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by Agussalim Burhanuddin

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An environmental analysis of human security at border communities in Sebatik Island of Indonesia

Sangkala¹, A Burhanuddin², and A A Yani¹

¹Department of Administrative Science, Faculty of Social and Political Sciences, Hasanuddin University, Jl. Perintis Kemerdekaan KM 10 Makassar 90245, Indonesia

²Department of International Relation, Faculty of Social and Political Sciences, Hasanuddin University, Jl. Perintis Kemerdekaan KM 10 Makassar 90245, Indonesia

Email: agussalim.fisip@unhas.ac.id

Abstract. This analysis is part of the study of measuring human security in border communities conducted by Hasanuddin University in 2016 and 2017. The study aims to map and measure socio-economic problems faced by people in border areas in the framework of human security in which environment is one of the crucial issues. Using combination of field observation, interviews, and document analysis, the research found out that environment in Sebatik Island has been largely degraded due to excessive exploitation of nature such as logging and palm plantation. As the result, the island is very vulnerable to the impact of the climate changes as landslide frequently occurs and the provision of clean fresh water becomes more difficult.

1. Introduction

In a big country like Indonesia, people who live in the border areas have to tackle human security problems related to the specific condition of their location. A relatively great distance to the location of the central government, in most cases even of the provincial/local governments, is a hindrance for the state to run its functions in terms of providing security and welfare over its citizen in the border, including effective policies regarding environment conservation. One of the crucial problems that are faced by people who live in the border is the degradation of their natural environment. This problem also occurs in Sebatik Island on which lays a border line between Indonesia and Malaysia.

Sebatik island lies between Tawao Bay in the north and Sebuku Bay in the south, and about 1 km off the eastern coast of North Kalimantan Province of Indonesia. Located between Malaysia's city of Tawao in northeast and the city of Nunukan of Indonesia in the southwest, the island is shared by two countries. The southern part of the island is within Indonesia's territory and the northern part belongs to Sabah of Malaysia, with the border line is roughly through 4°10' north. There is no border wall or fence as the demarcating line between the two territories, but instead some buried concrete piles can be found every one kilometer from east to west along the border.

For the two countries, Sebatik island has a strategic importance. During the confrontation between Indonesia and Malaysia (1963-1966), Sebatik was one of the areas in which heavy fighting between Indonesian armed forces and the British/Malaysian soldiers took place. While the confrontation has ended and today's situation in the island looks peacefully, the border area of Sebatik is still one of unresolved disputes and categorized by the two countries as one of Outstanding Border Problems



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(OBP). Moreover, the position of the island is getting crucial since the Ambalat block, a region waters rich of oil and gas deposit located east of Sebatik island, became center of maritime dispute between Indonesia and Malaysia in 2005.

The size of Sebatik island is relatively small, and by Indonesian government Sebatik is officially listed as one of the outlying islands (*pulau-pulau terluar*) of the country. The island's total area is approximately 452.2 km², and Indonesia's part of the island is approximately 246.6 km² (54.5%). With a population of 37,992 persons in Sebatik Indonesia and around 25,000 persons in Sebatik Malaysia,[1] the island density can be considered as high. Like in many other parts of Indonesia as well as in Southeast Asia, cultural identity is one of important factor in analyzing security and the quality of human life in particular communities. Although there are some cultural traces of indigenous ethnic groups of Kalimantan in the island, like ancient tombs of Tidung people in the village of Liang Bunyu [2]. The number of Tidung people in Sebatik today is not significant, except a few people live in west part of the island. The inhabitants of Sebatik are majority from the Bugis ethnic group (approximately more than 97%) which is origin from South Sulawesi. The other ethnic group can be found in the island are Timorese that are also origin from other island, though only in a few numbers. In the Malaysia's counterpart of the island, population is also dominated by the Bugis who worked in Malaysian oil palm plantations along with a few numbers of Indonesian citizens from other ethnic groups.

