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Future Turtle Management: Opportunities for Habitat Restoration Governance in East Java, Indonesia

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Abstract**—** *Turtles are species that lived on earth since millions of years ago, and are capable of annual migration, within thousands of kilometres between feeding areas and laying places. The current condition of turtles in Indonesia is threatened with extinction due to the uncontrollable exploitation of turtles and eggs. It is caused by greedy human behaviour. Turtles are protected by the Law of the Republic of Indonesia number 31 of 2004, although sea turtle conservation programme have been encouraged by the recent discovery of important new nestling beaches. The method used for future turtle management opportunities for habitat restoration governance is to use descriptive analysis. The current turtle management analysis was conducted with a literature review of various field and laboratory studies at the representative sites assessed for Indonesia. The results showed that turtle populations experienced a decline caused by turtle slaughter and harvesting of turtle eggs that led to turtle extinction. Therefore, it is necessary to manage the habitat of turtle habitat restoration which not only covers the technical aspect of captive breeding, but also covers the aspect of perfection of laws and regulations, economic and institutional aspects and community participation.*

Keywords**— uncontrollable exploitation, descriptive analysis, habitat restoration.***

I. INTRODUCTION

Gomez, *et al* (2011) stated that biodiversity is very important to increase economic activity in order to improve the prosperity of the community. However, the decline of biodiversity has a very serious impact on economic, social and environmental conditions. Destroying mangroves and coral reefs has social consequences, impacting on people's livelihoods and lifestyles — including the unmeasured cost of losing cultural traditions. Indonesian waters have a diversity of biological resources and habitat conditions that offer a suitable situation for the life of most marine turtle species. However, the current condition of turtles is threatened with extinction due to the uncontrollable exploitation of turtles and eggs caused by greedy human behaviour regardless of environmental balance. Beside, the threat to turtles is the trade of meat and eggs still exists, coupled with the emergence of demand for plastron for the international market.

To understand the condition of turtles and hatchlings in Indonesia, it will be done with 2 (two) approaches, namely the ecological approach of turtle habitat and approach of diseases suffered by sea turtles caused by infected fungi and bacteria. Both approaches are attributed to anthropogenic factors and predatory threats that are responsible for the decline of turtle populations in Indonesia. To get a more comprehensive understanding, it is taken as an example of three areas in East Java province consisting of Trenggalek regency, Jember district and Banyuwangi district.

For example, once abundant turtles, especially the Chelonia mydas species scattered throughout Indonesia, the current status becomes protected because of its existence (population) decreases, while the eggs laying period have to wait for about 3-4 years to spawn. All eggs can develop into hatchlings (turtle child) because of the threat from outside very many and various threats.

In Indonesia there are 6 of 7 types of turtles in the world. Of the 6 species of turtles, four of them are: leatherback turtle (*Dermochelys coriacea*), green turtle (*Chelonia mydas*), hawksbill (*Eremochelys imbricate*), and turtle (*Lepidochelys olivacea*) are known to breed in Indonesia, while other species, turtles crock (*Caretta caretta*) allegedly also breed here (Salm, 1984, salm and Halim, 1984, Silalahi *et al*, 1990). According to Suwelo, *et al* (1992) that turtle habitats in both nesting habitats and turtles foraging need to be protected and managed in the

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form of nature reserves or nature conservation parks. These natural conservation areas must be sufficiently large that at least 70% of the turtles can safely lay their eggs on the nesting beaches, the eggs have the opportunity to hatch and the hatchlings freely leap into the sea.

The turtle population has declined in number in Indonesia. The meat is thick and good taste to eat and the colour of the carapace is so beautiful. They make the turtle as a hunt by humans. In addition, coastal environmental conditions due to increased community activity, as well as reduced vegetation density caused by coastal abrasion and anthropogenic factors have resulted in less room for turtle nesting. The results of investigations conducted by Pro Fauna Indonesia (2005) states that the trade in sea turtles and turtle-containing products still occur freely on the southern coast of Java Island. This trade includes trade meat, eggs, preserved turtles and souvenirs made of turtle carapace (turtle products). Most (98%) of turtles traded were eggs, then turtle products (1.3%), preserved turtles (0.11%) and turtle meat 0.01%. Allegedly in one year there were about 60 turtles caught unintentionally by fishermen on the southern coast of Java Island. The abducted turtle is mostly consumed by the fishermen themselves. Fishing nets fisherman proved unsafe for turtles.

