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"Compromise" Between Human and Nature: A Multispecies Ethnography Approach for Redefining the Concept of Human Adaptation

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Abstract. In Anthropology, adaptation is interpreted as a variety of human efforts to adapt to the natural environment. This perspective, however, ignores the role of nature as an active subject. In fact, the reciprocal interaction between humans and the nature gives a significant impact to the survival of both entities. This paper intends to recommend a new perspective on the concept of adaptation through the approach of multispecies ethnography. The research observes the people of Kampung Laut in Cilacap. The data is collected through in-depth interviews and participation observations. The paper concludes that the people of Kampung Laut who live around the area where sedimentation takes place always face pressures from the environment as they often encounter tidal flooding. This condition requires the people of Kampung Laut to make efforts in order to survive the unavoidable natural disasters. The people of Kampung Laut "compromise" the environment in Nusakambangan island by growing *albizia chinensis* plantations. *Albizias* provide benefits to both the people and the sustainability of the environment. In addition to having a significant economic value, growing *albizians* among other hardwood trees on the hill of Nusakambangan helps in restoring the environment after the extreme illegal logging. Based on the findings of this research, I argue in accordance to the perspective of multispecies ethnography that the concept of adaptation can no longer place humans as the center of analysis, because this idea tends to disregard the fact that natural disasters are caused by human adaptations. This will ultimately threatens human survival over a period of time.

Keywords. adaptation, compromise, human, nature

Introduction

In anthropology, adaptation is interpreted as any human effort made to adjust to the situation of the environment. This perspective ignores nature as an active subject. As a matter of fact, reciprocal interactions between humans and the environment gives a significant impact on the survival of each entity. In this paper, I would suggest a new perspective in understanding the concept of adaptation with the approach multispecies ethnography.

There have been many studies on human adaptations conducted by anthropologists. One of them is the research on the adaptation of Hispanic and Anglo farmers in encountering drought in southeastern Arizona. The research conducted by Marcela Vásquez-León (Nelson et al, 2009) observes the adaptive skill of the two farmer groups as well as the ethnic and government interventions. The Hispanic farmers develop a kinship-based social network to ease their financial burdens during the last 100 years of drought. Meanwhile, the Anglo farmers who

lived in two valleys prefer to apply irrigation technology and receive financial aid from the government. From these two cases of adaptation, Vásquez-León concludes adaptations that give emphasis on kinship-based and localized capital intensive may be more sustainable in the long run. It is seen that the Hispanic farmers perform better than the Anglo farmers who rely on external capital intensive, technology and financial aid.

Another study is conducted by Ståhlberg and Svanberg (2010) on the Loplyks people who live near Lake Lop, PRC. Due to the artificial oasis construction in Xinjiang, the lake becomes dry and the people begin to lose their livelihoods that depend on the lake. The drought and the limited amount of water force them to survive by utilizing the soil for farming, as well as by hunting animals and fishing. The use of alternative resources is considered effective in sustaining the livelihoods of the people.

However, both studies on the farmers of southeastern Arizona and the people of Loplyks only focus on the survival of the people, without paying attention to the ecological impacts of the adaptations. This perspective obscures the exploitative nature of adaptation that causes the scarcity and extinction of certain species, as well as generating apocalyptic stories on environmental destruction (Harding in Kirksey and Helmreich, 2010: 545).

Multispecies ethnography emerges to provide a new perspective to fill the gaps in the concept of adaptation. Dooren, Kirksey, and Münster (2016) explain;

a multispecies approach focuses on the multitudes of lively agents that bring one another into being through entangled relations that include, but always also exceed, dynamics of predator and prey, parasite and host, researcher and researched, symbiotic partner, or indifferent neighbor. But these larger contexts are not mere environments in the sense of a homogeneous, static background for a focal subject. Rather, they are complex "ecologies of selves," dynamic milieus that are continually shaped and reshaped, actively—even if not always knowingly—crafted through the sharing of "meanings, interests and affects." (Dooren, Kirksey, and Münster, 2016:3-4)

