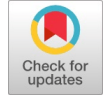


# Adaptation Strategies of Woman in Fishing Community towards Environmental Change in Administrative Village Of Kereng Bangkirai, the City of Palangkaraya



Evi Feronika Elbaar

**Abstract:** The purpose of this paper is to determine and to map the forms of environmental change, and also to describe the form of adaptation of women in fishing community related to the environmental change in Administrative Village of Kereng Bangkirai. Administrative Village of Kereng Bangkirai was chosen as the research site since the village is the part of Sabangau National Park conservation area. Therefore, it is important to understand the adaptation strategies that have been done by women in fishing community associated with environmental changes. Twenty informants were selected by using snowball sampling method. The analysis was performed with Miles and Huberman model that consists of data reduction, data display, and data conclusion. In this paper, the environmental change is divided into physical and non-physical aspect. The physical aspect includes the destruction of nature and climate change; while the non-physical aspect consists of economics (the growth of life necessities, modernization and commercialization); legal and institutional field (establishment of Sabangau National Park and improving the status of village); and socio-cultural field (the presence of migrants, changes in the social order as well as social activities that become more active). Adaptation strategies undertaken by women of fishing community include: seek alternative resources and livelihoods; always prepare boats and fishing equipment to use at any time; adjust to modernization; sought to obey the rules and the new institutional system and adapt to the socio-cultural development.

**Keywords:** Environmental Change, Adaptation Strategy, Women in Fisheries Society

## 1. INTRODUCTION

Women are part of the human resources that have the potential to demonstrate their role in the development and management of natural resources and the environment [1]. It also includes women from the fishing community, in this case the inland capture fisheries, where this circle is still included in the *grass root* circle which has many problems related to the environmental change [2][3] that they have to face.

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The study of the life of inland fisheries community will be able to highlight the lives of women in the society. Thus, it can be used as a reference source and an alternative to develop and empower the life of the fisherman's community of inland fisheries, including the women.

Gender in the fisheries sector that includes the role of women in the fisheries is studied and observed by both domestic and foreign circle (international organizations) e.g. FAO, World Bank and others. The results show that the women have a fairly important role in national and fisheries development. Various gender perspective programs aim at improving the quality of women in order to empower women, reduce the gender gap and eventually will lead to Gender Justice and Gender Equality. To accelerate the realization of these objectives, institutions and programs are developed in the area, including in the area of fisheries [4]

Generally, the men have dominant role and function in conducting fishing activity. This leads to the perception of the public to assume that women cannot and do not deserve to conduct business or fishing business activity. Thus, it causes gender practical needs do not meet gender strategic needs. As a result, women become indifferent to the fishing business. In fact, women have a capability to learn how to manage a fishery business in both the high school level and higher level, for instance a degree in the field of fisheries resource management. Women may be able to play a role as a manager or an employer who employs the existing workforce.

Capture fisheries community in Administrative Village of Kereng Bangkirai, as well as the public sector, is dominated by men. Administrative Village of Kereng Bangkirai is part of Sabangau National Park conservation area that causes fishing activities in this region become unusual due to the rules of conservation applied, added with condition that has been changing over time. Changing condition as a result of environmental changes both physical and non-physical (social, economic, cultural and legal) demands a shift in the role of women in Administrative Village of Kereng Bangkirai, mainly for women in fishing activity community which the activities are directly contacted with nature.

Women are required to adjust to the changes that occurred to maintain the survival of their families by doing domestic work optimally and supporting the public works that were previously dominated by men.

# Adaptation Strategies of Woman in Fishing Community Towards Environmental Change in Administrative Village of Kereng Bangkirai, the City of Palangkaraya

Women in the community of fisheries in Kereng Bangkirai need to improve their quality in order to empower women, reduce gender gaps and it may ultimately lead to the Gender Justice and Gender Equality.

## 2. MATERIALS AND METHODS

### A. Theoretical background

Adaptation strategy driven by changes in the environment has become an important issue and is highlighted by the whole world. The negative impacts of environmental change, particularly global climate change has relatively strong influence in various parts of the world, mainly in agriculture. Fosu-Mensah *et al.* (2012) found that climate change has significant environmental, economic and social impact on Sekyedumase District, Ashanti region, Ghana, mainly the rural farmers whose the livelihood depends on rainfall. The results showed that approximately 92% of respondents were aware that the temperature has risen, while 87% of respondents agreed that the rainfall has declined over the years. Adaptation strategies have been undertaken in the form of crop diversification, planting short-season varieties, changes of plant species and planting time shift. The analysis showed that access to extension services, credit, soil fertility and land ownership are the four most significant factors that influence the perception and adaptation of farmers. Other barriers such as lack of information on adaptation strategies, poverty and lack of information are about the weather. Although the people are precisely aware of the climate matter, it is merely 44.4% of the farmers who have to adjust their farming practices to reduce the impact of rising temperatures and 40.6% for the declining rainfall. The lack of funding became a major deterrent to implement adaptation measures.

More on measures of adaptation strategies, there are a wide variety of studies and research that have further exploration. Ayers and Huq [6] linked adaptation and mitigation to create mitigation actions that are more relevant to policymakers in Bangladesh. This case study strengthens the argument that combine mitigation and adaptation is a magic bullet for climate policy synergy, particularly at the project level, so as to contribute to the sustainable development goals related to climate change and the need to follow up. Almost similar, Duguma *et al.* [7] explored Ngitili system in Tanzania which has the function of adaptation and mitigation. Under current practice is more emphasis on the principle of complementarity, e.g. mitigation projects provide adaptation benefits and vice versa.