The living hood in Sebatik Island is mostly on the sectors of agriculture and trade. Many people of Sebatik Island work in oil palm plantations owned by companies, though there is also a large number of farmers cultivate their own lands. The major agriculture productions are palm oil, banana, and cacao, to be brought to Tawau City of Malaysia and then processed and exported to various countries by the Malaysian companies. Trading is the second major sector of income for Sebatik people as there are several markets both modern and traditional can be found in the island. Since there are fisherman communities in the island, Sebatik also produce fish but not in a large quantity, and the major sale destination is Tawau. In addition, there is a small number of state apparatus and government employees positioned in Sebatik to run the state's function of administration.

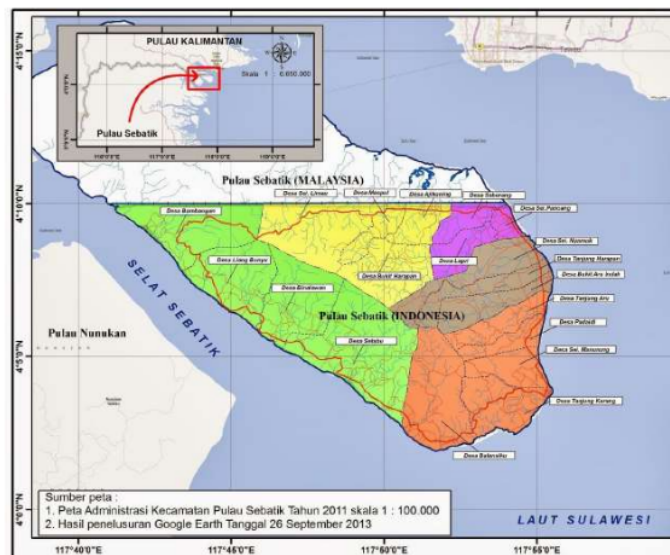


Figure 1. The Administration Map of Sebatik Indonesia
 Source: Central Bureau of Statistics (BPS) Nunukan Regency, 2017.
Kabupaten Nunukan dalam Angka 2017

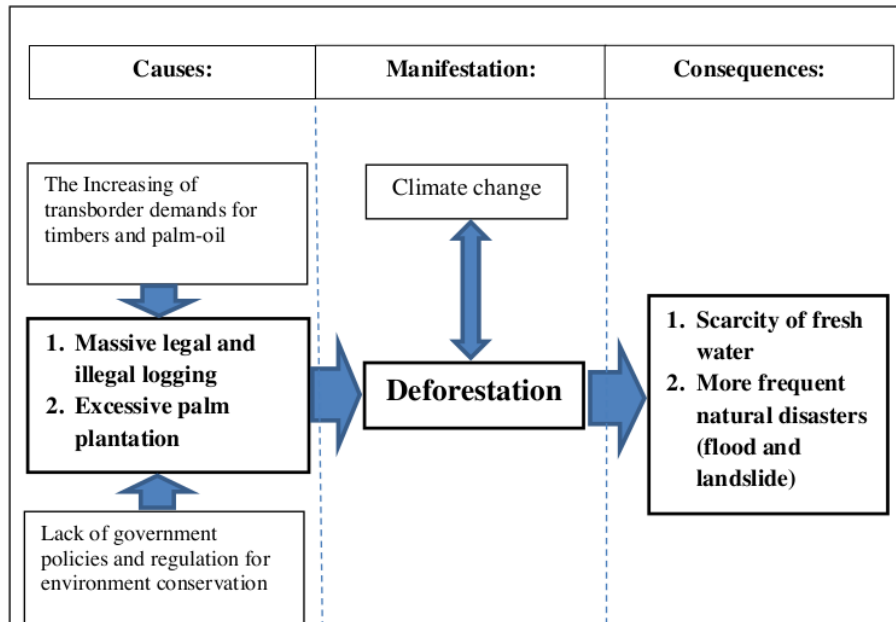
The administration of Indonesia's Sebatik is part of the Regency (*kabupaten*) of Nunukan, North Kalimantan Province (previously East Kalimantan Province), and divided into five districts (*kecamatan*): Sebatik, Sebatik Barat, Sebatik Timur, Sebatik Tengah, dan Sebatik Utara. The issue of governance of Sebatik Indonesia is very dynamic and the area has experienced a rapid administrative change since the 1998 Reform. In 1999, Sebatik Indonesia became new districts and was divided into 2 districts (Sebatik and Sebatik Barat) as a consequence of the creation of new regency of Nunukan (previously part of Bulungan Regency). In 2010, this area divided again by the provincial government into 5 districts in order to accelerate development in border areas. As local autonomy is one of central issues in the post Suharto reform, some local prominent actors have launched a discourse of the creation of Sebatik as a new municipal city and to be administratively separated from Nunukan Regency. The issue of development acceleration was basically taken as the main reason for the plan to create a new municipal administration of Sebatik. As a border area, Sebatik was expected to be a front gate of the country's development. However, unlike the issues of economic and security on the island, environment has been the issue that gain the least attention from both central and local governments.

