SUMMARY

Strategy for Vegetation-Based Environmental Conservation Development in Panjang Island, Jepara Regency, Central Java Province

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Panjang Island is a small island in Indonesia with an area of 19.7, and administratively is included in the district of Jepara, Central Java. The island has potential natural resources i.e., coastal resources and protected forest with its wildlife. The natural beauty of Panjang Island are white sand beach with water clear sea, become interesting for tourists. Based on its potential and the nature of small island which is vulnerable to environmental damage, the existancy of Panjang Island is important to be maintained and protected.

Panjang Island environmental conditions already suffered damage threatens the sustainability of the island if not be done protect immediately. Broad damage due to abrasion of Panjang Island has reached the 1/3 of total area of the island (BAPPEDA, 2010). In addition, there has been a heavy metal pollution in coral reef tissues (Susiati *et al*., 2008) and damage of coral reefs in Pulau Panjang (Indarjo *et al*., 2008).

The vegetation plays an important role in protecting and maintaining the ecosystem (Mirwanto, 2010). The role of vegetation are protecting the coast from erosion and as a habitat for various biota (Kustanti, 2011; Ghufron, 2012). Vegetation also plays a role in supporting bird life. Many research has been done related to the function of vegetation as habitat for birds (Dewi *et al*., 2007 ; Caprio *et al*., 2009). Vegetation is an essential element for the management of environmental conservation (Keppel *et al*. 2006). Vegetation studies needed as a base in the natural environment conservation strategies (Ming *et al*., 2012).

The problems that threaten the ecosystem of Panjang Island, among others abrasion, environmental pollution and damage as a result of tourism activities. Based on these problems as well as the function of vegetation in protecting the environment, the research on the development strategy based environmental conservation vegetation in an effort to protect the ecosystem of

Panjang Island is needed to be done. The study also supports the Regional Regulation (Perda) Jepara No. 2, 2011 concerning Spatial Plan Year 2011-2031, which mandates the Panjang Island as a protected area for wildlife breeding.

The objectives of this study are:

1. Analyzing the structure of vegetation and environmental quality in a protected forest area of Panjang Island Jepara.
2. Analyzing the availability of vegetation as habitat for birds in the area of Panjang Island.
3. Analyzing community participation in conserving Panjang Island environment.
4. Formulating of development strategy of environmental conservation based on vegetation of Panjang Island Jepara, Central Java.

This study used observational research (non-intervention). Vegetation sampling used purposive sampling. Observed vegetation observed were littoral area, supralitoral area, settlement area around the grave and navigation office. Plot (squared) size were 10 x 10 m for tree, 5 x 5m for shrub and 1 x 1m for grass/herbaceous (Mueller-Dombois & Ellenberg, 1974 ; Fachrul, 2007). Bird sampling was conducted using cruising method (field by field method) walk down the island (Bibby *et al*., 2000). Bird watching was conducted at the peak of activity of birds which was in the morning (7:00 to 09:00 pm). The level of community participation was conducted by interview and questionnaire

Vegetation data was analysed by calculating the Importance Value Index (IVI) and diversity (H '), the availability of vegetation as habitat for birds was analyzed descriptively and by counting bird species diversity index (H'). Whereas community participation were analyzed through quantitative-descriptive. To establish conservation strategies, SWOT analysis and AHP (Analysis Hierarkhy Process) were applied.

The study resulted is the structure of the vegetation in Panjang Island consists of 35 species of trees, 25 species of shrubs and 29 species of grasses and herbaceous plants. In the littoral area, vegetation was dominated by *Leucaena glauca, Thespesia populnea* and *Ceiba petandra*. A high-enough abration resulting in littoral area pushed into supralitoral area, so that the littoral area dominated by

coastal land plants do not mangrove. Mangrove in litoral area was only found in limited number both of species and number of individuals, those are *Avicennia officinalis, Phemphis acidula, Lumnitzera racemosa, Rhizophora sp., Excoecaria agallocha, Sonneratia alba* and *Xyllocarpus granatum.* A high-enough abration habitat have resulted in damaged and loss of many species of mangrove. Moreover, the absence of estuaries and delta in Panjang Island, led to the growth of mangrove was non optimal (Kathiresan and Bingham, 2001; Supriharyono, 2007).

In the supralitoral area, vegetation was dominated by deciduous tree species include: *Leucaena glauca, Bombax ceiba* and *Tamarindus indica.* Panjang Island has a climate with extremely low rainfall (<100 mm for 6 months) resulting in a limited availability of soil water (drought). Rainfall is a major factor that affects the richness of plant species of vascular in a region (Field *et al*., 2005), so it only withered plants that can grow and adapt. Adaptation is made by leaves shed to reduce transpiration. The availability of water in the soil will be extremely limited affect the plant growth (Kirnak *et al.,* 2001). The availability of water, temperature and light direct effect on the growth and productivity of plants. These factors are essential factors for process plant physiology (Field *et al*., 2005). While in the settlement area (around the grave) was dominated by crop cultivation. This area was close to a source of fresh water that can still be planted with crops.