Table.1: Prices of turtles are preserved in Teluk Penyu Cilacap, East Java

No	Species of turtles	Price (year 2005)*) IDR	Estimated Price (year 2017) IDR	Location
1.	Hawksbill turtle (hatchling)	35,000 – 50,000	36,750-52,500	Situbondo
2.	Small hawksbill	60,000 – 80,000	63,000-84,000	Situbondo
3.	Medium hawksbill	80,000 – 500,000	84,000-525,000	Situbondo
4.	Big hawksbill	500,000-1,500,000	525,000-1,575,000	Situbondo
5.	Medium Olive ridley sea turtle	60,000 – 80,000	63,000-84,000	Situbondo
6.	Big Olive ridley sea turtle	80,000 – 150,000	84,000-157,500	Situbondo
7.	Medium green turtle	100,000-200,000	105,000-210,000	Situbondo
8.	Big green turtle	200,000-300,000	210,000-315,000	Situbondo

*) ProFanua (2005)

To protect turtles, the Government of Indonesia has issued a policy on turtles. Sea turtles in Indonesia are protected by Law No. 5 of 1990 on the conservation of biological natural resources and their ecosystems in Government Regulation No. 7 of 1999 concerning preservation of plant and animal species which states that the following turtles including their eggs are protected animals by country. Protection and utilization opportunities have been regulated through captive arranged by Government Regulation no. 8 of 1999 on the use of wild plants and species. Turtle protection is regulated in Law number 5 of 1990 and Law no. 31 of 2004 and government regulation no. 7 and 8 of 1999. The Minister of Marine Affairs and Fisheries has issued Circular Letter No. 526 / MEN-KP / VIII / 2015 on the implementation of the protection of turtles, eggs, body parts and / or derivative products.

The problem is that various governments regulations have been issued, but they still decreases the turtle population. The question is how to effectively address the turtle problem, so that the turtle protection policy for the future can be effective in its implementation.

II. MATERIALS AND METHODS

2.1 Description of turtle laying eggs

Turtle nesting intervals are affected by sea water temperatures. The higher the temperature of the seawater, the spawning interval tends to be shorter. Conversely, the lower the temperature of sea water, then the spawning interval tends to be longer. The best interval is the long spawning time, because the number of eggs hatched by the parent more and more. Pancaka (2000) states that the behaviour of turtles from ascending to return again need time 81.6 minutes (1.36 hour) with the detail as follows: a) the time taken for the coastal turtle averaged 13.41 minutes, while the turtle time makes the average hole is 16.87 minutes; b) Based on the average observation of turtle nesting time is 22.41 minutes; c) The turtle shell closed the average hole was 17.66 minutes and the average time to return to sea 11.25 minutes; d) The average nest temperature is 30^0C, with an average air temperature of 28^0C, the average air humidity is 17%; e) Turtle turtles lay eggs with an average number of eggs 104 grains; f) The nest of vegetation averages 3.09 meters; g) The nest distance from the highest tide averaged 14.16 meters; h) The depth of the nest averaged 43.41 cm; i) Turtle landing between at 20:35 pm and 00:15 am at half pairs. The physical condition of Marengan beach is suitable as a place to lay turtle eggs with slope, sand type, and vegetation condition.

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The turtle nesting is currently undergoing its initial change since the turtle rises to the shore until it returns 1 hour 36 minutes, currently undergoing a change in both the landing frequency and the return to sea. A decrease in the frequency of green turtles that landed in the beach might be caused by variation of nesting activity, the number of eggs, and hatching success. Another threat to the population of nesting green turtles changes in turtles habitat at Pangumbahan beach, the level of lighting of the beach, the increasing number of buildings villa, and social condition (Haryanti, 2014)

2.2 Data turtle in National park of Alas Purwo in Banyuwangi regency and National park of Kili-Kili in Trenggalek regency

Changes in nesting habitat, villa buildings, and the number of tourists will affect the instinct of green turtles to lay their eggs. Data on tourist numbers, number of villa buildings, and habitat biophysical change can be shown in following table.