Multispecies ethnography elevates the position of nature in studying human adaptations. Nature can no longer be placed as an object, but as a subject that is capable of having mutual interaction with humans. When nature dies, people die too. The destructions of nature caused by human behaviours also affect the human lives. One of the most common examples is the phenomenon of global warming. Eduardo Kohn (2007) contributes his thoughts to multispecies ethnography. Kohn (in Kirksey and Helmreich, 2010: 545) explains multispecies ethnography as, "*an anthropology that is not just confined to the human body but also concerned with the effects of our entanglements with other kinds of living selves.*"

Multispecies approach redefines the concept of species and niche. The two concepts guide multispecies ethnographers in analyzing reciprocal interactions between humans and the nature. According to multispecies approach, nature refers to other non-human species (Bruno Latour in Kirksey and Helmreich, 2010: 555). Species is the basic concept to articulate biological differences and similarities. Eva Hayward (in Kirksey and Helmreich, 2010: 564) defines species as "*impressions; they carry the traces-structural, behavioral, and textural-of those people with shared shared contiguities and intimacies.*"

Each species occupies different niches. Fuentes (2010) defines niche as follows;
The fundamental niche is a heuristic concept used to represent the basic requirements of a species: space, nutrients, and other physical factors. The realized niche is the same set of conditions as in the fundamental niche, but restructured and altered by a reality occupied not only by the organism but also

shaped by the presence of competitors and other agents in a shared environment. The contemporary concept of niche includes notions of fundamental and realized niches that are neither static nor passive but, rather, malleable and mutually interactive with the species that exist within them. (Fuentes, 2010:604)

Niche includes the habitats, physical characteristics, food and predators, as well as symbiotic relationships with other species. No two niches are similar. The similarities of habitats and diets do not indicate that the species are belonging to the same niche, because the physical traits and the ways of life will remain different. The physical traits and ways of life determine which species is superior in catching preys or obtaining food. The interactions that are constantly shaped and molded by other species show the dynamism of niche.

Methodology

This paper presents a theoretical discussion on multispecies life in Kampung Laut, Cilacap, Central Java. It shows how the people of Kampung Laut, who live in the midst of tidal flooding and environmental degradations, compromise by growing albizias to sustain their lives. The methods used in this research are in-depth interviews and participant observations.

Tsing (in Dooren, Kirksey, and Münster, 2016: 9) introduces a method called "*the arts of noticing*" in multispecies ethnography, which is a method that involves scientists, farmers, hunters, indigenous peoples, and even activists to develop new forms of ethnography and ethological investigations. It criticizes the notion that the science of nature could only be comprehended by scientists. Local people empirically have their own knowledge on nature as they interact intensively with nature on their daily lives.

Therefore, I use the methods of in-depth interviews and participant observations to observe the social world of the people and to explore the phenomenon of tidal flooding in Kampung Laut. I observe floods, tides, environmental degradations in the hill of Nusa Kambangan, and the mouth of Citanduy river. The difficulty of conducting multispecies ethnography is that the researcher is required to focus both on the humans and the nature as two distinct and exotic entities, while searching for the reciprocal relationship between the two at the same time. The findings on the two entities are considered as a puzzle that ultimately will display an explanation on multispecies life.

Findings

The People of Kampung Laut in the Midst of Tidal Flooding

Kampung Laut Subdistrict was legally established on 24th December 2003, as written in the Regional Regulation (*Perda*) No. 54 of 2003. As a subdistrict of Cilacap, Central Java, Kampung Laut consists of 4 villages: Ujung Alang, Ujung Gagak, Panikel and Klaces. Most of the people of Kampung Laut are farmers and fishermen.

Kampung Laut is a new subdistrict built on alluvial plain formed by the sedimentation in Segara Anakan lagoon, a lagoon between Java Island and Nusakambangan Island. Sedimentation is the flow of mud particles from erosion that takes place in the upper course of a river (Khuriyati, 2009: 110). It takes more than 30 years for the alluvial plain to be inhabited by people. By that time, the soil has become more dense and strong enough that people can build houses on it.

The landmass formed by sedimentation is fertile as it carries organic particles (rich in nutrients). According to Latuconsina (2016: 128), the nutrients in the particles are rich due to the tides or due to the mixing of seawater and freshwater in estuaries. In addition, the sediments

that settle in estuaries have a high capacity in absorbing nutrients and are also able to dissolve them (Supriharyono in Latuconsina, 2016: 129).

