VECTOR BORNE DISEASES IN CLIMATE ETHNOGRAPHY PERSPECTIVE

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Abstract - Global climate change has already had observable effects on the environment and human daily activities. The effect of global warming and climate change is changing the season, including flooding in some areas but very dry in other areas, changing the temperature and humidity. Anthropogenic climate change may directly affect the behavior and geographical distribution of malaria mosquitoes and parasite life cycle, thus change the incidence of disease. Inter-relationship between climate system, mosquito, human population, and culture pose a major challenge to indigenous communities. We discuss the evidence required to attribute changes health sector to the early effects of anthropogenic climate change. The literature to date indicates that there is a lack of strong evidence of the impact of climate change on vector–borne diseases (i.e. malaria, dengue). Although, early climate and culture studies were mainly founded in archaeology and environmental anthropology with the advent of climate change, anthropology's roles have expanded to engage local to global contexts. Considering both the unprecedented urgency and new level of reflexivity that climate change ushers in, anthropologists need to adopt cross-scale, multi-stakeholder, and interdisciplinary approaches in research and practice. This research will contribute significantly to relevant disciplines and I argue for one mode that anthropologists should pursue the development of critical collaborative, multi-sited ethnography, which I term "climate ethnography".This research combines extensive literature study and fieldwork in two tribes in Indonesia. Based on result of the research, indigenous specific health indicators useful to Indigenous Communities who are assessing climate change sensitivities adaptation plans.

Keywords - Climate, Health, Indigenous People

I. INTRODUCTION

The relationship of climate, environment, vector borne diseases is complex. Global environmental change is expected to affect profoundly the transmission of the vector borne diseases (e.g. malaria, Japanese encephalitis, dengue fever, yellow fever, chikungunya) that cause human health problem. Potential anthropogenic cause of climate change is deforestation. The effect of deforestation on eco-systems and human health are diverse and have taken place for many decades, though both the rate and geographic range have increased markedly over the last 30 years (1).

Currently, global temperatures are presently in a warming phase that began in the early decades of the eighteen century. Potential impact of continued warming on human health focus on vector-borne diseases.(2) This paper will discuss Malaria as a vector borne diseases. This diseases transmission depends on favourable environmental conditions for both vector of malaria and parasite.(3) Malaria diseases caused by the plasmodium parasite and transmitted by female mosquitoes Anopheles sp. WHO estimates that one-sixth of the illness and disability suffered worldwide is owing to vector-borne diseases, with more than half of the world's population currently risk.(4) A dynamic interplay of biological, social, and environmental susceptibilities define malaria risk. Land-use patterns and agricultural practices, along with the climate and economics driven migration of workers into regions of differing malaria endemicity, are part of a wider historical narrative in which human actions have encouraged the breeding of malaria vectors, exposed populations to infection, and facilitated the movement of malaria parasites.(3) Among the anthropogenic drivers of change, deforestation is arguably the most conspicuous, and its rate is projected to increase in the coming decades. The canonical epidemiological understanding is that deforestation increases malaria risk in Africa and America and diminishes it in South–east Asia(5). Mosquitoes are found throughout the world except in places that are permanently frozen. There are about 3,500 species, of which nearly three-quarters are native to the humid tropics and sub-tropics. The largest populations of individual species occur in the Arctic tundra, where colossal numbers emerge in a single brood each summer from snowmelt pools that overlie the permafrost. (6) One early and major contribution of anthropologists for build ethnography studies to contemporary climate change research included the documentation of how place-based peoples observe, perceive, and respond to the local effects of global climate change. Founded in the essential capacity for local peoples to develop and practice adaptations to local variance, these new studies highlighted how adaptive strategies did not work as climate change pushed the boundaries of ecosystem variance.(7) A far wider range of factors affect the potential impact of interventions to control malaria disease. Development policies within countries are one example, whereby government,

private local companies or international consortia are responsible for environmental changes that create new conditions for the spread of disease. This includes the disruption of the local environment and changing the local ecology of vectors(8). Since these seminal studies, anthropologists have initiated projects in other "climate-sensitive" areas of the world, including areas of high and low latitudes, high and low altitudes, near sea-level, and deserts, where global climate change is having the most pronounced effects and often inhabited by place-based populations who depend directly on their immediate physical environment.(7)