Table.2: Biophysical Parameters Beaches in TNAP and TKK KB

Parameters	Measurement results (average) in TNAP *) for turtles (Lepidochelys olivacea) in Ngagelan beach	Measurement results (Average) in TNAP **) for turtles (Lepidochelys olivacea) in Sukamade beach	Measurement results (Average) in TKK KB ***) for turtles (Lepidochelys olivacea)
1. Width supratidal	14.01meters	17.5 meters	15.60 meters
2. Slope	5.33^{O}	$9,53^{O}$	6.01^{O}
3. Sand texture	Max diameter average 82.02 % (with diameter sand range from 0.21 - 0,50) Min diameter average 0.97 % (with sand diameter ranging from 1.00 – 2.00)	Medium sand 91.2 % (with diameter range from 0.25 -0.50)	Fine sand 82.67 %
4.Percentage of vege tation cover	Pandanus tecturius, Baringtonia asiatica, Manilkara kauki, Terminalia catappa, Hibiscus tiliaceus, Nypa fructicans	Barringtonia asiatica, Terminalia cattapa, Thespesia populnea, Pandanus tectorius, Rafflesia zollingeriana dan Buchanania arborescens.	Pandanus tectorius 1400 ind/ha

Note:
TNAP : National park of Alas Purwo in Banyuwangi regency;
TKK KB: National park of Kili-Kili in Trenggalek regency
*) source: Dumasari (2014);
**) Source: Yudhistira (2013).
***) Source:Prasetyo (2015).

Based on table 2 above, that the correlation between physical characteristics are obtained by correlation between turtle nest distance with the highest tide and supra tidal beach width that is equal to 0,921. This value indicates a strong correlation. Therefore, it is concluded that the farther the nest of the highest tides, the more distant the outer vegetation distance of the nest with the highest tides.

Dumasari (2014) by using Principal Component Analysis (PCA) shows that physical characteristics of nesting habitat contribute to axis F1 consisted of beach length of 14.34%, intertidal beach width of 8.99%, supratidal beach width by 11.30%, nest temperature of 10.93%, substrate type of very fine sand 14.99%, substrate type of fine sand of 14.45%, very coarse sand substrate type of 9.06% and the nest distance with the highest tide of 11.13%. While axis F2 contributed to slope 20.19 %, medium sand substrate type 24,49% and very coarse sand substrate type 22.59%.

Yudhistira (2013) analyzed using principal component analysis shows that on the one axis (F1) contributes 78.18% with the root character of 8.556. On the 2nd axis

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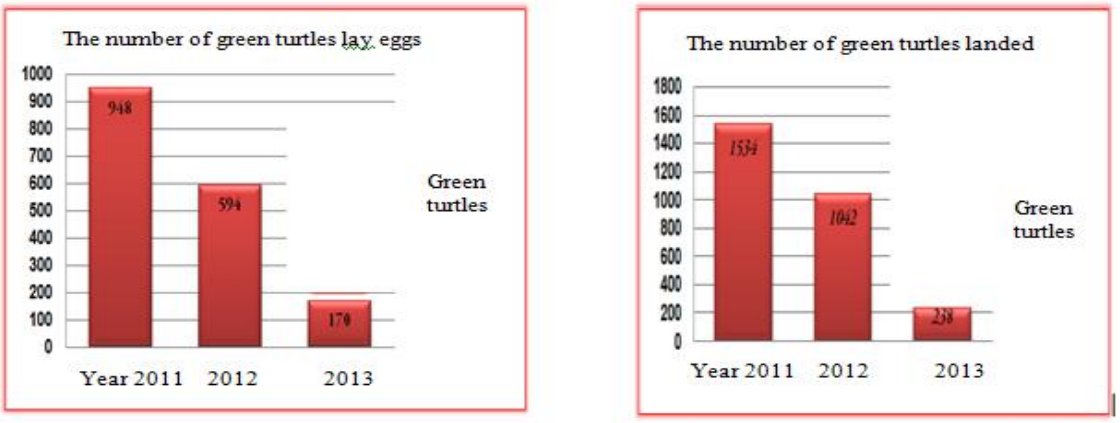
(F2) contributes 72.15% with the root character of 4.734. Meanwhile, on the 3 axis (F3) contributed 49.67% with the root character of 3.710. Axis 1 (F1) has a strong correlation with physical parameters such as coastal supratidal width, nest sand temperature, depth of sand nest, coarse sand, medium sand, fine sand, sand and dust. For axis 2 (F2) has strong correlation with coastal intertidal width, coastal slope, moist sand humidity, pH of sand nest, diameter of sand nest and very coarse sand, fine sand, nest distance from highest tide and clay. The main component analysis results show that most of the information is centred on two major axes ie F1 axis and F2 axis, where each axis describes 50.33% and 27.85% of the total variety. The result of data processing shows that the variables affecting the habitat of nesting green turtle on Sukamade Beach are beach width, sand texture consisting of: very coarse sand, coarse sand, medium sand, fine sand and very fine sand. While the sand fraction consists of sand, clay and dust.