Nambi *et al.* [8] conducted a study on 146 farmers of different agro-ecological zones from Tamil Nadu, India, related to seven adaptation measures, such as micro-irrigation, rain water, high quality crop, the use of fertilizers, crop insurance, income diversification and community effort. These adaptation measures were evaluated with Analytical Hierarchy Process by using four criteria: effective awareness, economic feasibility, compatibility of individual and institutional and the flexibility and benefits of independent.

Anik *et al.* [9] evaluated the climate-related perceptions and identified the adaptation strategies in lowland areas of North-Eastern Bangladesh. The main problem that arose related to the livelihood was the less availability of fish, drought in the dry season and frequent floods during rainy season. The result also showed that the minority (10%) of

respondents have good knowledge toward climate change. Local people attempted to adapt to climate change through changes in their own behavior and applied several adaptation strategies. There were approximately 16 adaptive measures, such as crop diversification, livestock maintenance, house making planting, digging canals, building dikes, and so forth. The study revealed that local knowledge owned by the people in the society has significant benefits in the context of adaptation to climate change and it needs special attention.

Boeckmann and Zeeb [10] found that in planning adaptation strategies in Europe, progress can still be made through community involvement in decision-adaptation, consideration of social and demographic factors as well as the strong relationship between infrastructure and the adaptation of the health sector. Overall, social justice framework may be able to serve as a guideline for the evaluation of adaptation policies.

Associated with the presence of the forest ecosystem as one of the main influence of climate change, Sonwa *et al.* [11], within the framework of Congo Forest Basin and Climate Change Adaptation (COFCCA), recommended to bring science policy into discussions to identify and prioritize the objectives of the project based on the forestry sector that is vulnerable to climate change yet is still significant to the household livelihood and national development. The purpose of the process of determining the priority is for the development of intervention in the forest as a measure for adaptation to climate change in Central Africa. In order to build the national priority, four forestry-related sectors were identified as a general priority at the regional level to focus on climate change adaptation. These sectors include: (1) energy with emphasis on firewood and charcoal; (2) Air, notably the quality, quantity, accessibility and others; (3) Food with emphasis on Non-Timber Forest Products, and (4) Health related to health products (medicinal plants).

Bele *et al.* [12] argues that the adaptation has been the main focus of the scientific community and policy-makers, as well as becomes the main topic of multilateral climate change process discussions. This is primarily significant for developing countries to pay special attention to the management of natural resources and agricultural activities. In most of the developing countries including Cameroon, forests play a vital role in achieving the goals of adaptation to climate change more broadly. However, forests generally have received less attention in national development programs and strategies such as policy dialogue on climate change and poverty reduction strategies. In the end, Bele, *et al.* [12] highlighted the need to integrate forests for adaptation into national development strategies and programs as well as recommended the reconsideration of the existing environment regulations and its implications on poverty reduction strategies and adaptation to climate change.

Furthermore, in terms of economics, Ojea *et al.* [13] presents a framework for estimating the costs of adaptation to climate change impacts on ecosystems. This framework is then applied to the forest ecosystem in India. The authors found that the total cost of adaptation to the forest ecosystem in India until 2085 is in the range of \$ 1.34 to 2.32 billion. It is proposed that for each of the estimated costs of adaptation, the impact of the regional level and the number of adaptation options related to impacts that occur must be taken into account.

Halsnaes and Trærup [14] uses three case studies that formulate how the indicators of development policy in practice can be used to follow up on the impact of climate change and adaptation measures in Mozambique and Tanzania. It is found that climate risks can be reduced with a relatively low cost while some of the broader development impacts in implementing adaptation measures to climate change still remain uncertain.

Agrawala and Carraro [15] examined 22 leading microfinance institutions in Bangladesh and Nepal to assess the synergy and the potential of microfinance-related adaptation strategies. The opportunities where microfinance can be used to play a greater role in fostering adaptation were successfully identified.

Adaptation strategies are a new topic that is highlighted by the world globally. Ford *et al.* [16] documented the characteristics and the status of adaptation in 47 hotspots of vulnerable countries in Asia and Africa, based on systematic reviews, as well as policy documents to extract the initiative adaptation measures. The result showed a significant increase in adaptation that has been done since 2006. Adaptation is mainly reported from Africa and other low-income countries, particularly the countries that receive adaptation funds, include a combination of objectives and concrete adaptation strategies to reduce vulnerability and particularly encouraged by national government, NGO and international institutions. Even countries that do not contribute significantly are also involved. In his research, Codjoe *et al.* [17] revealed that although sub-Saharan Africa do not contribute significantly to greenhouse gas emissions, a significant negative impact of climate change must be anticipated in this region. Countries in West Africa, which is highly dependent on rain fed agriculture, are projected to experience more frequent and intense droughts due to the change of rainfall pattern and the rise of temperature. Hydrology and climate change are likely to affect the crop yields [18], thus putting pressure on scarce resources in the resource area characterized by social, political, technical and financial limited.

Discussions related to the environment and climate change and adaptation strategies cannot be separated from the review of gender. Gender is the view of the public regarding the differences in roles, functions and responsibilities between men and women which is the result of social construction that became a habit that grows and agreed upon in the community and can be changed according to the times. Gender is not the nature or conditions of God so that gender relates to the process of confidence how should men and women play a role and act in accordance with the values, social conditions and culture of the people.

