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Development Strategies To Manage Village Forest In Bali

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Abstract—Presently, there has been deforestation and conversion of forest function within the forest areas. One of the central government's programs is implementation of village forest. Village forest is state forest that is within the territory of a village, used by the village, for the welfare of the village community. This program has been started to carry out within four villages in Bali province, Indonesia. The objectives of the study are to portrait the strengths, weaknesses, opportunities, and threats of the local institutions in managing village forest, and to recommend the strategic efforts for the village forest development. Four villages were defined as study sites where are located in the Northern part of Bali island. Data collected by using some techniques, namely: survey, interview, direct observation and documentation. Some key respondents were also selected to interview. Data collected was analyzed by using SWOT analysis and descriptive method.

The results of study pointed out that the local institution has function to manage village forest. The problems currently found in the villages related to the damage of forest within the upstream area; the changes of forest function; and the decrease of water storage at the forest level which during the dry season. The local institutions within the villages have the strengths, weaknesses, opportunities and threats concerning the management of village forest. It is needed to recommend four strategies for managing village forest, namely Strength-Opportunity (SO), Weakness-Opportunity (WO), Strength-Threat (ST), and Weakness-Threat (WT).

Keywords: Village, forest, institution, development, sustainability

Introduction

Forestry has multiple functions, such as to become a backbone industry due to the supply of raw materials, support economic development, and improve the social-cultural and ecological development (Andrew, 2003; Trumbore *et al.*, 2015). Development of forestry is addressed to promote rural economy development, especially in the mountain economy; to secure the land and water resources conservation within the forest area and its adjacent; to support the agricultural development, consisting of food and non-food crops, animal husbandary (Bourguignon, 2006; Lewis *et al.*, 2015). One of the problems in the forestry development is deforestation (Gardner *et al.*, 2010; Sutherland, *et al.*, 2013). This has been happened in many countries and has brought about the bad impacts for human being and environment (DeFries, *et al.*, 2010; Jeons *et al.*, 2014). Based on data in 2013, it was estimated that the total forest in Indonesia is about 98 million hectares, in which this is about half of the total country land. This large size of forest land has an important role in the climate change mitigation at the national level, and at the global level, as well. Besides, the forest has expected to support the green economy development in the country. It means that the forest must be well preserved as the natural assets for the future generations.

Bali is a very small island within Indonesia archipelago. The total area of Bali province is 563,286 ha or 0.29% of the total area of Indonesia. The area of forest in Bali is still below the minimum area (30%) of the land area. Therefore, there is a need for serious attention from the government and the people in Bali, and various other relevant institutions to maintain the preservation, safety and functions of the forest for the community and the environment. The forest within many countries, including Indonesia has functioned to secure biodiversity (flora and fauna) and natural resources (Gibson *et al.*, 2013). Various types of flora and fauna are found in various conservation areas such as nature reserves, protected forests, natural tourism parks, mangrove parks, botanical gardens and animal parks within Bali Island. In the last few years, there have been several problems or pressures on the security of

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forests in Bali such as illegal logging, hunting of flora and fauna, fires, forest encroachment and conversion of forest function as a result of non-forestry activities. This condition has caused a change in the balance of ecosystems and has an impact on habitat disturbance and the comfort of fauna in forest areas, and has caused a decline in biodiversity. Local people within and outside forest areas should have important role to manage the forest development (Duguma, et al, 2018; Blomley et al, 2006).

With respect to this condition, the central government of Indonesia has initiated to introduce the new program for forest development at the village level. This program is village forest development. The status of forest is state forest located outside villages' area. Bali is one of the provinces which has started implementing this program. The forest areas selected are in the northern part of Bali, which is within four villages. These villages are Ambengan, Sambangan Panji, and Panji Anom (see the Figure 1). The main purposes of this program are to conserve the forest and to improve the welfare of people living in the adjacent of forest. By this program, the forest could be managed by the villagers under the local institution for forest management. This institution was established after after the central government (Ministry of Forest and Environment) provide a right to village in managing the forest. The objectives of the study are to portrait the strengths, weaknesses, opportunities, and threats of the local institutions in managing village forest, and to recommend the strategic efforts for the village forest development.