Table.3: Number of turtles landed and Spawn in TNAP Year 2010 - 2012

Types of turtles	Year		
	2010	2011	2012
Green Turtle			
a. Number of turtles landed	13	5	2
b. Number of Turtles spawn	10	2	1
Hawksbill			
a. Number of turtles landed	5	3	3
b. Number of Turtles spawn	5	3	3
Leatherback turtle			
a. Number of turtles landed	2	1	1
b. Number of Turtles spawn	1	1	1
Turtles			
a. Number of turtles landed	1.506	1.457	1.450
b. Number of Turtles spawn	1.503	1.455	1.446
Amount			
a. Number of turtles landed	1.526	1.466	1.446
b. Number of Turtles spawn	1.519	1.462	1.449

Source: Reporting of TNAP (2013)

Table 3 above shows that some turtle populations experience decline both on landing and laying eggs. Decrease in the frequency of green turtles that landed in the beach might be caused by variation of nesting activity, the number of eggs, and hatching success. Another threat to the population of nesting green turtles changes in turtles habitat at TNAP beach, the level of lighting of the beach, the increasing number of human activities, and social condition. The data presented by TNAP is different from the data presented by Yudhistira (2013) based on his observations in the field. Green turtles observed based on data from 2011 to 2013 are shown in Figure 1 below.



Sources: Yudhistira (2013)

Fig 1: The number of green turtles landed and lay eggs

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Data shown figure 1 is indicated that on the period of 3 years from January 2011 to March 2013 the number of green turtle populations decreased. In 2011 the number of green turtles laying eggs 948 of the number of green turtles that landed 1534. In the following year in 2012, the number of turtles laying eggs are decreased to 594 from the number of green turtles that landed as many as 1042. Then in 2013, the number of sea turtles laying eggs decreased by 170 from total turtles that landed as many as 238 turtles. The decline in the number of turtles is due to: 1). extreme weather is a strong wind that is sometimes accompanied by a storm and occurs when the west season winds. Strong winds cause large waves and grains of sand flying along the beach. High rainfall causes the nesting areas to be harder and harder to dig. This causes the green turtle to delay the laying process. Lightning light can affect the turtles not to landing because turtles are very sensitive to light and moving objects that are considered predators; 2) Turtle Conservation Management Unit officers are very limited staff factors that have an impact on the monitoring of green turtles laying eggs in the morning and evening.

Bacterial parasites and fungi are disease that agents often infect turtles in conservation areas. Therefore, the decline in the number of turtles is not only caused by human hunting, but also caused by various diseases that threaten the survival of turtles. The disease is caused by viruses, bacteria, and environmental pollution. Pollution and blooming algae are the factors causing turtle disease. The role of diseases suffered by both hatchling and adults turtle will be given examples in Meru Betiri national park in Jember regency and Alas Purwo in Banyuwangi regency. Primaoktosa research results in Meru Betiri national park. The total of this national park is 58,000 Ha. There are 8 villages surrounding this park. The population of 8 villages as a buffer zone of Meru Betiri National Park is 62,145 people from 19,535 households.

Primaoktasa (2013) conducted a study on the study of ectoparasite distribution on green turtle (Chelonia mydas) in Meru Betiri national park, East Java. The results showed that the number of parasites found in each of the hatchlings in the maintenance pond showed the body parts covered with mushrooms include: forefoot, plastron, carapace and neck. The types of parasites found are Aspergillus sp, and geotrichum sp. While the parasite found in adult turtles is Chelonibian testudinaria. Aspergillus sp arises due to poor water conditions and it contains a lot of decomposition of organic material, so that the fungus grows as a polluter. According to Oros et al (2004) that aspergillus sp was found to have a turtle jellyfish flipper (Caretta caretta) due to poor water quality management and it caused the disease to have a hatchling. Diseases caused by Aspergilus spp are related to the circumstances of the hatchling environment, the environment with temperatures tends to be low and can help the growth of this type of fungus. The mushrooms attack the hatchling by utilizing the nutrients that are in the body of the hatchling slowly to breed and inhibit the imum response. In addition, the remaining feed in the breeding pond is one of the factors that make mushrooms grow. According to Phillott et al (2001), the mushroom invasion does not kill the newly hatched eggs, but gradually exploits the nutrients within the egg embryo network by penetrating the inorganic and organic tissues of the shell.

