bamboo stems. In the worst condition, the clear cutting could bring erosion, puddle, or drought. This is the implementation of harvesting management based on the knowledge of bamboo and the local wisdoms. This is purposed to maintain the sustainable of bamboo forest for the future.

5. The Limited Day for Harvesting based on *Wariga*

Wariga is the knowledge about the characteristic of day become good day or bad day based on calculation of traditional cycle calendar (*siklus dauh, siklus wawaran, siklus wuku, siklus ingkel, siklus sasih, and siklus masan*). This cycles calculation is believed will influence to the result of the work of the day. Research on this cycle has been held by Prof. Johan Silas from Institute of Technology Surabaya (ITS) about the time of harvesting bamboo. The result shows that in the good day for harvesting bamboo based on Wariga, the glucose of bamboo logged is in the lowest level, the termites do not like it, so the bamboo stem has more long life (more preserved). This practice also purposed to limit the exploitation of forest product. The exploitation without limitation will bring the forest to the destroyed conditions, unsustainability, and the worst is the extinction of bamboo forest.

6. Local Wisdom Education to the Young Generation

The local wisdoms of Balinese in managing bamboo forest and tradition are transferred from the old to the young generation day to day in daily life activities. The philosophy of local wisdoms are also practiced and told by the old in the simple way to the young. This is one of efforts to maintain and preserve the sustainability of the local wisdoms. When the local wisdoms are sustainable, the environment and the bamboo forest will sustainable as well.

7. Ecotourism

The Panglipuran Village, Bangli also become the ecotourism destination in Bali. This program is initiated by Bangli Regency Government in purpose to increase the economic development and spread the knowledge of the local wisdom in managing bamboo forest. In ecotourism program, people in the community sell their bamboo product or handicrafts to the tourists. They get income from this program. In other side, they also spread their knowledge in managing bamboo forest based on local wisdom to the young generation and people outside the village. Therefore the larger areas would be conserve and bamboo forest is sustainable for the future.

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The implementation of local wisdom in bamboo forest management have bring the success of conservation bamboo in Panglipuran Village, and the result is the sustainable bamboo forest. With this sustainable bamboo forest, people around the forest can take advantage from the forest product for their life and can improve their economic life. The sustainable bamboo forest and rural economic development can be achieved at one by implement the local wisdoms of Balinese in managing bamboo forest.

On-going Project

The project carried out in Bangli Regency is a model capacity building for efficient and sustainable utilization of bamboo resources. This project is not in capacity to change the habits or rules that are already exist in the community, but to increase the capacity of community to become stronger and better or to repair it, in accordance with the local wisdom and the condition of the community. The Balinese community itself already has the good basic concept in managing bamboo, but still less in the proper silviculture techniques.

One part of projects undertaken is the establishment of demonstration plot of intensively bamboo cultivation with the proper silviculture technique. This project was conducted in 6 ha area in over three years from 2014 until 2017. So this is still running. The object consists of the stands of damaged bamboo clumps of two types namely are *tiing tali* (*Gigantocloa apus*) and *tiing petung* (*Dendrocalamus asper*), where found stump out of the wood and wild branches.

This program does not intervene the community to have to follow. This is only become the show window of the good practice of bamboo silviculture technique. Silviculture technique implemented is the bamboo maintenance techniques which consists of landfill into the ridges, cleaning stump-logged, and manage the composition of bamboo stems in a clump. Maintenance techniques will be very useful for the community to improve the productivity of bamboo clump without changing their beliefs.

The Lessons Learned for the Greener Future

The local wisdoms of Balinese are the conceptual framework that have been able to set up a reciprocal relationship between humans and the environment, therefore the quality of the environment can be maintained. These have been provision for the people of Bali because of the belief, knowledge, values, attitudes that will enable them to interact in harmony with the environment.

The local wisdoms of Balinese in managing bamboo are lessons learned for us for the greener future. When in the most of countries in the world trying to educate people about the importance of protecting the environment, the Balinese doing it first. What we can learned of these local wisdoms namely to give understanding and awareness begin from the childhood about the importance of a harmonious relationship between humans and the environment, especially bamboo as one of the main plant in their culture. They are also educated how precious is the bamboo for their life and environment. The parents and family also give them examples and practice to maintain the bamboo properly.