The fertility of the soil creates history in agriculture. In 1986, there was a bountiful harvest in Kampung Laut. The people grew more crops than usual. This is told by Mr. Broto. He shared his memories of the bountiful harvest in Kampung Laut.

“At the harvest time, every hectare of the field produced 5 to 7 tons of rice. Now everyone had about two to three hectares of rice field. You can imagine how prosperous the farmers were. No wonder they made a big celebration, that even the local government of Cilacap was invited to Lempong Pucung, the place of the celebration.” (Field note)

Nevertheless, tidal flooding that lately occurs frequently causes the farmers of Kampung Laut to accept the harsh reality. The bountiful harvest is now a history. Floods cause the harvest to drop dramatically. If long ago farmers could harvest 7 tons of rice per hectare, nowadays they are considered lucky if they harvest 3-4 tons of rice. In fact, most farmers today only harvest quintals of rice. Many of them also experience a total failure.



Picture 1. The rice field is harvested prematurely because farmers are worried of tidal flooding.

Source: Research Team

According to Suhelmi (in Asrofi and Ritohardoyo, 2017: 126), tidal flooding is the rise of seawater that inundates the surrounding land. The occurrence and the level of flood could be fluctuative depending on the situation of the tide. If the tide is very high, the flood will reach the land, following the elevation of the surface or the morphology of the coast. The global sea level rise causes tidal flooding to be worse than years ago. Kampung Laut is not an exception. Back then, tidal flooding only reaches embankments. Lately, flood inundates the foothill of Nusa Kambangan. Hydrological theory explains that the amount of water on Earth remains the same; however, the shape may vary from water, ice, snow, to water vapor (Jusuf, 2015: 15; Latuconsina, 2016: 30). In Segara Anakan, the water settles into several bodies of water and into several forms. There are brackish water in the lagoon and brackish water in sediments. Freshwater in rivers will meet the brackish water in the lagoon, while some freshwater is trapped in the hill of Nusakambangan as ground water. There is also water in the form of water vapor trapped in the atmosphere, ready to come down to the surface as rain.

Although the total area of estuaries in Segara Anakan decreases due to the emergence of newly formed alluvial plain, the amount of water in Segara Anakan remains the same. Water

mixes with mud in alluvial plain. When people build concrete houses on alluvial plain, the muddy soil is suppressed and pushes the water to leave the soil, causing the height of the land to decrease. The water that leaves the soil returns back to the lagoon. However, when the base of the lagoon becomes increasingly shallow due to the massive sedimentation, the water will flow to the land again. Not to mention the fact that the total area of the forest in the upstream course has decreased. This means the water catchment shrinks as well. As a result, the water that should be stored in the ground flows directly into the stream and increases the amount of water in the lagoon. This causes tidal flooding and harvest failures in Kampung Laut.

The people of Kampung Laut have to survive in the midst of agricultural crisis caused by tidal flooding. However, they have faith in the hill of Nusakambangan which is notable for its fertility as it is the only surviving dipterocarp forest in Java. Now, will the people continue to perform agricultural activities while sacrificing the forest of Nusakambangan?

The Crisis of the Hill of Nusakambangan

Nusakambangan is an island with a forest which is under the authority of the Department of Law and Human Rights. The people who inhabit the island are high-class inmates and prison guards who are on duty of guarding and securing the territory. Nusa Kambangan forest was known as a virgin forest. It was full of old trees. Endangered animals such as Javan leopards, a number of mammals and birds become the non-human inhabitants of the hill in Nusakambangan.

From 1997 to 1998, Nusakambangan welcomed new residents. The company owned by Tutut Soeharto cultivated Cavendish bananas in Nusakambangan (10 hectares of land was used). The cultivation was performed in Pasuruan and the company had obtained the permission from the Nusakambangan Authority. To support the project, the company invited farm workers from West Java. They lived in the plantation while managing and growing the garden. Huts were built for the workers to settle.

The collapse of the Soeharto regime in 1998 affected the companies run by his family, including Tutut's Cavendish garden. The company went bankrupt and could not pay the workers. Since the workers had no other job offer nor enough money to go back to their hometowns, they continued to work in the Cavendish garden.