Whereas, geotrichumsp is highly resistant to oxygen and to carbon dioxide reduction. (Hudecova et al, 2009). Chelonibian testudinaria is a living organism attached to its host without giving any benefit to its host or is called Epibiont. This epibiont does not attack the immune system of the turtle, but it sticks to the skin and it causes the speed of the turtle to swim off. Meanwhile, Algadri (2014) studied the bacteria and fungi on hawksbill (Eretmochelys imbricata) in the hatchling phase in Alas Purwo Banyuwangi National Park, East Java. He researched on 15 samples of both hatchlings and turtles adults. He stated that the bacteria was found to include gram-positive, anaerobic and aerobic and fungi species identified as aspergilus spp, fusarium spp, geotricum spp and scolecobasidium spp. Fusarium is one of the pathogenic fungi causing damage to eggs and hatchlings in the conservation area. this type of fungus utilizes the nutrient source in the organism by sticking to the skin surface, then enter and start the infection stage in the organism. Whereas, scolecobasiidium is a pathogenic fungus that causes Pulmonary mycoses disease that causes infection in turtles.

Table.4: Comparison of Parasites in TMMB, TNAL and TKK KB, East Java

No	Type of parasites
1.	TMMB:*) for green turtle (*Chelonia mydas*) a. Aspergillus sp (in hatchlings); b. Geotrichum sp (in hatchlings); c. Chelonibian testudinaria (Adults turtle)
2.	TNAP**) for green turtle (*Chelonia mydas*) and hawksbill (Eretmochelys Imbricata)

a. Aspergilus spp;
b. Fusarium spp;
c. Geotricum spp;
d. Scolecobasidium spp.

3. TKK KB ***) for turtle turtles (*Lepidochelys Olivacea*) and Hawksbill turtle (*Eretmochelys Imbricata*)
a. Aspergillus sp;
b. Geotrichum sp;
c. Fusarium sp;
d. Gliocladium sp.

Note:
TMMB: National park of Meru Betiri in Jember regency;
TNAP : National park of Alas Purwo in Banyuwangi regency;
TKK KB: National park of Kili-Kili in Trenggalek regency
*) Researched by Primaoktasa (2013);
**) Researhed by Algadri (2014);
***) Reserached by Fitalaya (2015)

2.3 Methods

The methods used to develop future turtle management based on opportunities for restoration governance habitats, are used the policy analysis method of Dunn version (Nugroho, 2012). The information used the several researchers in the three districts in East Java province as described above. The policy analysis method incorporates five general procedures: definition, prediction, prescription, description and evaluation. In this paper only evaluation is used. Thus, the evaluation process focuses on the information already submitted by researchers both related to turtle habitat ecology, as well as by diseases suffered by the turtles themselves. The basic questions stated before doing evaluation as follows:

1. What is the essence of the turtle problem?
2. What is the result of the turtle policy that has been made to solve the problem ?
3. How significant are these results in solving the problem of turtles and hatchlings?
4. What is the best alternative for turtle management?
5. What results are expected?

Table 5: modified evaluation model

type of criteria	Questions
effectiveness	Whether the results of research conducted by turtle researchers in the three districts of East Java province have shown sufficient results and can be used as basic information on sea turtle population decline analysis in Indonesia.
efficiency	Is the policy that has been done to protect turtles to yield positive or otherwise harm?
adequacy	How far the achievement of desired results has solved the problem of turtle population decline?
Equity	Equality of turtle management with other protected fauna?
responsiveness	Are the results of research conducted by researchers able to provide policy input for decision makers?
accuracy	Whether the research results can reconstruct future turtle-handling policies.

III. RESULTS AND DISCUSSIONS

3.1 Results of the study

The existence of turtles population declined due to the impacts of human activities and natural factors. Human factors are influential not only the rapidly growing population, but also the need for residence land, business activities and ecotourism areas. In addition, the role of the government in determining a national park area does not involve community participation. As a result, land conflicts arise. Qodim (2012) mentioned that the pattern of social relations between Balai Meru Betiri National Park and the parties, especially with the community of the buffer village is the result of the construction of political policy and the pressure from the government on the importance of the conservation area.