Conclusion

The local wisdoms of Balinese have supported the bamboo forest management project in Bangli, Bali towards sustainable forest management. These local wisdoms guide the society how to interact with the environment, especially bamboo as one of the plant in the Balinese culture. These local wisdom can be lesson learned for the global world how to treat the bamboo and the environment for the greener future.

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Table and Pictures

Table 1. Types of Bamboo in the Panglipuran Village (source: Wiguna, 2012)

No.	Bamboo name	Characteristic Features	Utilization
1	Tiing Jajang Aya (<i>Gigantochloa aya</i> Widjaja & Astuti)	Diameter about 9-11 cm, rather large fiber, the bark is clean	Ceiling
2	Tiing Tali (<i>Gigantochloa apus</i> (J.A. & J.H. Schultes) Kurz)	Diameter about 8-9 cm, small fiber, the bark is clean	Strap for building
3	Tiing Jajang Batu	Diameter about 9-11 cm, rather large fiber, the bark is not really clean	House wall
4	Tiing Jajang Taluh (<i>Gigantochloa taluh</i> Widjaja)	Diameter about 8-9 cm, small fiber, the bark is clean	House wall
5	Tiing Jajang Papah	Diameter about 8-9 cm, small fiber, the bark is very clean	Weaving bamboo for house wall (the best quality)
6	Tiing Lepung	Diameter about 15-16 cm, large fiber, the bark is clean	Pillar of house
7	Tiing Tultul (<i>Bambusa maculata</i> Widjaja)	Diameter about 8-10 cm, the bark is yellow with dark dots	Weaving bamboo for house wall (regular quality)



Picture 1. The Residential area in Panglipuran Village
Source: disperda Bali



(a)



(b)

Picture 2. (a) Balinese woman was weaving bamboo for box (*sokasi*), (b) the boxes for sale



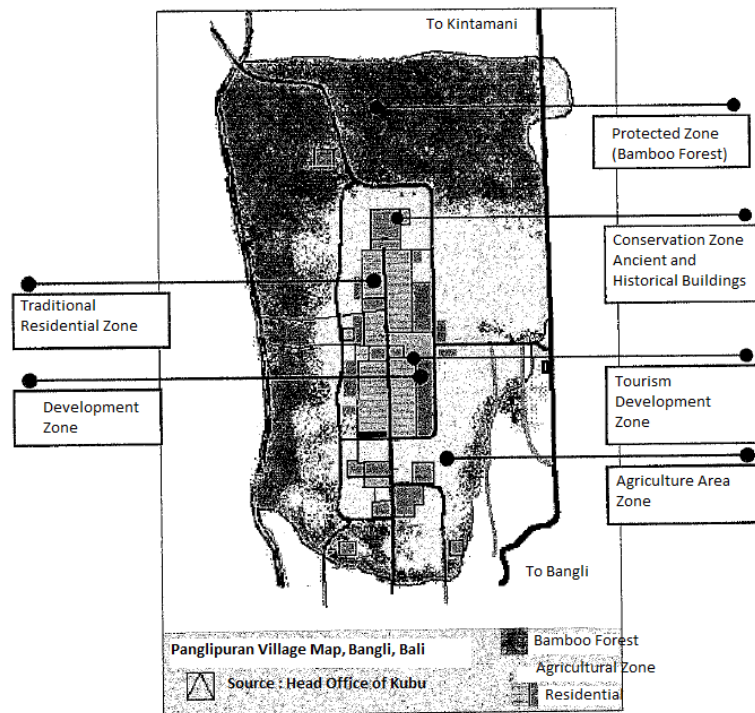
Picture 3. The Map of Bali Island, Indonesia



Picture 4. Bamboo Forest in Panglipuran Village, Bangli Regency, Bali.



Picture 5. The utilization of bamboo in Ngaben *Cremation* Procession in Bali
(Source:Disparda Bali)



Picture 6. Panglipuran Village Map, Bangli, Bali.
Source: Head office of Kubu