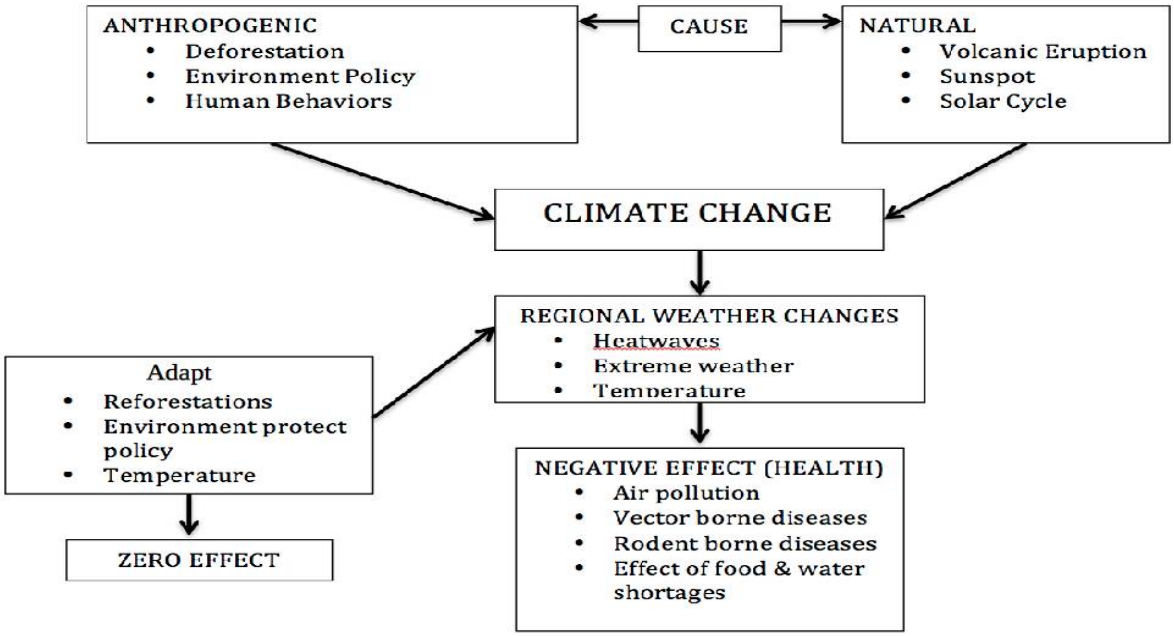


Figure 1. Flowchart of the Climate Change Cause and Impact

There is two climate change responses can made impact negative impact (no adapt) and zero effect (adopt) in community. Adaptation to climate change means minimizing the damage that can occur in the socio-economic aspects caused by physical changes in climate. Adaptation measures are simply the self adjustment to events caused by climate change/global warming. Negative impact if community can not adopt the environment condition.(9)

This review conducted by anthropology perspective to describe malaria transmission in the indigenous people. It provides the environment and climate change impact in indigenous people, especially in the transmission of malaria diseases

Relationships between environment and climate is important to explain malaria transmission. This review article provides a indigenous people and malaria case overview of these relationships, highlighting the regional differences, and assessing the extent to which qualitative assertions about malaria and deforestation are supported by secondary data.

II. MATERIAL AND METHODS

Literature review on malaria, climate change, and vector borne diseases in tropical area. Compare with literature review case study in Orang Rimba, Jambi Indonesia and Baduy tribe in Banten, Indonesia. Relevant article relating deforestation in both area (Jambi and Banten) reviewed, to describe relationship of malaria disease and environment condition. Geographical Information System (GIS) from open source website https://earth.google.com/ were used to compare forest condition in case studies area.