Initially, they continued to work in the garden because they had to survive. Steadily, they began planting rice that has a higher economic value than bananas on the fertile land of Nusakambangan. Rice was grown as the main crop along with other secondary crop. The success of rice farming supported the expansion of ricefield. The farmers started to clear the forest for agricultural activities. They even invited their relatives to farm there. Finally, the forest was cut down.

There were many immigrants who built illegal settlements in Nusakambangan. They built houses and farms in the virgin forest of Nusakambangan. There were 912 families who illegally lived in the hill of Nusakambangan.

The cutting of the forest causes the numbers of animals in Nusakambangan to decrease. The animals attempted to survive by ravaging the farms. Monkeys and wild boars were the animals that usually destroyed the farms. Certain types of birds such as Javan pond heron and gulls that used to inhabit the forest of Nusakambangan were no longer seen.

The forest degradation created an arid landscape. The climate also became hotter because there were less trees. Moreover, the spring water of Nusakambangan also reduced drastically. Tree roots that supported underground water disappeared. The roots of rice plants do not help in storing rainwater to the soil, so there was less underground water. It is true that

water still penetrated the soil, but the amount was very little because it was not supported by plant roots.

To address the environmental crisis in Nusakambangan, illegal settlements were destroyed forcefully. Huts were burnt to clear the hill of Nusakambangan from illegal immigrants. After the eviction, Silvagama entered the scene and conducted reforestation in Nusa Kambangan.

Silvagama is a student association for environmental and adventure activity (*Mapala*) of the Forestry Faculty of UGM and is actively engaged in environmental conservation (check mapalasilvagama.or.id). One of Silvagama's main activities is Scientific Exploration and Expedition. In 2004, the activity was carried out in Nusakambangan.

Silvagama implements three types of programs; short-term, medium-term, and long-term plan. The short-term plan aims to ensure the implementation of rehabilitation programs that also provide economic benefits from the sale of forest products. These products are albizia trees that can be harvested in five years. Mr. Saryono explains:

“If we only grow albizias, there will be no soil left for other plants in Nusa Kambangan, because we harvest the barks. This means we have to cut the trees. If we cut them, the land will be bare again. Therefore, we can only use 10% of the land to plant albizias. Only the 10% is used to obtain economic benefits. The rest of the land, the 90%, are meant for other plants and trees that will not be cut.” (Fieldnote)

The medium-term plan focuses on growing fruit trees. From the fruit trees, the people who participate in the reforestation may benefit the harvest. It is called the medium-term plan because the time for the trees to grow and produce fruits take a quite long time. Both albizias and fruit trees can be sold to a small company managed by the people of Nusakambangan. This plan prohibits the trees to be cut down. The trees are expected to be profitable although not as high as albizia's economic value.

Finally, the long-term plan that focuses on planting hardwood trees that are forbidden to be cut. Hardwood trees such as teak and mahogany are expected to purify and maintain the stability of underground water that flows into the foothill. The trees are also expected to restore the habitat of animals that left the area due to deforestation, as well as providing other economic benefits from tourism once the forest regains its beautiful landscape and the sounds of its chirping birds. The program involves the people of Kampung Laut. They are given the task to regrow the forest. Each family has one hectare of land to be grown. Meanwhile Silvagama acts as the facilitator. The management of Nusakambangan reforestation is handed to the people of Kampung Laut, but the authority is still held by the Ministry of Law and Human Rights of Nusakambangan. The program applies the contract system. Since the beginning of 2004, the people of Kampung Laut have been given the right to manage the land for 25 years. After the contract expires and the forest has been successfully regrown, the forest will be taken and managed by the Department of Law and Human Rights. The people will lose the opportunity to obtain profits from the forest.

In the midst of the economic crisis suffered by the people of Kampung Laut due to tidal flooding, they gain economic opportunities by being involved in the reforestation program. However, the contract system will make the people to lose economic opportunities after 25 years. Do environmental recovery programs always have to sacrifice the people's lives? How do the people and the environment of Nusakambangan compromise in overcoming the crisis?