Simatauw *et al.* [19] explain that the relationship between women and men has been changing from time and time. The mode of production, changes of nature, war, meeting with other cultures, education, change those relations. Any changes to the factors related to human relations (family, education, science, politics, and religion) may be able to change the natural patterns of gender relations. It should be noted any momentum for change in society such as what kind of changes has happened? When did the changes happen? How did the process of change happen? Who are the actors? What is the impact on the relations inside the community? What is the impact on women and men?

For women, losing management area has an impact on the increasing workload and declining revenues that may have an impact on health, education and violence. Women in many

societies are the backbone of the ongoing management of the household as well as having a major role in food preparation. As a manager of the households, the declining of income is frequently urged women to seek alternative income or cleverly find a way so that every member of the family may still be able to have proper meal according to the income. Women are forced to increase production in the area around the house by planting any plants that can be eaten or sold. Sometimes women become workers by working as housemaids, cloth-washers, or work as daily laborers in industries, and even become construction workers. Women are forced to work to add the family income or even become the main breadwinner for the families in addition to do household chores. Thus, the increasing in women's workload due to the economic pressure is caused by the narrowness or the reduction of conservation areas [19].

The decline in revenue or the loss of traditional ways to meet the needs is also affect women's health or the health of the family. The excessive workload has lowered body's resistance to disease, while the money is not allocated towards sick family members. Treatment for pregnant women or when the women are giving birth is immensely less. Not to mention the damage to the environment as a whole resulted in contamination of water, soil and air. Diseases caused by excess workload, pollution of water, soil and air have sprung. The people do not have enough money to go to the doctor and pay for the medicine while the health-care facilities are inadequate in terms of distance and service. The location of health service center is far away and difficult to reach. Medicines are incomplete or expensive. Women who develop new diseases are forced to suffer longer because of inadequate health facilities [19].

The pressure due to the economic has an impact on girls' education. Limited amount of money is allocated sparingly. Thus, their children's education is sacrificed. The boys are preferred over the girls to continue further education. This is influenced by the view that women will marry and follow their husbands and will not contribute anything to the family. However, in some cases, it may be the girls who may have capabilities to continue further education rather than the boys. Thus, the option for doing further education is based on gender instead of ability. The women who experience additional burden due to the narrowness of the area and environmental damage, inevitably do not have much time to receive information and knowledge from the outside. They do not have time to meet, discuss, receive information, and exchange information. Almost all of their time is used to fulfil the needs of the family, prepare food, fetch water, work in the garden or do anything that makes the family survive or try to live on a regular basis [19].

Women are confined within practical jobs to survive and did not have time to stop for a moment to think about and plan for the future.

Space of communication and information has been covered by the workload, including the time to attend a meeting to discuss issues of advocacy and organizing. In some parts of society, women who are interested to join the fight for the existence of the land became frustrated since the limited time has prevented them to join.

## Adaptation Strategies of Woman in Fishing Community Towards Environmental Change in Administrative Village of Kereng Bangkirai, the City of Palangkaraya

In another part, the women do not aware of the real issue at their doorstep. Sometimes women become suspicious of all activities and slow down the progress of advocacy activities. The limited access to information and knowledge are not affected by the heightened workload alone. Social construction, the traditional division of roles as well as outside influences (the country and religion) actually makes women do not have access to the knowledge as the men have. Since time immemorial, women's obligation to meet the needs of family life is greater than men. The time and opportunities that women have to receive information, schools, and exchange ideas are fewer than men have. Women's reproductive role is frequently not appreciated although the reproductive role is vital in protecting and maintaining good family economics, education, and health. Therefore, women are left behind in the access to information and education [19].

As the "manager" in the family, women have a role to arrange the entire family to get enough food to eat, good health and good education. When the source of livelihood and territory that manages to feed one family is missing, then the first person in the family that is shocked is the woman. People frequently are not aware that as the keeper of the harmony and development in the family, women have many thoughts in their minds when knowing that their families would get into trouble. When viewed in depth, this matter is slightly significant for women. The traditional role of women, despite its unfairness, has been inevitably pervasive in everyday society, including the women themselves. Women rarely complain when their role in the family mentioned. Generally, rural women are proud of the role as the family food regulator. Although a family food regulator is a tough role, however, this role is their identity [19].

The role of women is generally divided into domestic role and public role. In short, the domestic role is a role in the household (e.g. related to food of the family, raising children, cleaning the house and others), while the role of public is a role outside the household (e.g. related to livelihood and social life). Domestic role is frequently interpreted as a role that is non-productive since they do not generate income. On the other hand, public role is considered as a role that support the family income. In many communities in the world, women are employed in the domestic sector while men dominate in the public sector.

The definition of work is not only related to what a person does but also related to conditions underlying the work, as well as social assessment given to the work. In today's society that has experienced the commercialization and market orientation; people frequently create a strict distinction between a paid job or an occupation that generates income and non-paid job or an occupation that does not bring in revenue. In this situation, it is understandable that working women are frequently not visible (invisible) because in most of the communities, the involvement of women is with non-paid jobs or not conducted outside the house [20].

The origin of the sexual division of labor between men and women can be explained by two major theories, respectively the theory of nature (nature) and nurture (culture). Nature theory assumes that the psychological differences between men and women are caused by biological factors between the two. On the other hand, nurture theory argues if the differences that occur are the learning process from the environment. There is also a combination of both theories which believe that the

differences that occur as an interaction between biological and socio-cultural factors [21].