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The government's policy has put the buffer villagers as weak communities in conservation and as if the community do not need nature conservation. The government, with its own authority, without any dialogue and other social processes with the community directly establishes zoning of the region. With the authorities establishing zone, the government is pushing the enclave societies with social stigma as illegal settlements and limiting the movement of non-enclosed buffer villages to access natural resources. Estuary of the process zoning areas in which already established areas of community life, forming a pattern of relations dimensioning long-term conflict, sustainable and broad spectrum.

The location map of the observation for the analysis of the physical characteristics of sea turtle habitat and the study of the diseases suffered by turtles is shown in the map below.

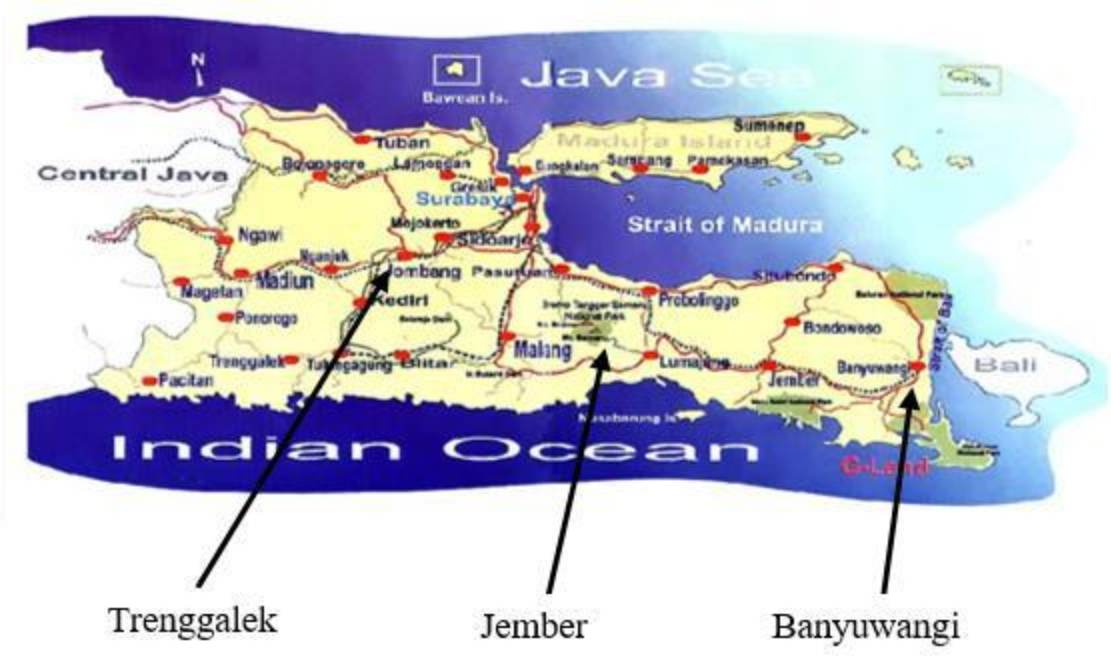

Fig 2 Map of Research Location

The condition and productivity of TNAL, TNMB and TKK KB as well as the flora and fauna associate with them are largely driven by these weather patterns and climatic events. It is reasonable to expect that such national parks will be sensitive to climate change. Therefore, the goal of turtles habitat management on units of the three national parks System are to ensure the long-term maintenance and where possible, restoration of healthy populations of native turtles, wildlife, plants, and their habitats.

The cause of the decline in turtle populations caused by the disease, actually due to human activities itself that do not follow the procedures in raising turtles and hatchlings. Ignorance of national park managers about turtle breeding, especially about water management, causes turtles and hatchlings to infect some fungi. Diseases that settle in hatchlings and turtles between adult parks Meru Beriri in Jember district and in Alas Purwo national park in Banyuwangi district have similarities about the diseases suffered by turtles in both national parks. The main cause is the management of water in the turtle breeding is not done properly and correctly.

Captive breeding of turtles aimed at saving and raising hatchlings including turtles from predatory threats has yet to show successful turtle breeding. Captive breeding of turtles originally intended to: a) perform maintenance and research for the survival of turtles; b). meet the demand for turtle shells; c) use it as a tourist attraction. Based on research by Primaoktasa (2013) and Algadiri (2014) that turtle breeding is not done properly and correctly that will accelerate the death of hatchling.