III. RESULT AND DISCUSSION

Indigenous peoples in tropical rainforest belt are the richest habitat type of the world in terms of the diversity of inhabiting peoples. Tropical forest ecosystems harbor at least 1,400 distinct indigenous and traditional peoples, if areas under current forest cover are considered, and about 2,500 if historical coverage of tropical and subtropical moist forest eco regions are included.(10) They are very dependent on the forest. Many of them are already today affected by the impacts of environmental and climate change and are struggling to adapt to the changes in the environment they live in. Most of these peoples are hunters-gatherers. However, while it is widely assumed that hunters-gatherers still exist in a symbiotic relationship with agriculturalist groups with whom they barter and trade; for example the Punan and Kenyah in Borneo and the Baka Pygmies and Bantu in the Congo Basin, etc. Nowadays, the

situation is changing. Most of these hunting and gathering communities are gradually adapting their lives to an agricultural economy and are increasingly becoming semi-sedentary. It appears that many of them will eventually transform their way of life into agriculture and that they will become more integrated into the market economy. The following table gives an overview over the current situation and regional distribution of present day hunter-gatherer communities across the world.(11)

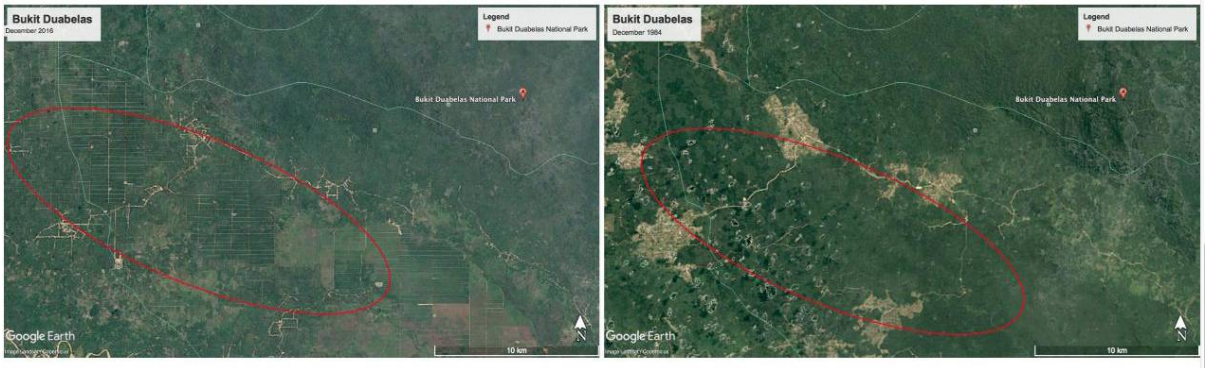


Figure 2. Satellite imagery of Bukit Duabelas National Park Border at December 2016 and December 1984

3.1 Malaria in Orang Rimba

Orang Rimba (people of the forest), a Malay speaking minority group who traditionally lived throughout the lowland rainforests of Jambi (fig.2), Sumatra island, Indonesia. Orang Rimba have much in common with surrounding Malay peoples, including a similar local dialect and variants of regional Malay customs and beliefs. They are different from the Malay and other Austronesian peoples in that they have a unique, mobile, flexible economy that traditionally shifts in and out of periods of swidden gardening and a very nomadic life based on digging for wild yams, largely upon death. They have an egalitarian social system based on sharing and reciprocity, which occurs within the context of a system of relationships in which women have great rights over forest resources and extraordinary distribution rights.(12)