Back on adaptation strategies focus on women, in their writing, Yila and Resurrección [22] show that a drought and crop failure that have happened in Yobe have caused many farmers are in despair and frustration. Resources and supports are needed to respond the climate change. Yobe Agricultural Development Program is a form of support from the government that is assigned with the responsibility of helping farm households to adapt to climate change in ways that may be able to enhance their adaptive capacity. Associated with gender, social variability needs to be segregated by gender, based on the fact that there are women who are still unable to access the adaptation strategies endorsed by Yobe Agriculture Development Program.

Almost similar to it, Enete [23] says that climate change is the most serious environmental threat to agriculture in Africa because of its impact on agricultural productivity during pre- and post-harvest, including the cassava agriculture. Factors that are influencing the level of vulnerability are gender, household size and the size of the farm. Workers are predominantly women, making women become more vulnerable to its effects. Some factors are blocking the adaptation, for instances, the scarcity of processing input access to water, institutional and poverty matters.

Lewis [24] also found that the gender impact for women and men are different, in terms of climate and disaster variability. In his writing, Lewis would like to shift the focus from women as a vulnerable victim to women as a significant agent related to mitigation and adaptation to climate change and disaster risk reduction. Lewis expects that by empowering women so that they can contribute to a more equitable and inclusive sustainable development.

In his paper, Donkor [25] discusses about what it means for Ghanaian women to "look back" and how to "look back" at the adaptation strategies that have been dictating them. Donkor [25] found the low status of Ghanaian female immigrants in the economy is not a reflection of adaptation yet a measure to help them connect with the community.

Onta and Resurrección [26] analyzed the influence of gender and cultural relations in the process of adaptation to climate change by presenting a study of households in Humla, Nepal. The Humla people have experienced the change of rainy season, decreases in snowfall and drought, which brings an adverse effect on their livelihoods. The main focus of this article is to highlight the dependence of cultural, social, and economic to determine whether the process of adaptation has exacerbated or changed the gender inequality and caste dependency.

Completing the study of women's adaptation strategies, D'Souza, Karkada and Somayaji [27] reported a study on predictors of health-related quality of life among women in India in the mining environment and the agricultural community. Physical health, mental health and SF36 scores of women in agricultural community has increased significantly compared with those in the mining community.

## B. Research Method

Based on the needs of the research, qualitative research approach through interviews was conducted with the help of questionnaires given to 20 informants consisting of people who are directly involved with fishing activities in Administrative Village of Kereng Bangkirai. The informants were purposively selected by using snowball sampling method. The three purposes of the study were analyzed by using Miles and Huberman Model, which consists of data reduction, data display and data conclusion.

## 3. RESULTS AND DISCUSSION

### A. Environmental Change in Administrative Village of Kereng Bangkirai

#### A.1. Physical Environmental Change in Administrative Village of Kereng Bangkirai

The physical environment has a slightly significant value for the fishing community in Kereng Bangkirai. The society is exceedingly dependent and relies on natural resources for fulfilling the needs. For the people of Kereng Bangkirai, elements of nature in the form of water, forests and natural factors such as weather, season and climate are the significant parts of their lives since those physical elements may affect or fulfill the primary, secondary and tertiary needs. Changes that occur in nature will certainly affect their lives.

Aquatic resources, in this case, it refers to the water used by the people to meet the body's daily needs, such as for: bathing, washing and toilet; drinking water; cooking; transportation; and livelihood. The change that occur in water issue is in the form of declining quality of water resources which significantly decreasing the number of fish in the water.

Declining quality of water resources is caused by pollution, damage and aquaculture engineering. Pollution and damage have occurred because of both waste disposals into water as well as dangerous fishing activities (poison and electrocution), also the blocking water flow.

Furthermore, for the community, forest resources are mainly used as a source of timber, for example, for making buildings and appliances; or as a source of plants that is needed, for example, for vegetables or drugs; and other forest benefits such as a habitat for forest animals which some of it become a source of income for the community.

The changes in forest resources are caused by forest destruction as an impact of forest fires and excessive exploitation of forest products. In the dry season, fire may destroy plants along Sabangau riverbank. Dried rasau (*Pandanus Helicopus*) trees are vulnerably ignited fire and burned. It occurs since there are many people from outside the area come fishing in Sabangau river. They carelessly threw cigarette butts or created a bonfire on the riverbank yet did not extinguish the fire properly. In addition, due to human activities, forest fires may be caused by the friction of timber trees, mostly in summer when the sun is blazing and with the addition of blowing wind.

Outside its relation to fishing activities, forest fires may cause a trouble to the presence of forest animals such as birds or other animals, as well as the existence of the flora, for example, trees. For people who use the forest resources, for example, *jelutung* sap or *gemor* sap that are intercepted for sale or timber that is used by the community for building

material and material for making a variety of equipment. The damage of flora and fauna indeed creates negative impacts for some kind of hunted jungle animals.

In addition to forest fires, changes in forest resources in Kereng Bangkirai are caused by excessive exploitation of forest products, particularly timber. Kereng Bangkirai is part of the forest with production forest status. This area used to be managed by 13 timber companies until the mid-1990s, followed by illegal logging era until 2006. Exploitation of natural resources is going way beyond the carrying capacity of the environment. Logging-timber forest development raises a network of nearly 1,000 transport channels that accelerate the flow of water from the peat dome and led to the draining of peatland. Drying of the peat dome through the canal contributed to a decrease in ground water level, peat degradation and decomposition and the destruction of Sabangau forest ecosystem as a whole, which has triggered the natural disasters such as forest fires, are reduced the population of significant plants and animals as well as environmental pollution.