2. Methods

Data collection was conducted in November and December 2016 through a combination of field observation, in-depth interview, and document study. Field observation was carried out in several urban and agricultural areas in Sebatik to gain information of the condition of the island natural environment and its supports to human life. Interviews were then taken with a number of informants representing citizens, government officers, NGO activists, and prominent persons to obtain information about the quality of environment, the change of environment, and factors behind environment changes. Data collection was later finalized by studying secondary data in forms of public documents and findings from previous researches. Since the issues of human security at border communities are broad and complex, this article focuses on the environmental analysis of human security at border communities in Sebatik Island.

3. Results and discussion

This study found out that natural environment in Sebatik Island has been degraded to the level of critical. This apparently manifests in a total deforestation of the island. Rainforest that covered the whole of the island half of a century ago is almost completely vanished today, replaced by a wide vast of plantation of oil-palms and other industrial agriculture commodities. Environmental degradation in Sebatik Island can be described as a systemic as it can be analysed through three parts; manifestation, causes, and impacts, as can be seen in the following graph.



Graph 1. The Sistic Environmental Degradation in Sebatik Island

Basically, the environmental damage in Sebatik Island occurs due to years of deforestation. Prior to the Indonesia-Malaysia Confrontation (1963-1966), Sebatik was simply a rainforest island without inhabitants except a few numbers of military personnel that were temporarily stationed to watch the borderline and perhaps small temporary settlements of fishermen. According to elderly people in Sebatik, the island began to be inhabited during the Confrontation when Bugis migrants from Sulawesi to Tawau of Malaysia started to live on the island since the military forbid them to cross the border due to the conflict. Like other areas in Kalimantan, Sebatik has a very fertile land that made more and more people settled in the island even after the conflict. Within a few decades, Sebatik has grown to become a crowded island where its people mostly rely on agriculture.

With a population of more than 82.000 persons (37,992 persons in Sebatik Indonesia and around 25.000 persons in Sebatik Malaysia) living in area of approximately 452.2 km², the island density can be considered as relatively high. Such crowdedness subsequently has a detrimental consequence on environment. Traditionally, economic activities that based on agriculture and the need for woods for housing led people to cut the trees excessively. However, it was industrial factors that damage environment in a massive scale. Like in other parts of Kalimantan, trees and forest on the island has been depleted very fast in the last three decades due to intensive commercial logging which relates with the increasing international demand for timber and agricultural commodities such as palm-oil, coffee and cocoa. Having geographical advantage of being close to Tawau, one of the Malaysia's

industrial cities in Sabah, Sebatik was openly exposed to international trade. Moreover, deforestation in Sebatik offers multiple benefits for economic activities. The conversion of forest into farming provided profits from timber production in the beginning and agricultural products in the later phases. A study suggests that profits from logging activities are able to subsidize the oil palm plantation costs in initial years before coming to production. These include the establishment and maintenance of the plantation for 3 to 5 years [3]. For such promising benefits many companies then got involved in economic activities on the island, especially in palm-oil business. This includes palm plantation, milling process, and distribution of fresh fruit bunch of oil palm. With the involvement of big enterprises, environmental degradation of Sebatik is inevitable.

The current total area of palm plantation in Sebatik island is more than 15.000 hectares, owned by companies and local people, with annual production more than 50.000 tonnes of palm fresh fruit bunch. The whole production is transported crossing the border and sold in Tawau, Malaysia. Oil-palm plantation alone in Sebatik covers more than a fourth of the island total area, indicating an excessive use of land area. Deforestation and conversion to mono agriculture in Sebatik has made the island lost its biodiversity. Oil palms that have been introduced and planted massively throughout the island are alien to the local ecosystem, and as monoculture they cannot support biodiversity as the same level of rainforest. As the consequence of deforestation to Sebatik biodiversity, it is almost impossible today to see species of native fauna of Kalimantan like birds and monkeys on the island.