Based on the analysis with the approach of turtle habitat and approach of diseases suffered by sea turtles caused by infected fungi and bacteria, then it is done by conducting a study of Dunn model matrix as in table 6 below:

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Table 6: Modified Evaluation Model for Turtles

type of criteria	Questions
Effectiveness	Whether the results of research conducted by turtle researchers in the three districts of East Java province have shown sufficient results and can be used as basic information on sea turtle population decline analysis in Indonesia. The research results of the researchers in the three districts in East Java province showed a happy result. This is because the government is still limited to present data related to the condition of turtles and hatchlings. For example, the data provided by TNAP in Table 3 and Figure 1 shows very wide data gaps. In all national parks studied, of course, provide accurate information. Although it is still acknowledged that research by researchers has not provided a complete picture of the condition of turtles and hatchlings as a whole. Thus the results described above are very effective to help the government to reconstruct the turtles policies. The impact of the above sea turtle research suggests that turtle conservation is a fixed price and cannot be negotiable.
Efficiency	Is the policy that has been done to protect turtles to yield positive or otherwise harm? Based on the technical guidance of turtle conservation management issued by the Directorate of Conservation and Marine National Park, Directorate General of Coastal and Islands Marine Affairs, Ministry of Marine Affairs and Fishery of the Republic of Indonesia in 2009, stated that the technical management of turtle conservation consists of seven stages starting from: a) Technical Turtle nesting and egg nesting monitoring: b) Technical Breeding; c) Technical Monitoring; d) Technical Tagging; e) Technical Rescue of Turtles in Migration Areas; f) Technical Patrols; g) Technical Habitat Coaching; h) Technical Management of Turtle-Based Tourism. In addition, there are other regulations and policies that protect various types of turtles. Decree of the Minister of Forestry Number 882 / Kpts / II / 92 on the status of protection for turtles (Natator depressus), Decree of the Minister of Forestry Number 771 / Kpts / II / 96 on protection for hawksbill (Eretmochelys imbricata), Government Regulation Number 7 years 1999 on the preservation of plant and animal species in Article 4 paragraph 1 stated that the types of plants and animals are stipulated on the basis of: a) protected plants and animals; b) unprotected plants and animals. This Government Regulation states that all biological species in the annex include all types of sea turtles in accordanc Despite numerous laws, government regulations and various ministerial decrees to protect turtles, the reality on the ground shows that the turtle population is declining.
Adequacy	How far the achievement of desired results has solved the problem of turtle population decline? The protection of turtles has been declared in various forms of laws and regulations by both central and local governments. In each area that has turtles have created a management institution called the Turtle Conservation Management Unit. But the condition of turtle populations still decreased. Observations in the field indicate that the illegal harvesting of turtles is still taking place, such as the theft of turtle eggs, turtle hunting and harvesting of marine natural resources which are turtle feed. In addition to human disturbance, the turtle also has a disturbance of natural predators of lizards, raptors, ants, rats, wild pigs. Other disturbances that occur in the habitat of coastal abrasion and deflection of the river so as to make changes to the nesting beach.
Equity	the equality of turtle management with other protected fauna is the same. The difference lies in the treatment tailored to each character. For the management of turtles that need attention is on increasing the institutional capacity of turtle management, which includes the number of supervisors, facilities and infrastructure including operational funds that are currently limited.
Responsiveness	Are the results of research conducted by researchers able to provide policy input for decision makers? The use of evidence-based policy (evidence-based policy) today is increasingly considered very important and a demand. One of the basic evidence of policy that is able to document policy is the result of research. The use of inaccurate research results in policy making can lead to policy failure. The paradigm shift in evidence-based policy-making provides a great opportunity for researchers to participate in policy-making in cooperation with policymakers, but there is still a need to ensure that research is accessible to policy makers so that research results can be used more effectively. Therefore the government needs to create a forum for dialogue with turtle researchers, on the need for future public policy reconstruction
Accuracy	Whether the research results can reconstruct future turtle-handling policies. Many policies are based on

ideology, intuition, experience, public opinion, or made on the basis of political interests. Even some cynical figures about policymaking, Keynes says "There is nothing more hated by a government than complete and detailed knowledge, because it makes the process of getting to decisions far more complex and difficult." While Cook states "The main objective of politicians is to be re-elected rather than to respect the evidence", and Kogan conveyed "The government will seek to legitimize its policies by referring to the idea of evidence-based decision-making, but the government uses only research evidence if such evidence supports priorities, their politically driven priorities ".