Another change of forestry resources is in the form of restrictions on public access to the forest resources as a result of the enactment of the forest status in Kereng Bangkirai as part of Sabangau National Park. Restrictions that occur such as: prohibition to cut or burn timber, a ban on catching small fish as well as the prohibition to hunt wild animals. From the point of view of environmental management, these restrictions have to be done for the preservation of nature. However, the access-restriction surely caused disadvantages to the community of Kereng Bankirai who use timber for building materials or for sale, catch small fish to sell or to become bait as well as hunt forest animals such as birds, deer or pigs for food or sale. Changes in the physical environment occur due to natural factors and human factors.

The natural factors such as climate change which cannot be controlled by man; it occurs and it is formed by nature itself. The society is generally aware of the terms of climate change and global warming, yet has not been able to understand it scientifically. They know these matters based on public information and personal understanding. The natural unpredictability is not favored by fishermen. They do not like the rain that suddenly falls and then stops suddenly as well.

The unpredictable situations cause the fishermen lose their opportunity to prepare the fishing equipment. It may give the impact that they lose the opportunity and the chance to get a catch. In addition to the factors of climate change, it is realized that the human factors also give a contribution to the changes of the environment. The people are aware of the acts and the attitudes that may damage the environment.

However, if the actions are related to their subsistence, then their actions are not in line with the knowledge and the attitude they have. The behaviors consist of hunting forest animals, cutting down trees, illegal fishing, forest fires, throwing garbage into rivers, etc. The people may be aware that the actions may cause damage, yet, they still engage to the activities as it relates to their livelihood, subsistence and surprisingly as a habit. Although it is not seen from a scientific standpoint, however, we realize that it is the human factors that mostly have been damaging the environment. Unexpectedly, the natural disasters may be triggered by the human factors.

## Adaptation Strategies of Woman in Fishing Community Towards Environmental Change in Administrative Village of Kereng Bangkirai, the City of Palangkaraya

Environmental changes in Kereng Bangkirai began around 1990s, with the peak in 1997 when Sabangau area encountered a fairly long period (approximately seven months) massive wildfires. At the time, the drought was severe and prolonged so that the land became dry and the water receded. Not only that, the extensive forest destruction in Sabangau area that occurred in the era of logging business both legal timber by timber companies that was allowed by the government and illegal logging that occurred since the legal license was lifted in 2004 and 2006. Environmental issues were increasingly complex with the monetary crisis as well as political climate that was heating up in Indonesia.

Sabangau environmental degradation began to subside during the enactment of Sabangau National Park as a conservation area. Slowly but surely, illegal logging activities began to stop as the establishment of the rule of law although there are some obstacles to be encountered.

### A.2. Economic Aspect Change in Administrative Village of Kereng Bangkirai

Changes in economic value in fisheries community in Kereng Bankirai are closely related to the needs of family life such as primary, secondary and tertiary needs as well as ways to fulfill them. The primary needs such as food, board/shelter and clothing/apparel; secondary need is additional needs such as vehicles, electronic goods, personal needs; and the tertiary need is complementary needs such as entertainment facilities, keeping up with the current development. The development of the necessities of life due to the modernization and commercialization that refer to the increase of life demand as well as the uncertain income from fishing activities so that the people should seek other alternative occupations.

The phenomenon of modernization and commercialization cannot be inevitable along with the current development. Moreover, the location of the Administrative Village of Kereng Bangkirai that is relatively close and directly adjacent to Palangka Raya as the capital city and the central government as well as the center of population in the Province of Central Kalimantan, indeed, has been facilitating the modernization and commercialization.

Modernization in fishing activities in the Administrative Village of Kereng Bangkirai mainly may be found in the use of machines or tools with advanced technology that are used by people to replace traditional technologies or techniques that previously used. Some modern machines or tools are already widely used by the people in Sabangau area as follows: Alkon engine, mobile phones, tools for fishing equipment, and electronic equipment. Alkon engine replaces the function of the paddle for people who initially used *jukung* (small wooden boat) then changed to *kelotok* (a larger size motor boat). The presence of Alkon engine is immensely helpful for the people who initially relied heavily on human dexterity to be able to get to the long distance destination. However, by putting Alkon engine on *kelotok*, people are no longer need to row since they simply need to turn the Alkon engine on. Initially, the trip usually took days. However, it becomes faster now which is reached in a few hours. In terms of size, *kelotok* is more profitable. *Jukung* has limited capacity since the larger the size of the boat, the more difficult it is to row. Meanwhile, the size doesn't matter for *kelotok*. It simply needs to adjust with the size of the engine so that it may be able to load more goods.

Besides, the presence of cellular phones or mobile phones positively support fishermen fishing activity. In the past, the information related to the caught fish or inventory supplies were not known if the fishermen did not meet each other in person. These caused fishing activities became inefficient as they had to go back and forth between the residential village and the fishermen village to sell fish or get supplies. Thanks to the mobile phone, the matter does not need to occur anymore. Without meeting in person, the fishermen may be able to exchange information via mobile phones. Thus, a fisherman may be able focus on fishing activity without thinking of the fish that must be sold or thinking of depleted inventory supplies because there are some people who do and prepare it for the fishermen.

Another sign of modernization is also found in the form of materials for making fishing gear that is relatively uncomplicated to obtain and in various forms. Thus, it is practical for fishermen. The example is mesh or net. In the past, the ancient fishermen had to assemble the ropes into net by themselves, on the other hand, there are now factory-made nets of various sizes and types of rope so that the fishermen do not have to spend time to assemble the net.

Although electronic tools do not directly support fishing activities, however, it becomes one of the important requirements for the fishermen. Television and radio may be able to be the source of entertainment and information to fishermen. Refrigerator and fan make the lives of the fishermen and their families become more comfortable.