Method

This study are purposively conducted within four villages (Ambengan, Panji, Panji Anom, and Sambangan) located in Buleleng regency, in the Northern part of Bali island (see Figure 1). The selection of the four villages is based on the government program about the village forest which has been carried out in these villages. The program has been started in the end of December 2018. Data gathered are primary and secondary ones which are collected by using several techniques, namely: (i) survey; (ii) observation; (iii) documentation; and (iv) focus group discussion. Key respondents selected are the government officials (Department of Forestry, at the provincial and district levels), heads of customary villages and administrative villages, heads of *subak* (traditional irrigation system), anmd head of *subak-abian* (dry land farmers' organization), and the management boards of village forest manajement institution (local institutions or LIs which has been established at the village level). Data collected is analysed by using SWOT analysis and descriptive method.

Figure 1-Location of study sites



Results and Discussion

The implementation of village forest management is based on the law and regulations, among other things are: (i) The Law 41/1999 about the Forestry; (ii) Regulation of Minister of Forestry No.: P.88/Menhut-II/2014, about the Community Forestry; (iii) Regulation of Minister of Forestry No.: P.89/Menhut-II/2014, about the Village Forest; and (iv) Regulation of Minister of Environment and Forestry No.: P.83/MENLHK/SETJEN/KUM.1/10/2016, about the Social Forestry. The principles of village forest management are: (i) benefit and sustainability in terms of social, cultural, ecological and economic aspects; (ii) democratization; and (iii) equity.

Management of village forest could not be separated with the existence of other local institutions within the villages, such as the customary village, *subak* and *subak-abian*. Customary villages have a very important position in the lives of residents in Bali. The members of this village have a strong relationship bond among themselves in the daily life. The leader of this village has close synergy with the head of administrative village. The activities of customary village are fully based on the philosophy, called *tri hita karana* (three causes of happiness) which consists of *parhyangan* (the harmonious relationship between the people and the God), *pawongan* (the harmonious relationship among the human being); and *palemahan* (the harmonious relationship between the people and natural environment). Community activities are regulated by the *awig-awig* (traditional village regulations). It is expected by the government that the customary village might have significant role to support the implementation of village forest program.

Subak is a farmer organization known as the traditional irrigation system which has religious socio-agrarian in nature. This also has *tri hita karana* philosophy. The main role of *subak* in the village is to carry out irrigation water management and agriculture in paddy fields. Several main tasks of *subak* are to coordinate members in the activities, namely: (i) distributing and allocating irrigation water; (ii) regulating cropping patterns and planting schedules; (iii) carrying out operations and maintenance of irrigation networks together with the government; (iv) resolving internal

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conflicts at the *subak* level; (iv) organizing economic activities at the *subak* level, such as savings and loans; and (vi) organizing ritual activities as an agricultural cultural heritage.

Similar to *subak*, *subak-abian* also has a role in managing agriculture on dry land or plantation. The *subak-abian*'s activities are not as intensive as the *subak* organization because of the different intensity of farm management. In *subak* system, the farmers cultivate seasonal crops, but the perennial crops are cultivated in the *subak-abian* system. The main task of the *subak-abian* is to coordinate its members for a number of activities relating to the technology of plantation cultivation, such as the supply of seedling, pest and disease control, and post-harvest. The cropping areas of *subak* and *subak-abian* are mostly located in the hilly area near the forest area. In addition, the areas of these are also under the management of the customary villages. Therefore, the management of forest land is related to the existence of *subak*, *subak-abian* and customary village.

2.3 Current problems related to forest management in the villages

Based on the results of the survey and observation in the villages, several issues were currently found, namely physical, human resources, and institutional aspects. Problems related to physical aspect include the condition of forests, land and water. The current forest conditions are: (i) forest damage in the upstream area as a result of illegal logging; (ii) the function of the forest has changed, it is no longer planted with wood trees but changed for planting flower crops; (iii) the downstream areas have declining water storage which is indicated by a significant reduction in water discharge during the dry season.

Illegal logging was happened due to the less control from the government (forest officers). The limited number of forest officers while the area covered is very large is one of the influencing factors. Besides, this is also happened due to the low innovation and initiative of the people concerning the forest management as happened in the other countries, too (Nurtjahjawilasa *et al.* 2015). The people who take illegal logging have never paid attention to the bad impacts. Several bad impacts of forest destruction are the landslides within forest areas including outside the forest area, soil erosion, and degradation of soil fertility. Aside from this, the quantity and quality of water are also being low due to the mismanagement of forest. The change of forest function is mostly resulted by the economic reason. The people could gain much more income from the flowers cultivation. They could harvest flowers nearly every day due to the need of flowers is very high in Bali province for the ritual ceremonies. According to people, the earning gained from the flowers cultivation is extremely higher than the other crops cultivation. Actually, the good forest management could provide higher indirect use values or intangible benefits or rather than tangible economics benefits (Farber *et al.* 2002; Pearce 2002).