The forest has a value, which is very important for Orang Rimba. Forests not only have the function as a place to make a living, but also as a symbol of their culture. They relate many rituals to trees and certain places that are in the forest. Forest loss not only means losing a source of livelihood but also losing their source of cultural identity.(13) Massive deforestation on border of Orang Rimba area show at Fig.2 compare satellite imagery in December 1984 and December 2016, show at red border (Fig.2) deforestration for agricultural development. Malaria cases depend on environmental condition. Mapping the distribution of malaria requires spatially referenced data (e.g., altitude, temperature, rainfall, and vegetation extent). Then, these relationships can be applied to the environmental data, generate continuous global maps. (14). The situation is getting worse for the ethnic minorities who do not receive adequate support from the state. They are losing their cultural ethnic identity because the cultural identity of the ethnic minority groups in Indonesia. As well as in Southeast Asia shown by the geographical landscape and the ecosystem (Fig. 2). If the ecosystem of ethnic minority habitat is disturbed, it will affect lives of those groups. They believed that the destruction of the ecological environment is the main threat that the ethnic minority groups have to face to survive. The destruction and change of land usage are due to a variety of reasons: for a transmigration area, oil palm plantations, conservation purposes for a national park logging area, the privately owned plantation.(13) Land use and land cover changes were classified into 14 categories based on the difference in subsequent land use type, especially agriculture (crops): 1) general deforestation, 2) land exploitation and pollution, 3) cacao plantation, 4) cassava, 5) sugarcane, 6) coffee plantation, 7) tea plantation, 8) rubber plantation, 9) rice cultivation, 10) irrigation system, 11) hydropower dam, 12) clearing of mangroves or swamps for fish pond or charcoal, 13) mining, and 14) new settlements and urbanization, including highway construction.(1). Environment policy at previous government, vast areas in around Jambi rainforest have been converted into monoculture plantations. Beginning with concessions granted to fuel political patronage, forests were used as industrial plantations for timber, rubber and palm oil once the hardwoods had been depleted. (12) Rubber plantations. Local major malaria vectors increased in all four examples of rubber plantations in Malaysia and Thailand. In Malaysia hilly areas, forest clearance for rubber plantations, which started in the early 1900s, exposed the land and streams to the sun and created breeding places for An. maculatus, which led to an increase in this species and a marked increase in the incidence and severity of malaria. Cyclic malaria epidemics in Malaysia over 50 years are correlated with rubber replanting in response to market fluctuations(1).Researchers from Eijkman Institute teamed up with KKI Warsi to collect blood samples from Orang Rimba populations to screen for malaria, hepatitis, and G6PD deficiency as well as

studying the population genetic diversity. This study held on Orang Rimba who live in the depth of Bukit Duabelas National Park forest in Jambi. They visited eleven Orang Rimba communities who live around the border of Bukit Duabelas National Park. Team managed to collect 579 blood samples for Malaria surveillance, also successfully collected mosquitoes larvae from puddles around the sampling sites to examine the mosquitoes species, especially if any of them are vectors of malaria.(15) Malaria is major public health in Orang Rimba Community (16). Another research in Rimba Tribe found the incidence of malaria in children.(17) The main cause of Malaria in Orang Rimba are deforestration and agricultural cultivation.(16)