Modernization that has occurred is related to the commercialization. In the present time, all objects are measured with money. In the past, the main purpose of fishing was for family consumption. On the other hand, in the present-day, the main purpose of fishing is mainly for selling the fish or earning money. The use of technology or modern tools demands commercialization. Previously, the use of *jukung* did not cost money. On the contrary, in the present, the use of *kelotok* costs amount of money to purchase the fuel, lubricant and engine maintenance. Similarly, the other modern equipment is also cost money.

The modernization and commercialization that have plagued inside the society of Sabangau also describes that the society of Sabangau is a community that is effortlessly influenced. It is able to be seen from the migration patterns of community activities that are regularly changed. Before Sabangau was designated as a conservation area, most of the people, particularly men who work in timber companies which were legal at that time. It gave the opportunity for women to engage in fishing activity as a livelihood. However, after the legal status of timber companies revoked and the National Park Sabangau declared a conservation area, the opportunities for women have been alienated as the job *malauk* is mostly conducted by men who are no longer working for timber companies. Another matter is the rise of mining activities in rivers. People are intensely interested in the type of business that is classified as an instant and is able to provide greater result, including gold mining business. Gold mining activities requires men to travel for work and it needs a long time. As a result, it requires women to do jobs that were previously done by men. It means that the women have to bear double roles.

One of the examples is a job as a fish dealer which previously was done by man, then, it is taken over by women due to the close of most fish collection points. This raises the justification that the modernization and commercialization in Sabangau area do not marginalize the role of women, despite a shift in the role of women as a result of the changes that have occurred.

Along with current development, the needs of the society also increase. The needs that did not exist or are limited in the past, in some way, have been emerging and it requires the readiness of the society, for example, education for children and the presence of technologies such as electronic equipment or modern vehicles. The rise of life needs encourages people to balance their expenses with the income they need to earn in order to meet the demands of the economy.

### A.3. Changes and Legal Aspects of Government Institutions in Administrative Village of Kereng Bangkirai

In addition to the environmental changes due to activities, the status of Sabangau Region as a National Park also impacts the population, mainly in terms of its legal aspects. Besides, the enactment of administrative programs in Administrative Village of Kereng Bangkirai also has an impact.

From the legal aspect, various government regulations that are applied through relevant institutions have changed the behavior of people to be more controlled and led the people to follow the government rules. One of the examples is the restoration of moist peat swamp forest in Sabangau National Park by WWF which has been implemented from 2008 to 2038 and has been providing a long-term positive effects to the society, mostly for the management of fisheries and jelutung sap.

Marsh and aquatic ecosystem damage caused either due to illegal logging, forest fires near swamps and rivers or illegal fishing methods have resulted in reducing numbers of fish which have an effect on the decrease of fishermen productivity in fishing activity. Therefore, for the field of fisheries, hydrological restoration in the project area will lead to repopulate fish in lakes where these lakes are fish spawning areas. The people mostly use this area for fishing and they may benefit from the recovery of fish resources. In addition, the numbers of fishing gear that are allowed to use in National Parks and the ownership also have rules. Fishing gear is an indicator that represents the abundance of fish. The more fishing gear showed, the abundance of fishery resources exists and vice versa. While the use of illegal fishing gear (using poisons and electrical current) in the long run will reduce fishery resources as the young fish are also killed and simply discarded since it has no economic value. Besides, illegal fishing damages existing ecosystems, thus, there are penalties for fishermen who conduct illegal fishing.

Another impact that also benefits the residents of Sabangau is the reduction of forest fires which means that less smoke caused by the fire. This may have a positive impact on public health and to create safe conditions for boating on the river (smoke reduces visibility and disrupting transport). Fire monitoring is supported with the monitoring of hotspots that is performed daily by the Ministry of Forestry.

Applicability of administrative programs also affects the changes in Kereng Bangkirai Village. Historically, to

conform with the provisions of Law No. 5 of 1979 on the main points of the Village Government, with the approval of the Minister of Home Affairs, the Governor of the Province of Central Kalimantan issued a decree on February 21, 1989 Number: 414/42 / Pend., so that the status of the Kereng Bangkirai Village turned into Administrative Village of Kereng Bangkirai, which was formally started on July 31, 1989. In March 2001, Administrative Village of Kereng Bangkirai formed a new administrative village called Administrative Village of Sabaru which was based on the regional autonomy and the agreement among the Mayor of Palangka Raya, sub district and village heads as well as the related elements.

The changes of the institutional structures have encouraged the implementation of government programs that also affect the changes in Administrative Village of Kereng Bangkirai. The government programs, such as the presence of migrants through the migration program and community development programs that help to shape the community's way of life and views on the political and legal aspects. The presence of some people who feel the injustice, mainly related to aid programs, is the obstacle that may occur. This pessimistic point of view may shape public attitudes to be reluctant to get involve in programs enacted. Thus, it may be a gap in the legal field.

### A.4. Changes in Socio-Cultural Aspects in Administrative Village of Kereng Bangkirai

The changes in socio-cultural aspects are influenced by the presence of migrants in Kereng Bangkirai. Administratively, the government territory of Administrative Village of Kereng Bangkirai is of 27.050 hectares. The large potential in the area makes it possible to carry out various activities such as the utilization and management of natural resources which consist of agricultural, plantation, animal husbandry, fishery and forest products. The extent of land and the potential of this region that drives the migration program to Kereng Bangkirai. Initially, the Administrative Village of Kereng Bangkirai was a village inhabited by 21 households or 90 people, then added by the placement of another 90 households or 350 people from Village Resettlement Program in 1973. Based on existing data, the numbers of inhabitants in Kereng Bangkirai have been increasing from time to time.