The decreased water felt by the people living in the downstream area is indicated by the limited water for domestic uses and irrigation. Based on the interview with the respondents, this is caused by the bad management of forest in the upstream area. Meanwhile, the sources of water (water spring) located in the the upstream area are used by several villages. This could make a little bit conflict to use water among the users. These conditions should be overcome by the villagers, government and other stakeholders. Government has a role to regulate (issuing the law, regulations) and make law enforcement concerning the forest management. The villagers could also take a role not to cut down the trees within the forest. Human resources issues are related to the limited awareness toward forest management, limited knowledge about good forest management, limited capacity on the agricultural cultivation technology for increased productivity and quality of products, and limited access to the postharvest technology to increase product value added. Meanwhile, the institutional issues within the villages are the local institutions (LIs) for forest management is a new one due to this program has been started in the beginning of 2019. The management boards of LSS still have limited knowledge and capacities and skills toward the forest management.

3.2 SWOT analysis

Strategies for business development, especially the village forest management in the villages (Panji, Panji Anom, Sambangan and Ambengan), should be done by the villages and LIs to support the sustainability of development programs within the villages. In general, village forest management is directed at realizing sustainable forests and increasing the income of communities around the forest area. In this study, the SWOT analysis is used to formulate a development strategy. The SWOT gives information about the internal and external factors of village organizations and village forest management institutions as local institutions (LIs). Based on the results of interviews with key respondents and Focus Group Discussions (FGDs) in the villages, the strengths, weaknesses, opportunities and threats could be seen in Table 1.

Table 1-SWOT analysis

FACTORS	18 STRENGTHS	WEAKNESSES
INTERNAL	<ol style="list-style-type: none"> 1. Closed relationship among the villagers who are members of LIs for the village forest management 2. Positive attitudes of members towards village forest management 3. High expectation of members to obtain economic incentives 4. Farmers' experience in farming 5. Community concerns about the impact of forest destruction 6. High motivation for forest conservation 7. Encouragement for increasing community income 8. 21 Availability of village funds from the government (at the central and district levels) 9. There are several groups of farmers (<i>subak</i>, <i>subak-abian</i>) that have been growing since a long time ago 	<ol style="list-style-type: none"> 1. Limited knowledge of LIs members about village forest management 2. The capacity of LIs' administrators and members (management and organizations) is still low 3. Limited knowledge of LIs' management board and members toward agricultural cultivation 4. Limited quality of resources (funds) 16 managing forests 5. Limited quality of human resources for the development of environmental services 6. Knowledge of village boundaries and allocation of land area and location for LIs' members 7. Limited authority of village in the forest management
	OPPORTUNITIES	THREATS
EXTERNAL	<ol style="list-style-type: none"> 1. Central government program on village forest management 2. Supports from the government at the levels of province and district and village 3. Potential land for the development of plant and livestock cultivation 4. The improved post-harvest technology 5. Open cooperation between the villages 6. Open cooperation with the management of environmental service (tourism) 7. Open access to market 	<ol style="list-style-type: none"> 1. Unclear boundaries between the villages (being a potential conflict) 2. Forest encroachment from outside parties (being a potential conflict) 3. Natural disasters due to bad forest management by the upstream villages

3.2.1 Strengths

1. Relationship between citizens who are members

The close social relationship among the community members in the village including the members of new LIs is one of the strengths to jointly manage the village forest. Togetherness values in the community can be their social capital to develop the village and conserve the forest.

2. Positive member attitudes towards village forest management

The attitude of members of the village forest management institution to the village forest management plan is classified as positive, namely the tendency to agree to the management of village forests.

3. Expectation of members to obtain economic incentives

Based on the results of surveys and interviews with respondents in Ambengan Village, it shows that on average they have high expectations that through development programs in the village, and village forest management plans, economic benefits will be obtained. These economic benefits are an incentive for them to play an active role in village development. Community members always follow government programs to increase their income. In village

forest management, it will also be tried to carry out intercropping, which is between forest plants (wood) with several types of plants, both seasonal and annual.