Albizia Trees: The “Compromise” for the People Welfare and the Environmental Recovery of Nusakambangan

The contract that demands the land to be returned in 25 years after the forest is regrown makes the people of Kampung Laut to reverse the composition of the planned reforestation program. The program demands 90% of the land to be planted with hardwood trees and the remaining 10% to be planted with albizias, but the people of Kampung Laut use 90% of the land to plant albizias and the 10% to plant hardwood trees and fruit trees. On one occasion, Mr. Wahyono explains,

“It’s hard to think that we will not gain anything after conserving the environment. Moreover, these days we only focus on working on the forest of Nusakambangan, as the situation of our farms in Kampung Laut is bad due to tidal flooding. Meanwhile the land we manage in Nusakambangan will be taken by the authority in the future. Therefore, growing albizia trees is the solution to the environmental and economic problem of the people of Kampung Laut.” (Fieldnote)

On another occasion, Mr. Siswanto tells a similar statement,

“The informal ownership of the forest land makes the people to avoid taking risks. Probably after participating in the reforestation program, and after growing the forest to be green again, the forest will be taken back by the Department of Law and Human Rights. Meanwhile, we will return to our farms and struggle with harvest failures. Therefore, we compromise by planting albizia trees and other trees such as rubber trees as an experiment, trees that absorb water, and other hardwood trees for building materials. But we will mostly grow albizias in this forest.” (Fieldnote)

The economic value of albizias is not higher than rice’s, because rice is harvested once in three months, while albizias are harvested once in five years. If the farmers harvest albizias, they may earn at least Rp10.000.000, -. If it is divided per three months, the farmers earns Rp500.000, -. This is equivalent to the profits of rice harvest in three months if they farm in Kampung Laut that is often inundated by tidal flooding. Nowadays the farmers could only harvest quintals of rice in Kampung Laut, while they could actually harvest tons of rice in Nusakambangan. However, environmental degradation in Nusakambangan makes the people avoid doing activities that may worsen the environment because this will also affect the people’s lives. Particularly, the people need fresh groundwater that flows in the foothill of Nusakambangan.

Trying not to be greedy, the people of Kampung Laut choose to plant more albizias on the hill of Nusakambangan. Albizia is a kind of lightwood plant. The features of the tree according to Warisno and Dahana (2009: 5-7) are as follows:

- a) The growth rate is very fast, i.e., 5 - 7 meters every year.
- b) It has a perpendicular stem and leaves alike to bitter bean’s.
- c) It has taproots and little fibrous roots.
- d) The cultivation of the tree is relatively easy. After proper planting and maintenance, farmers only need to wait for the plant to be cut down. No fertilizer needed.

Not only they provide economic benefits, albizia trees also restore the environment of Nusakambangan. First, they make the forest to be physically green. Secondly, they provide space for monkeys and wild boars to live after a long period of exclusion due to the deforestation. Furthermore, the trees are planted along with other fruit trees such as durian and

avocado, which are the diets of the animals. Thirdly, growing albizia trees and other hardwood trees stabilizes the groundwater of Nusakambangan through the process of interception.

Interception is the retention of rain water on plants; thus, it does not directly touch the ground. It occurs in the canopy, forest floor or litter layer, and the stem flow. Canopy interception is the retention of rainwater on leaves, branches, and stems that evaporates. Litter layer interception is the retention of rainwater on dead organic matters on the forest floor. Meanwhile, stemflow refers to precipitation of water on stems of trees that eventually seeps into the ground and becomes ground water. (foresteract.com, 2016)

When it rains, the raindrops fall on plants. Through interception, the raindrops that fall on leaves can proceed to flow through tree stems until they touch the ground. Subsequently, the water will flow through pore spaces in the soil and fills the soil as groundwater that later settles in the roots through the capillary action of the plant. Capillary action makes the water to defy gravitational force and gather in plant roots. When pore spaces are filled with water in the root layer, the water will then fill the pore space and create an underground river (foresteract.com, 2016). The underground water keeps flowing through crevices and spread outward as spring water in the foothill of Nusakambangan. This is regarded as a gift by the people of Kampung Laut.

In albizia plantations, interception occurs in two ways; through litter layer interception and stemflow. The canopy that is not wide causes rainwater to be suspended by the canopy only for a short time until it falls to the ground through the stem. The kinetic power of raindrops makes them forcefully enter the pore space in soil.