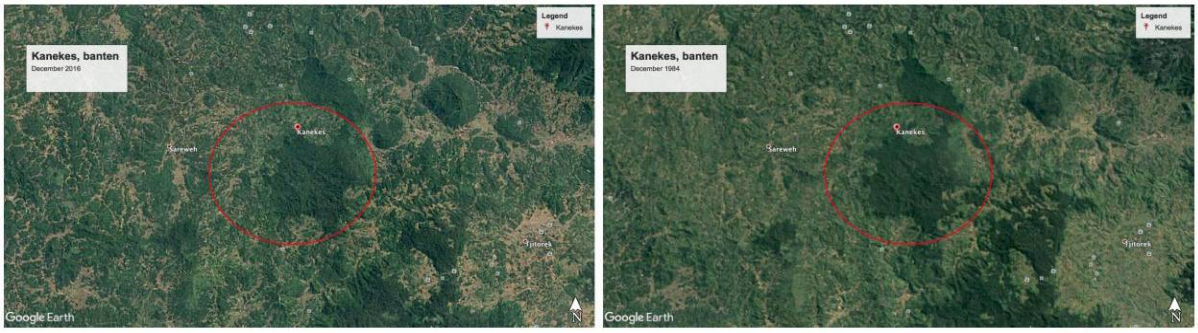


Figure 3. Satellite imagery of Kanekes at December 2016 and December 1984

3.2 Zero Malaria in Baduy

The term "Baduy" refers to a complex collection of social and ecological entities. Baduy is the name of an indigenous social group, including their language and their homelands. Although, scholarly literature on Baduy has existed for a long time, its history remains unclear. (18). The Baduy community lives in a special reserve of sacred forestland (in state forest) in Kanekes Village, Leuwidamar district, Banten, West Java, Indonesia. The Baduys, who call themselves Kanekes, are a traditional sundanesse community. Unlike other villages in Indonesia, Kanekes are a tribal village who still retain an ancient hierarchy. The village leader named Jaro, is called Pu'un. The Baduy tribe is divided into two groups "Baduy Dalam (inner baduy) and Baduy Luar (outer baduy)", seperated by cultural barriers. Formal education for the children of Baduy is against their traditional customs. They reject governmental proposals to build educational facilities in the villages. Even today, despite the goverments attempts to force them to change their society and build modern schools in their territory, the Baduy still strongly oppose these governmental proposals. In addition, customary provisions that set the Baduy customs and ways of life apart from others are these guidelines that must be executed correctly. The Baduy community in inner Lebak regency, Banten are behind the environmental movement of forest area by planting various kinds of plants. It is done for the preservation of nature and the environment. "The Baduy customary forest area comprises a land area of 5,101.85 hectares in accordance with the Regional Regulation (Perda) Number 32 Year 2001. They committed to preserve the forest area around Ulayat land, becoming green area and sustainable (Fig. 3).

A local regulation save the forest by prohibits Baduy communities to cut down the tree arbitrarily. However, they are allowed to log trees outside the lands of Ulayat rights areas (19). Their norms and beliefs which are articulated in the form code of conduct or taboo are complex because of multiple interpretations and explicitly unwritten. However, we tried to justify on an ecological basis, why the Baduy community implemented those taboos.(20)

Kinds of taboo	Justification
a. To enter and utilize forest products in sacred forest.	To protect upper course of river and preserve biodiversity.
b. To change natural landscape such as; making irrigation/ dams, ponds, waterholes, to flatten land e.g. for housing.	To avoid natural damage and prevent catastrophe.
c. To plant exotic species such as coffee, clove, cassava, etc. d. To breed large livestock such as cows, buffalos, and goats.	To protect the gene pool of local plants species from contamination.
e. To use modern tools in farming practices such as hoes, ploughs and tractors	To avoid soil erosion.
f. To apply chemical fertilizer and pesticide, in farming practices.	To guarantee their natural resources remain uncontaminated and to protect them from unpredictable disasters.
h. To change time schedule in swidden farming	To protect swidden farming from pest and disease attacks.
i. To use products which have chemical content for home consumption such as soap, shampoo, detergent and kerosene.	To guarantee their natural resources are uncontaminated and to protect them from unpredictable disasters.
J. To apply chemical fertilizer and pesticide, in farming practices.	

Source: IIn Ichwandi; Takeo Shinohara. Indigenous practices for use of and managing tropical natural resources : A case study on Baduy community in. tropics. 2007;16(2)

Table 1. Some taboos in Baduy customary law

Based on satellite imagery result (Fig.3), from 1984 until 2016 in Baduy area not shown radically environment change. In addition, secondary data of District Health Office in Lebak, Banten during 2002-2006 and Annual Parasite Index (API) of Malaria in Distric of Lebak 2004-2006 were categorized in Middle Case Incidence (MCI) which mean (2.87%) in interval of 2.04-4.51%. From 35 work regions of Public Health Center (Puskesmas) in Distrik of Lebak, there are 6 regions of endemic reagent which include Malimping, Binuangeun, Bayah, Cihara, Panggarangan and of Cilograng (21). Baduy area in Kanekes Village and under control of Public Health Service Cisemuet no malaria cases (22).

CONCLUSION

The case studies in the previous sections demonstrate that malaria case transmitted in indigenous and traditional peoples. Show evidence that the dangers of environmental change with implication climate change are already threatening traditional people health status. Environmental degradation follows with malaria case in Rimba tribe cause of political system and economic power in the forestry industry. Different with Baduy Environment, Baduy and local government committed to preserve the forest area around Ulayat (baduy area). Malaria risk is inextricably linked to the related factors of environmental degradation, agricultural cultivation, economic power, and environmental policy. Each of these factors is intertwined with the prevailing political system. The role of anthropogenic climate change, largely caused by industrialized countries, in exacerbating the burden of malaria is still controversial, but a growing body of research provides evidence that environmental conditions in the developing world contribute significantly to the higher burden of malaria.

ACKNOWLEDGMENT

Thanks to my institution Institute Vector and Reservoir Control Research and Development, National Institute Health and Research Development, Minisitry of Health which has provided support for this literature studies. Thanks to Eijkman and Warsi Jambi share discussion about Rimba condition. Thanks to DKK Lebak Regency and Cisimuet Public Health Service for collecting secondary data.

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