4. Experience of farming members in a

Members of LIs have experience in farming on farm land. This experience became a force to support them in agricultural development in the village, including planting in village forest areas.

5. Members' concerns about the impact of forest destruction

The experience of floods and landslides in Ambengan Village is a strength for community members to preserve forests. Concerns felt encouraged community members to take efforts to prevent and control forest destruction.

6. High motivation for forest conservation

Villagers have a high motivation to preserve forests because of concerns about the impacts that will be caused if there is forest destruction. This motivation is the main force to invite community participation in the implementation of development which aims to preserve the forest.

7. Encouragement for increasing community income

Community members in the village always have hope and a strong drive to further increase their income both from the agricultural sector and non-agriculture. This encouragement is a force to support the realization of the objectives of development programs including the management of village forests.

8. Availability of village funds

Villages have strength in the development budget after programs from both the district and central levels are oriented towards rural development. The existence of these programs makes it a new force for the village to develop villages including village forest areas which are intended for the welfare of its citizens.

3.2.2 Weakness

1. Limited knowledge of LIs' members about village forest management

Until now, the members have not clearly known yet the various matters relating to village forest management. Some of the rights and obligations of village forest management institutions are not fully known because these have not been intensively socialized yet. The limited knowledge of members can lead to misunderstandings among them, and between the LIs in other villages (which have economic potential on the border of village forests)

2. The capacity of management board and members of LIs is still low

The capacity of the management board and members of LIs is relatively low because this institution has just been formed. At present, the LIs do not yet have skills regarding forest management.

3. Knowledge of management and members of LIs is limited to agricultural cultivation

Agricultural cultivation technology for increasing productivity and product quality has not been fully controlled by farmers. Moreover, agricultural cultivation technology will be developed in the village forest area. Planting new types of plants requires a touch of good and correct cultivation technology. Currently, farmers as subak members, sub-abianes including village forest management institutions do not have adequate knowledge and skills regarding good crop cultivation technology.

4. Limited quality of resources (funds) for managing forests.

Limitations of funding sources at the level of members and village forest management institutions can be an obstacle for them to manage aquaculture in village forest areas quickly. The limitations of farming capital have resulted in them having to wait for assistance or seed subsidies from the government or other parties to be planted and maintained.

5. Limited quality of human resources for the development of environmental services.

The quality of human resources residing in village forest management institutions is still limited, especially those relating to the management of environmental services. Management of environmental services requires the quality of specific human resources in addition to the availability of business capital and technology. The limited quality of human resources can result in them not being able to make independent efforts to develop environmental services that can generate additional income or income for members of village forest management institutions and local village governments.

6. Limited Knowledge of village boundaries and allocation of land for members

Until now, the village and LIs do not yet know the clear boundaries of the village forest land to be managed. This condition might cause potential conflict into the LI with other LIs. In addition, potential conflicts can also occur because LIs do not know yet the allocation of land portion (area size and its location) for each member.

7. The limited authority of the village in forest management

This is caused by the forest area is belong to government and controlled by the Forestry Service. This limitation has caused the villages to be unable to take actions that are deemed incorrect on forest management, such as replacing forest functions from timber plants to flower plants (especially in the upstream area, namely Wanagiri Village).

3.2.3 Opportunities

1. Central government program on village forest management

Government support from the beginning was shown by the issuance of ¹³ Decree of the Minister of Environment and Forestry of the Republic of Indonesia concerning the Granting of Village Forest Management Rights to the Village Forest Management Institution in 2018. The rights to village forest management hereinafter referred to as a right granted to village institutions (LIs) for managing state forest within a period of time (35 years). In addition, support from the central government is also implicitly indicated by the opportunity for the village government to allocate village funds to support village forest management programs and activities. LIs have the opportunity to draw up a work plan and utilization business together with the village government.

2. Support of provincial and district governments in the development and management of village forests

Governments at the ²⁴vincial and district levels always provide development support in various aspects of the Villages which aims to improve the welfare of people. In the forest ³ sector, for example, the provincial government (Forest Service) always provides facilitation in implementing village forest management through the Forest Management Unit (FMU) located in Singaraja (the capital of Buleleng regency). The government provides facilitation aimed at increasing the capacity of villages and LIs in the implementation of village forests. The facilitation provided in the forms of: (i) education and training; (ii) institutional formation and development; (iii) guidance on the preparation of the work plan; (iv) business development; (v) agricultural technology guidance and; (vi) access to markets and capital. This facilitation is an opportunity for LIs to further improve the dynamics of the organization to realize the objectives of village forest management.