Deforestation is one of the main causes of global warming and climate change. According to Union of Concerned Scientist, the conversion of rainforest into agricultural field contributes 10% of carbon emission in tropic (UCS, 2013). Tropical rainforest is the earth carbon storage, and deforestation releases the carbon into the atmosphere. Clearing the land for oil palm plantation contributes in releasing high amount of carbon dioxide (CO_2), one of the so-called greenhouse gases that is believed play instrumental roles in global warming. After trees are cut down and transported, land for oil palm plantation is cleared using fire. This method is cheap for the planters but dangerous for the nature since it releases dangerously high level of carbon to air and contributes to global warming.

Sebatik contribution to global warming was made worse by the establishment of the first palm oil mill on the island in 2018. This mill processes oil palm fresh fruit bunch to produce crude oil palm (CPO) which is that basis of many oil palm products such as cooking oil, margarine, and many other food and non-food products. In the last two decades, palm oil has also emerged as an alternative renewable biofuel [4]. Beside crude palm oil, the milling process in the factory also produces environmentally dangerous waste called palm oil mill effluent (POME) in a considerably large quantity. For every one metric ton crude palm oil produced in a mill, there is approximately 0.5-0.75 metric ton POME generated [5]. Releasing POME into the nature can be very dangerous. POME is typically released into ponds or waterways, and without special treatment this practice would subsequently contaminate the surrounding soil and ground water with acid substances, and destroy aquatic ecosystem on the island. Mills, like that one in Sebatik, usually employ conventional treatments using aerobic and anaerobic to reduce POME impacts on environment. This method, however, is not effective enough to overcome the negative effects of POME on environment [6]. Besides that, POME also releases greenhouse gases including carbon dioxide, hydrogen sulphide, and methane which is the most powerful contributor for ozone depletion in the atmosphere [7].

The issue of pollution also always comes with the operation of palm oil mill. The milling process also generates solid waste, liquid waste, and air pollution, all in large quantities. In terms of solid waste, producing CPO in a mill generates solid waste in forms of empty fruit bunch, mesocarp fruit fibres, and palm kernel shells. Empty fruit bunch is usually dumped directly on land, and without a particular process would contaminate the ground with its remnant oil. Besides polluting land, disposing empty fruit bunch is actually wasting potential energy since like mesocarp fruit fibres and palm kernel shells it can be used as fuel for steam production in the mills [8]. In terms of liquid waste, pollution takes form in palm oil mill effluent or POME that has been discussed in the previous paragraph. During the digestion of POME, it releases odour into surrounding air, decreasing the quality of the air. Taking the small size of Sebatik Island into consideration, the presence of palm oil

mill on the island will pose a real danger for the environment at the island as well as at the global level.

Moreover, the excessive use of land for agriculture can also pose detrimental effects to natural environment and human life in direct ways. Science has proved that deforestation alone can cause several forms of natural disaster including drought, flood, and soil erosion that may manifest in landslide. Trees play an important role as water cycle regulator in the nature. They save water in rainy seasons and release it drops by drops via their roots so soil water is sufficient even in dry season. Without forest, Sebatik Island has environmental problems due to water cycle. During the rainy season, low areas in Sebatik island are affected by annual flood, leaving destruction of hectares of farming and settlement. For many villages and urban areas in the island like Aji Kuning, Sungai Pancang and Liang Bunyu, flood has become regular disaster in rainy season. In hilly areas, the effect can be more fatal since landslide can occurs without any warning. The thick foliage of rainforest functions to absorb and soften the impact of rainfall to prevent soil from erosion and landslide. Without trees, soil is more exposed to the rain drops, and heavy rainfall would create dangerous landslide. In contrast to rainforest, the monoculture of oil palm plantation is unable to protect the ground from being washed away by the rainfall. Planting oil palms that is usually in rows also causes a related problem. It creates underground water channel and paves the way for erosion and landslide, especially on steep slopes and hilly areas. This explains why landslide has been another common problem in Sebatik. During the field observation in Sebatik, the research team witnessed a number of landslide spots throughout the island.