The kinetic force actually causes soil erosion. However, the forest floor of the hill of Nusakambangan minimizes the effect. The forest floor is full of dead organic matters from the dead weeds that were killed by pesticide poisoning, and old albizia branches and leaves. Certain types of weed may hinder the growth of albizias. Therefore, such weeds have to be killed. Meanwhile, the albizia trees are planted only for their trunks. The branches and leaves of albizias are scattered on the forest floor as fertilizer. The forest floor may weaken the kinetic force of raindrops. Steadily, the raindrops touch the ground by passing through the forest floor. They are finally absorbed through pore spaces in soil. When the amount of rainwater is more than the amount of water the soil can absorb, the water will flow downhill and result in little erosion.

Discussion

The empirical narratives of the events in Kampung Laut, Cilacap and the hill of Nusakambangan result in an analysis of multispecies ethnography. Tidal flooding that inundates the rice fields of the people of Kampung Laut causes harvest failures; however, in the midst of environmental problems, the people have to survive. Instead of causing more environmental damages to Nusakambangan, the people of Kampung Laut compromise by planting albizia trees, contributing to the relationship between the people of Kampung Laut and the environment of Nusakambangan. The people are aware that if the environment of Nusakambangan is damaged, there will be more problems in their lives. Drought will occur alongside harvest failures that often happen lately.

Albizias provide benefits both to the people and the environment. Apart from having a significant economic value, planting albizia trees and other hardwood trees on the hill of Nusakambangan aids the restoration of the environment after the extreme forest logging committed by illegal immigrants. Although the forest will not be as good as the old virgin forest, the reforestation program helps in reserving groundwater. The physical characteristics of

albizias and the way of harvesting them allow stemflow interception and prevent raindrops kinetic force to create soil erosion.

The people's effort on encountering tidal flooding is not anthropocentric. Likewise, the restoration of Nusakambangan forest is not purely ecocentric. Ultimately, humans and nature are two equal entities that have the right to live in harmony. In order to actualize this idea, albizias are brought to the interaction. This species of lightwood tree has a significant impact on the survival of both the people and the environment.

The theoretical contribution of the research is the elaboration of the concept of adaptation. The concept can no longer place humans as the center of analysis that disregard the fact that environmental damages are caused by human adaptations. The anthropocentric view will ultimately threaten the human survival in the future. Adaptations that place humans at the top of the hierarchy without considering nature degradation they could cause will contribute more apocalyptic stories on extreme environmental degradation or the extinction of living beings including the humans themselves.

This study also brings a methodological contribution. I would argue that when conducting research on human adaptations, we have to observe the reciprocal relationship between the people and the environment from both sides balancedly. We should not place hierarchical relationship in observing human adaptations, because as the empirical data have shown, when humans adapt to environmental changes, the environment also responds by giving impacts to the humans. This mutual response reveals a reciprocal relationship between humans and nature. Analyzing the reciprocal relationship between the two will result in a richer discourse that minimizes environmental exploitations.

Conclusion

A number of research on human adaptations has been conducted by anthropologists. As an instance, some of them have observed the adaptations of Hispanic and Anglo farmers in the southeastern part of Arizona and the people of Lopyks in PRC in encountering drought. However, these studies are anthropocentric in nature that they abandon the changing environments. As a result, they do not acknowledge the fact that environmental damages are caused by human adaptations.

This research which is conducted in Kampung Laut, Cilacap, Central Java, does not adopt the anthropocentric concept of adaptation. Environmental changes caused by humans' behaviour are also placed as the units of analysis, parallel to the people. The study discovers that the people of Kampung Laut adapt to the environment by constantly paying attention to the effects of their actions to the environment. They are aware that every destructive action will bring an impact to their lives as well.

The theoretical contribution of this paper is the elaboration of the concept of adaptation that no longer places human as the center of analysis while disregarding the fact that environmental damages are caused by human adaptations. This thought will ultimately threaten human survival in the long run. The methodological contribution of this paper is the suggestion that one needs to observe the reciprocal relationship between humans and the nature and observe both entities balancedly, while not carrying the concept of the hierarchy of beings when observing adaptation. As the empirical data have shown, when humans adapt to environmental changes, the environment also responds by giving impacts to their lives.

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