Regeneration of forest tree stands in Panjang Island going well demonstrated by the availability of saplings less than mature trees both the number of species and number of individuals. The ability to regenerate tree stands can be seen from the ability of a species to reproduce, which can be reflected in both the availability of seedlings and saplings seedling stage (Deb and Sundriyal, 2008 ; Anitha *et al*., 2010). This conditions will greatly threaten forests in the future.

Leucaena glauca was the dominant species and widely distributed from the littoral to supralitoral. Similarly, the type of *Lantana camara* was a species of shrub that dominates the Panjang Island. According to Lowe *et al.* (2000), *L.glauca* and *L. camara* are an invasive plant. The nature of invasive plants have the ability and higher power of competition than the local plants that will dominate

the region. The presence of invasive plants should be aware because it will suppress the growth of native plants and will cause damage to the forest ecosystem. Grass/herbaceous which dominates Panjang Island was *Amorphophallus variabilis*. This plant is a wild plant that grows well in the shade of the trees in the forest (Afifah *et al.*, 2014).

In Panjang Island, it founds of the plants species that need to be protected its existence since already included in the category of Least Concern which means it has threatened with low risk (IUCN, 2015) i.e., are *Phemphis acidula, Excoecaria agallocha* and *Cordia subcordata.* Species *of Excoecaria agallocha* and *Cordia subcordata* are also a protected species in Indonesia (Pusat Penelitian Biologi-LIPI, 2001).

In the island, it founds 27 plant species which serve as bird habitat including for food source, a place to rest / perch, shelter and reproduce. The vegetation is needed to support the life of the bird, because the vegetation becomes a breeding ground habitat, food sources, shelter and a place to rest (Ayat, 2011).

Birds on Panjang Island as many as 27 species with most number of species of the family Ardeidae with a total number of 162 individuals and bird species diversity index of 2.67 (medium category). All bird species found in Panjang Island have been included in the category of Least Concern (LC) by IUCN and 7 species of birds of which are included in the list of bird species that are protected in Indonesia (Undang-Undang No. 7, 1999).

Although the species richness of bird was found quite abundant, but the number of individuals of each species were relatively few. This is probably due to availability of food was insufficient. During the dry season almost all the plants which were a source of bird feed was die, so that it will disturb the growth of bird populations. Gleditc and Calro (2011) stated, that the continuous availability of feed needed to support bird life. Abundance of birds is also influenced by the abundance Arthopoda and flowers (Mc.Grath *et al*., 2009).

Social communty is an environmental components which play an important role in the protection and preservation of the environment. The level of community participation in supporting conservation activities in Panjang Island

was 72.53%. These results show that people in Panjang Island have participated actively to preserve the environment in Panjang Island. Community participation is an indispensable element in the implementation of environmental management strategies (Soetomo, 2009) and the involvement of the public will be able to build a sense of belonging (Suparjan and Suyanto, 2003).

The results of SWOT and AHP show that there were 3 strategies prioritized for the development of the environmental conservation of vegetation based on Panjang Island, i.e.: 1. Preserving the diversity of plants, especially plants setigi (*Pemphis acidula*), kayu buta (*Excoecaria agalloca)* and kalimosodo (*Cordia subcordata*) and bird populations, 2. Maintaining the mangrove and pine seedlings in order to reduce abrasion, 3. Producing government regulation to prohibite disturbing setigi (*Phemphis acidula*) and bird hunting.

Reforestation urgently to be implemented in the littoral area using local plants, i.e., *Avicenia officinalis, Phemphis acidula, Excoecaria agallocha, Lumnitzera racemosa* and *Xyllocarpus granatum.* While in the supralitoral area, reforestation would be best using other local plants, i.e., *Ceiba petandra, Bombax ceiba* and *Terminalia catappa*. It is necessary to enrich the vegetation using plant species which serve as feed for birds such as: *Muntingia calabura, Ficus benyamina* and *Eugenia uniflora*.

Novelties of this research were: 1. The concept and method of environmental conservation-based development by integrating ecosystem of littoral and supralitoral vegetation on the small island (Panjang Island). 2. The found of species plants are protected: *Phemphis acidula* J.R & G. Forst (Setigi), *Excoecaria agallocha* L. and *Cordia subcordata* Lamk. (Kalimosodo) and 27 species of birds protected in Panjang Island. 3. Three priority strategies for vegetation-based environmental conservation development are: a. Preserving plants diversity, especially *P. acidula*, *E. agallocha* and *C. subcordata*; b. Maintaining of mangrove *Rhizophora mucronata* and *Casuarina equisetifolia* seedling in order to reduce abrasion ; c. Prohibition for *P. acidula* exploitation, and municipal law that prohibited bird hunting.