The scarcity of clean fresh water has been a common problem for many inhabitants of Sebatik Island. Drought has been a normal problem during the dry season. Yet, in many areas of the island, fresh water scarcity may occur throughout the year. The absence of forest that save water is arguably the primary cause. The replacement of forest by oil palm plantation is not a solution, and instead seemingly making the problem worse. Many studies have indicated that there is a correlation between oil palm plantation and the problem of fresh water provision. It has already found out that in order to grow and produce, oil palms consume a big amount of water. Although among oil plants, soil water up-taken by oil palm is relatively lower than canola and sunflower [9], a vast wide oil palm plantation over a small island will deplete the whole groundwater reserve. As an illustration, water usage for a kilogram oil palm fresh fruit bunch is up to 1.14 m³ [9]. With annual production of up to 50,000 tonnes, water consumption of oil palm plantation in Sebatik can be 57,000,000 m³ per year. This finding suggests that the scarcity of fresh water in Sebatik Island is also caused by the excessive absorption of water by oil palm plantation.

Moreover, the insufficient amount of fresh water in soil allows the intrusion of sea water into the island at considerable amount. For a small island with limited water recharge area like Sebatik, ground water resources are easily influenced by seawater intrusion, and the excessive water absorption by palm plantation makes the soil functioning like sponge and contaminated by sea water in a considerable amount. This explains why ground water in Sebatik mostly tastes salty. Moreover, the relationship between water scarcity and oil palm plantation can be a cyclical problem. While excessive palm plantation may lead to the depletion of fresh water and the intrusion of seawater, high degree of soil salinity would be detrimental to oil palm agriculture. A study on the impact of soil salinity on agriculture shows that seawater intrusion threatens the sustainability of agriculture at coastal areas [10]. This study suggests that without real actions taken to prevent further seawater contamination on the island, palm oil business in Sebatik will be greatly affected in the future.

Environmental degradation in Sebatik Island will likely get worse in the future since there is no real actions taken by governments to reduce or at least to limit economic activities that may damage natural environment. As one of national border areas, Sebatik Island receives special attention from both central and local governments. At national level, central government of Indonesia issued the Presidential Regulation (Perpres) no. 78/2005 on the Outlying Islands Management, in which Sebatik is categorized as one of the country's outlying island [10]. Regional development on border areas is also one of the national priorities of development as it is stated in the National Medium Term Development

Plans (*Rencana Pembangunan Jangka Menengah Nasional* – RPJMN) 2004-2009 and 2010-2014, recognizing Sebatik as one of the Centers of National Strategic Activities (*Pusat Kegiatan Strategis Nasional* -PKSN) locations. In 2010, the national government established the National Agency of Border Management (*Badan Nasional Pengelola Perbatasan* – BNPP) that basically functions to coordinate all efforts in accelerating economic growth, human development, and institutional capacity empowerment in border areas. However, government policies and regulation on Sebatik Island are directed mainly to human developments through improvement of welfare services and empowerment of people economic capacities, while efforts on environment conservation are carried out at minimum scales.

In terms of environmental policies, Indonesian policy makers have actually developed a bureaucratic framework to control environmental impact of development and planning processes for almost 3 decades. This regulation is well known as Environmental Impact Assessment (*Analisis Mengenai Dampak Lingkungan* – Amdal) and aimed to ensure that environmental principles are applied to planning and development processes. Yet, again, the regulation has never been effectively applied to ensure environmental consideration are taken in oil palm businesses in the country, and rather used as administrative procedures for companies [11]. In this regard, it is not an exaggeration stating that economic interests have overwhelmed all environment considerations in palm oil industries.

4. Conclusion

Environmental degradation in Sebatik Island has reached a critical level since deforestation takes place almost throughout the island. Such an environmental problem occurs in a systemic way involving multiple factors and impacts. The main cause of the environment damage on the islands are basically human economic activities namely commercial logging and oil palm plantation, which are driven by the increasing international demands for timber and palm oil. The island environmental damage is also made possible by the lack of policies and regulation taken by governments to conserve natural environment. Today, environmental degradation posed great and present dangers to human life on the island as the provision of fresh water becomes more difficult and natural disasters such as flood and landslide occurs more frequently.

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