3. Support of village government in the village forest management

Support from the village government, including the customary village, was shown from the beginning on the preparation for submitting proposals for applications for village forest management rights in protected forest areas. The villages have a high interest in conserving the forest to improve welfare of the people.

Potential land conditions for the development of plant and livestock cultivation

4. In agro-climate, land and weather in the village area are suitable for agricultural cultivation with the commodities mentioned above (such as coffee, cloves, coconut, rice). Likewise the case in village forest areas has good potential for managing farming or crop cultivation, namely through intercropping. In addition, the development of bee cultivation to obtain honey also has the potential to be developed.

5. Post-harvest technology that continues to grow

Post-harvest technology that continues to evolve into a great potential to be developed by citizens in order to be able to process agricultural products in an effort to increase the added value of the products produced, such as coconuts, fruits produced, including woven.

6. Open cooperation between villages

Cooperation between villages, especially those adjacent to the border of village forests, is a necessity for villages that are given village forest management rights. Collaboration between villages can also be done in tourism management even outside the village forest area. Potential conflicts in border areas will be prevented and resolved coordinatively through inter-village cooperation or inter-village discussion.

7. Opening cooperation with environmental service managers (tourism)

The potential of natural resources in the village has been utilized by tourism managers even though it is still on a small scale scale of community members to organize tourism businesses, such as utilizing waterfalls, natural beauty of rice fields and other natural environments. Therefore, the managers have an interest in the preservation of the natural environment (land and water) in the upstream. Synergy of forest conservation activities provides an opportunity for village forest management institutions to establish cooperation related to environmental management, especially in village forest areas. This collaboration is expected to provide economic benefits for village forest management institutions and non-economic benefits.

8. Open access to market for agricultural product

Agricultural products produced by farmers have a good access to market even though the prices of the product are still relatively low. Farmers do not have strong bargaining power to define the price. The middlemen in the village are the ones who get more profit in marketing agricultural product.

3.2.4 Threats

1. Unclear management boundaries between villages

Although a decree has been issued from the Minister of Environment and Forestry regarding village forest management rights, the village forest management institution does not yet know the clarity of the boundaries of the village forest area with the forest area managed by the villages of other villages. The vagueness of these boundaries can be a source of conflict between village forest management institutions, especially in border areas that have the potential to generate economic resources for them.

2. Forest encroachment from outside parties

Forest encroachment carried out by logging timber trees can cause forest damage and have an impact on land degradation, land erosion and disruption of forest water storage. This condition can endanger the cultivation of plants carried out by farmers who are members of village management institutions, for example due to landslides or floods or declining levels of land fertility.

3. Natural disasters due to forest management by upstream villages

Apart from being human-caused, forest destruction can also be caused by natural disasters, which disrupt village forest management by village forest management institutions.

4. Physical development (settlements and housing)

This physical development is in line with population growth and increased economic activities in the village. They use paddy fields to build houses, settlements including other physical infrastructure. This condition will result in land conversion that can disrupt the hydrological function of the rice fields and decrease rice production in the village.

3.3 Alternative strategies to manage village forest

Village forest management within the four villages that have been granted rights through the Minister of Environment and Forestry Decree is carried out by the Village Forest Management Institution as local institutions (LIs). This institution is a village community institution established under the village regulation. LIs is expected to be able to utilize the village forest area to obtain environmental benefits, optimal social benefits and economic benefits without reducing the main function of the forest. Based on the SWOT analysis, there are four strategies for managing village forest, namely Strength-Opportunity (SO), Weakness-Opportunity (WO), Strength-Threat (ST), and Weakness-Threat (WT).

3.3.1 SO strategy

This strategy takes advantage of opportunities by maximizing the internal strengths possessed by the village and LIs. In this strategy, several recommended efforts are as follows:

1. Increasing creativity and innovation

The villagers and management boards of LIs should increase their creativity and innovation to seize opportunities that exist from the provincial and district governments and villages. This effort is related to the social and economic development program within the each village. The creativity and innovation are addressed to improve the ability and capacity to make rural development plan including programs for village forest management.