Socio-culturally, the residents of Kereng Bangkirai Village consist of Dayak, Banjar, Java and others ethnicities. The majority of people in Kereng Bangkirai Village are Muslim, Christian and Kaharingan. The cultures that are alive and thriving in the social orders of the people of Kereng Bangkirai Village as follows: Dayak and Banjar culture, the last is strongly influenced by Islamic culture. In addition, the original culture of Kaharingan society may still be able to be found in Kereng Bangkirai Village.

Kereng Bangkirai Village is a traditional residential area that has been continuing to exist for a long time, located at the end of a public road of Palangka Raya city and Sabangau riverside. The infrastructure is relatively well-developed since the village is located inside the city area, thus, the access to social and public infrastructures is straightforwardly obtained.

## Adaptation Strategies of Woman in Fishing Community Towards Environmental Change in Administrative Village of Kereng Bangkirai, the City of Palangkaraya

The land transportation is fully developed as it is close to the city center. Moreover, there are many watercraft options such as *speed boat*, *klotok* and other private transport facilities that are used to access the downstream of Sabangau river or Pegatan area.

The formal organization in Kereng Bankirai Village is led by the Head of the Village who is assisted by a secretary, the head of the government affairs, the head of development affairs, the head of public affairs and administrative staff. There are several organizations that are functionalized for the village activities such as the Resilience of the Village Community Institution (LKMD), the Village Council (BPD). The other community group activities as follows: The Development of Family Wellbeing, Youth Organization, book of Yasin reading groups, service groups, and a traditional institution of Kereng Bangkirai Village which is customarily still inside Pahandut District territory, Palangka Raya.

Overall, in Sabangau area, some institutions with social values are still prevailing in the society. The government, through the nearest head of administrations such as district and village heads as well as the departments (fisheries department, department of agriculture and animal husbandry) that provide guidance, carrying out their duties under the government programs and rules (legislations, regulations, etc.) that are applied to achieve the welfare of the community.

Similarly, the non-governmental organizations, in this case the WWF, the task of WWF is based on the designation of Sabangau as a conservation area with the status of National Park under the Decree Number 423 / Ministry of Forestry / II / 2001 on October 19, 2004 with the area of  $\pm$  568 700 hectares that is also managed by WWF as an international organization.

Since the people still live in the existing traditional system, indigenous institution may be able to perform its function. One of the basic customary laws is the result of the customary meeting held in Tumbang Anoi in 1894 and it is a declaration of the entire *damang* (male villager) in Central Kalimantan. The law contains 96 articles that regulate various aspects of life of indigenous people such as the marriage, divorce and environmental management.

Community group as the closest social platforms has influenced the society's behavior since there is an order of written or unwritten norms implemented in the practice of social life.

Based on the reviews completed with the testimony of the informants, the increase in social activities has occurred in Kereng Bangkirai. It can be seen from the establishment of the active social institutions and since Kereng Bangkirai area is reachable for the people, it leads this region becomes increasingly crowded, forms a new social order and grows the attitude of the people to interact socially.

Changes in the form of socio-cultural conflicts have occurred. The conflicts are not caused by competitions between societies; however, it is mainly caused by the attitudes or behaviors that are contrary to the rules of the society. For the fisheries community, they are not worried about the competition in the fishing business as the river or water ownership rules have been the existing since the time of their ancestors. The conflicts occurred were caused by the behavior of certain parties who have used poisons and electric shock for fishing and it has caused a loss to other fishermen. Existing conflicts have resolved amicably and

deliberately. Instead of doing some vigilante punishments, the people would prefer to hand it over to the authorities.

### B. Adaptation Strategies for Women in Fishing Community in Administrative Village of Kereng Bangkirai

#### B.1. Adaptation Strategies towards Physical Environmental Changes

Women of fishing community in Kereng Bangkirai have adapt by changing the pattern of dependence on nature. Previously, their livelihoods depended entirely to the natural resources that were regularly available. Then, when the changes have occurred, they must be prepared at all times to adjust to the changing of natural conditions. Related to the fishing effort, the fishermen attempt to have prepared fishing gear and boats. Similarly, the people have to obtain their daily needs, for example, the need of water. Most of the people are no longer rely on rivers as the source of water, on the other hand, they replaced it by consuming water provided by Indonesian regional water utility company.

#### B.2. Adaptation Strategies towards the Changes of Economic Aspects

The current development in the form of technologies has affected women of fishing community and is considered as a change that leads to a better life. The consequences of these technologies are commercialization and the growing needs, which requires them to earn extra money. Thus, the adaptation made by the women is finding new sources of income to fulfill the growing family daily needs.

New alternative jobs are taken as side jobs apart from fishing. When the fish stocks are reduced, alternative occupations become the choice to fulfill their needs in order to cover the absence of income from fishing activities. Change in this pattern of activity requires fishermen to have prepared equipment and supplies for fishing. Thus, they should regularly ensure the availability or stocks of these tools. Here are the jobs performed by women of Sabangau as a form of adaptation strategies.

#### B.3. Making Salted Fish (Mamundang)

The fish made into salted fish are generally fish that are dead while waiting for the fish dealers. However, there are some people who intentionally do not sell fresh fish and made the fish into salted fish which they argue that salted fish are more valuable than fresh fish. Thus, it appears as the effort of women to add value to their catch so that it has a relatively higher value. It is also an economic strategy for saving available resource so that they regularly have a reserve fund in the form of salted fish.