The message of the above matrix are: a) Input of research result as material to reconstruct turtle policy; b) The importance of public participation in the preparation and determination of policies on national parks and conservation areas; c) The addition of infrastructure and cost in the management of the park area; d) Maintenance of turtle habitat should be seriously done both on land and sea; e) Sanctions for sea turtle habitat / breakers, as well as hunter turtles including trafficking will be subject to sanctions in the payment of environmental fines; f) Strict bans and penalties for those who trade turtles.

Therefore it is necessary as a material to develop turtle habitat restoration with the formulation of turtle management policy in national park as turtles habitat restoration governance, includes:

1. Effort to Improve shorelines conditions to keep shoreline as natural as possible, including removing things like retaining walls (If there is) to make them suitable for turtles;
2. In keeping with this simple, “go natural” philosophy, it is very important to plant native shrubs and trees;
3. Turtles love to bask on old logs or large rocks, so let that fallen log lie on the shore to become part of the natural habitat;
4. All stake holders, interns, and volunteers must hard at work monitoring and protecting turtles nesting beaches;
5. It is critical for both turtles and the other aquatic inhabitants of coastal, lakes and ponds that the water in which they live be kept free of harmful chemicals. So avoid using fertilizers and pesticides to the farmers;
6. Pile up all the huge wooden debris that has been stranded on the beach, then cleaned so as not to disturb the turtle's journey to spawn or travel back to shore;
7. Strengthening the monitoring process on a regular basis and carried out the recording and documented as a material evaluation of leadership;
8. The management of turtles in the national park prioritizes the principles of transparency, participation and accountability to the public;
9. Planning, implementing and evaluating the turtle condition should focused on the formal and informal actor participation.

3.2 Propose programme for Sea Turtle Conservation & Management in East Java province

In order to conserve sea turtle and to restore their habitats, the main policy recommendation as follows:

1. Inventory of marine turtle nesting potential, including its habitat at sea;
2. Take decisive action against anyone who becomes a predator for turtles, whether done by humans or by fauna. Action will be taken against who is involved in collecting turtle eggs and killing the tortoise for any purpose;
3. Coastal and turtle island nesting places will be preserved and protected from turtle hunters;
4. National park areas that have been designated as turtle protection areas will be closely monitoring, and local communities are invited to participate in conserving turtles;
5. The turtle breeding will be built in the right areas and the old captivity needs to be rejuvenated with due regard to the principles of good and proper management;
6. Turtles and hatchlings need to be scheduled for release to the sea for the sustainability of increased turtle resources;
7. Intensify the promotion of cooperation between national parks in turtle management and regional cooperation of Asia and International with a focus on management activities;

3.3 Constraints

Constraints encountered by each national park in East Java are: a) There are still many untrained supervisors handling turtle management when moving turtle eggs to captive breeding, including managing water properly. Supervisory skills in each national park are becoming an important issue; b) The difficulty of supervisors to control and regulate turtle eggs away from surveillance sites, so that eggs are vulnerable to destruction by predators; c) Observation in each national park is a matter of transport to control the existence of turtle nest that spreads in very distant areas, including communication issues between supervisors with main office, or between supervisors and communities who find violations of turtles and hatchling; d). Suitable research methodology has not been found to

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hatch eggs with high success rates, so traditional methods are still performed with a high risk of death; e). Information on the research ever conducted in national parks either from colleges, NGOs are only registered, without any attempt to review. Review actions are essential as materials for improving turtle management.

IV. CONCLUSION

The objective to be achieved is to manage both existing and undiscovered turtle habitats throughout the turtle's national parks to promote the inherent ecological diversity and integrity (both flora and fauna) around turtle habitats existing on land and at sea.

Goals Management turtle habitats through restoration is emphasizing the preservation of native flora and fauna over the next 10 years to achieve the following conditions: (1.)The balance of existence strategy between native species and non-invasive species. Even degraded indigenous genes, however, are of high value with regard to ecological diversity and management efforts should strive to provide equilibrium tips that support the turtle community; (2). The main threats of turtles in Indonesia are identified as (a) destruction / modification of the breeding habitat, related to intensification or alteration in coastal exploitation, (b) drought and climate change during the rainy and dry seasons poses a clear threat to the existence of both current and which will come; (c) any hunting or exploitation of turtles shall be terminated and the offender shall be punished accordingly; (d) any person who disturbs the habitat and life of the turtle shall pay an environmental fine subject to the degree of damage; (e) Predators of both human and animal life assessed to incriminate the life of the turtle need to be closely monitored, especially during reproduction, and the turtle species suffers from low productivity and ultimately encounter mortality rates in both adult and turtle turtles;

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