2. Building synergy between the village and government (provinces, districts and villages) in the

planning and implementation of development in the village including village forest management plans. This synergy is very possible due to the governments has vision and mission on the forest conservation. In the connection to village forest management, the village and LIs can arrange work plans together, so that the budget of village could be allocated to the village forest management. This synergy is expected to increase income of villagers, LIs and members. This additional income would become an economic incentive for villagers (including forest managers) to further increase their activities in participating in village development.

3. Conducting agricultural extension and training on agricultural technology/practices with a participatory

approach. On trial training, for example, should be done by making a demonstration plots for several types of tress and crops, such as durian, mangosteen, and other types of medicinal plants, and certain crops for ritual ceremony. In addition, it is encouraged to do bee cultivation for producing honey. Honey produced to be well packed with a good branding system to increase added value. Extension and training can be carried out by extension officers from the Department of Agriculture, Departement of Forestry and other technical agencies related to processing agricultural products and bee livestock.

These agricultural practices might be an additional income, and even to be alternative sources of income (Harris & Sills 2005).

4. Building partnerships between the LIs and agricultural entrepreneurs company in conducting business activities, particularly in processing and marketing agricultural products produced by farmers.
5. Establishing the cooperation between the village and another village by signing the Memorandum of Understanding (MoU). This relates to the management of village forests (economic, social and environmental) and other economic activities.
6. Encouraging the LIs to get compensation from the tourism companies which utilize natural resources within the villages. This is a part of company's Corporate Social Responsibility (CSR). In addition, LIs should sit together with the other stakeholders to implement the program of the willingness to pay and willingness to participate to conserve the forest.

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3.3.2 WO Strategy

The aim of this strategy is to fulfill the weaknesses of LIs within the village in order to be able to take advantage of the opportunities. Some of the recommended efforts are as follows:

1. Conducting socialization of development programs that will be held at the village level, including village forest management (regulations, benefits). The villagers, including members of LIs are expected to know and understand various development programs in the village, not only forest management.
2. Providing agricultural extension and training to farmers and LIs' members related to the technologies or practices on the crops cultivation that will be planted and developed within the forest areas.
3. Strengthening the capacity of LIs' administrators and other local organizations in the village, especially on the management, leadership and administration aspects, because these institutions have just been formed. Capacity building can be done through trainings or workshops on management and organizations.
4. Providing training to make village development proposals including village forest management. This training is directed at gaining access to development financing from the government and other institutions for the sake of development interests in the village.
5. Improving business capabilities and business partnerships between the LIs and other business institutions at the village, regency and province levels. One of the partnerships that might be taken is the partnership with tourism companies which are operating their activities within the villages. The four villages have their own tourism attraction destinations, such as water fall, flying fox, hotels and restaurants. Market need should be considered by the LI in order to generate income (Gelo, *et al*, 2016; Ribot, *et al*, 2010)

3.3.3 ST strategy

The aim of this strategy is to reduce threats from outside parties by strengthening the internal strengths in LIs. Some of the efforts that need to be done are as follows.

1. Building stronger cooperation between villages that have border village forest areas.
2. Strengthening capacity of the LIs' management board to supervise and control the village forest areas to anticipate conflicts regarding forest boundaries.

3.3.4 WT Strategy

This strategy aims to improve the LI's weaknesses and minimize external threats. Some of the efforts that can be made are as follows.

1. Improving knowledge of the management boards of the villages about the authority related to forest management.
2. Strengthening the capacity of the villagers, particularly the farmers to have proper practices on the crop cultivation in order to achieve the economic and ecological benefits as well as hydrological forest functions.
3. Improving the quality of human resources in the village (village government, village enterprise, LIs) in anticipating potential inter-village conflicts related to forest management.
4. Providing information on the clarity of village forest boundaries to all adjacent villages.

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5. Ensuring the clear authority or right to the village for managing village forest. The right of forest management would give the villagers to have autonomous decision based on their needs but still follow the government regulations (Mutune *et al*, 2017).

Conclusion

Management of village forest is carried out by the local institution, called village forest management institution which is established under the village regulation. The current problems found in the villages are: forest damage in the upstream area; the changes of function of the forest; and declining water storage at the forest level which is indicated by a significant reduction in water discharge during the dry season. SWOT analysis shows that the local institution within each village has the strengths, weaknesses, opportunities and threats [4](#) the relation to the village forest management. There are four strategies for managing village forest, namely Strength-Opportunity (SO), Weakness-Opportunity (WO), Strength-Threat (ST), and Weakness-Threat (WT).

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