#### B.4. Karamba (Mangaramba)

Another strategy to increase revenue is to make *karamba*, a rectangular wooden box that is left partially drowned in the river. *Karamba* is hand-made from raw material such as Blangiran wood or bamboo. Apart from adding revenue, *karamba* is relatively useful supply when the fish stocks are declined. However, it is not all fishermen families that have *karamba* since creating a *karamba* requires considerable amount of money.



### B.5. Catching and selling young snakehead fish

Women sell young snakehead fish to *karamba* owners or buyers from outside the village. A young snakehead fish, which is the size of a grain of rice, is caught by using gapless *sahiyap* or *kalawit* made of gauze or mosquito net. Then, it is placed in *karamba* that is made of gauze pads as well. The young snakehead fish are fed with liquid egg yolks. After the young snakehead fish go to the further stage, they are fed with smooth blended fish. Then, the relatively large young snakehead fish are sold at the varied prices depending on the size.

### B.6. Rubber tapping (Mamantat)

It is conducted during dry season. Thus, it is conducive to tap rubber trees when the weather is brightly sunny. Women usually come to the rubber plantation owners, who are mostly their own siblings or relatives, and reveal their willingness to work as a rubber tree tapper. Rubber plantation owners generally practice profit-sharing system, 50% for plantation owners and 50% for rubber tappers.

### B.7. Working with WWF (Manabat, Mimbul, Mamipa and Manyaman)

In addition, the presence of WWF is a source of income for women. The women are involved in farming activities (*mimbul*) and they work as groups of contract labors.

### B.8. Adaptation Strategies Towards the Change of Legal Aspects of Government Institutions

From the legal and institutional aspects, the changes slightly affect the lives of people in capture fisheries community. The presence of conservation agencies provides some limits to people who used to be able to take natural product without getting any interference. There are several rules contested by the community, for example, the limits of certain natural resources related to livelihood of the people that are allowed to be carried from the forest, trenching programs and the aid programs that might not be equally distributed to the people.

Therefore, adaptation strategies conducted by the people are emphasized to obey the implemented law and to support the existing institutions by replacing the restricted activities that to other activities. However, there are some irresponsible people who dare to quietly break the rules in order to remain able to take the natural resources as they desire. Based on this, the people expect authorized agencies to pay attention to run programs that are also sided with people in the society.

### B.9. Adaptation Strategy Towards the Change of Socio-Cultural Aspects

Socio-cultural change in Administrative Village of Kereng Bangkirai is in the presence of immigrant populations migrated from other regions. In general, people do not sense the negative side of the change; it unexpectedly tends to be in a positive direction. According to the community, migrant communities help to progress the development of Administrative Village of Kereng Bangkirai Village. Surprisingly, the change has brought positivity to the economy by expanding the marketing of the fish. Kereng Bangkirai society is the society that assesses the degree of a person based on personal achievements such as attitudes and actions as well as education in the present days, the people are assessed based on the level of education. It brings the people to be updated with social progress, for example, by giving priority to education for children, complete the

education facilities (there are some families who have computers or laptops to support the education of their children), et cetera. Social activities which are religious, customary or those held by institutional, are held regularly and organized by the community

## 4. CONCLUSION

In the gender perspective, the impact of environmental change in the Sebangau area causes the shift function of man and woman. The Sebangau men have to go out the area for finding the income alternative which increases the work burden of women. The environmental change in the Sebangau area makes the women have to adapt in some life aspects including the description of job pattern in the income activity of fish capture. The adaptation that is carried out by the woman shifting the woman function in the job description which the woman function on the physic, economic, social, culture, and institutional in the family environment as well as in the society. The shifting makes the work burden and the responsibility which is carried on by the woman becomes heavier due to the responsibility that is not only to care her family (domestic function), however she also makes decision in her family and she has to be responsible to carry out the function and the role as the head of family for running the public affairs and as the community members. Even though, the result of this research indicates that the Sebangau woman has the ability to be adapting with the physical and non-physical change which is happened in the Sebangau area due to the environmental changes surrounding it. The increasing of work burden and the responsibilities are not assumed as the burden, however the responsibilities are carried out with the full sincerity. The woman adapt by increasing the self-ability for carrying out the economic affairs, children education, public affairs, and the important decision making which is not carried out by the woman before. By the truth, it is as the double burden for the Sebangau woman. However, they are consciously and responsible to carry out the function.

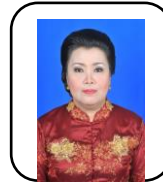
There is needed the concrete effort, the coaching, and the accompanying from the local government, public, community element stake holders for decreasing the work burden that is as the responsibilities by the Sebangau woman with the some manners as follow: a) To increase the facility and the quality of children education in the Sebangau area by increasing the facilities and infrastructures of education, children play ground, and the competent teacher or instructor, and b) To provide the facilities and infrastructures of shopping, buying and selling of capture fish product which is easily accessed by the society as the producers, fishermen as well as the consumers. To carry out the coaching and the training on the management of capture fishery product for obtaining the additional economic value and to increase the family income of capture fishery fisherman in the Sebangau area. Indigenous people are not afraid of competition nor feel threatened by the presence of migrant communities as they are able to guarantee what is rightfully theirs. The only negative side raised by the presence of migrant communities is their behaviors that may be considered to be incompatible with existing norms. Generally, it has been addressed or resolved amicably

# Adaptation Strategies of Woman in Fishing Community Towards Environmental Change in Administrative Village of Kereng Bangkirai, the City of Palangkaraya

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