Honey Hunters' Way of Life at Thung Bang Nok Ohk Forest in the Lower Songkhla Lake Basin amidst Climate Change in Southern Thailand

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Abstract

In the Southern part of Thailand, especially in the Lower Songkhla Lake Basin, climate change has affected the way of life of the surrounding communities where people's lives depend on natural resources. In Songkhla Province, Thung Bang Nok Ohk is the largest melaleuca forest to which *Apis dorsata F.* migrate in the beginning of the rainy season when melaleuca flowers begin to bloom. Wild honey has been an income source for people in the community for more than a century. The local wisdom used by villagers to hunt for wild honey is to make nests called "Bang Kad". However, with changes in the environment like forest encroachments, forest fires and climate change, forests have been affected and villagers can perceive the changes, especially their occupation in harvesting wild honey. During the last decade, villagers know that the amounts of honey they can collect have been less than before. This article aims to reveal that villagers can perceive the climate change in the seasons of the year, the amount and intensity of rainfall, and the change of wind velocity. These factors affect the wild honey production and the income they make from selling it which has obviously declined. The number of

"Bang Kad" they make to nest honeybees and that of beehives made by honeybees are in inverse relation, that is to say the number of "Bang Kad" increases while that of the beehives decreases. Because of their perception of the problems, wild honey hunters have gathered into a group of community enterprise that conserves giant honeybees. This is another way of preserving the forest for sustainable utilization by the community.

Keywords: Honey hunters, Wild honey, Melaleuca forest, Climate change, Songkhla Lake

Introducion

Thailand is affected by climate change in terms of temperature, amount and intensity of rainfall, and storms. Each year the average temperature increases from 0.01 to 0.04 degree Celsius continually in all areas of the country, and the average monthly temperature also increases, especially in winter (Thailand Research Fund, 2012). The average number of rain days per year decreases in all parts of the country. For the Southern part of Thailand, there are frequent storms passing by; the rainy season begins sooner; it rains continually, and storms are severe. The data of the Thai Meteorological Department on the amounts of rain during 2006-2010 comparing the highest and lowest and the averages in 30 years (1971-2000) indicate that there are obvious changes in the scattering of rain different from those in the mentioned 30-year period (Thai Meteorological Department, 2005-2013 ; Hydro and Agro Informatics Institute, 2013). In addition, the rainfall amounts and estimates for each decade in the past and the future, namely from 1961 to 2090, the comparison between the decade from 1991 to 2000 and the decade from 2081 to 2090 indicates that the Southern part, especially the lower part will have greater amounts of rainfall (Climatological Center, 2009). The Eastern coast of the Southern part, especially in the Songkhla Lake Basin area covering three provinces of Nakhon Si Thammarat, Phattalung and Songkhla, will be affected by an increase of the sea level in the Gulf of Thailand with a long-range average for 65 years at the rate of 3-5 millimeters per year. This is a faster rate than the world average (Thailand Research Fund, 2012). Such changes have affected the communities surrounding Songkhla Lake in their fishing, agriculture, and forest utilization, especially hunting for wild honey, which depends on honeybees' migration that has been affected by climate change, intensity of rainfall, seasonal uncertainty, and wind velocity of rainstorms. These factors affect the honeybee population each year. The honeybees' migration follow-up data reveal that the wind speed over 29 km/hour can increase the migration rate of honeybees. When the number of honeybees increases, it affects the biodiversity of the forest because "honeybees" pollinates plants and flowers in the forest and are producers of "honey"

that is valuable sweetness from nature that are useful for humans. Honey from giant honeybees (*Apis dorsata F.*) is an important income source for the community and an important economic source for communities in Asian countries (Suwannapong et al., 2011; Rattanawannee et al., 2012). Moreover, in hunting for wild honey, each community usually uses their local wisdom that focuses on utilization with mutual benefit between humans, honeybees, and the forest that is a relationship system between humans and nature that reflects human learning and dependence on nature for existence.

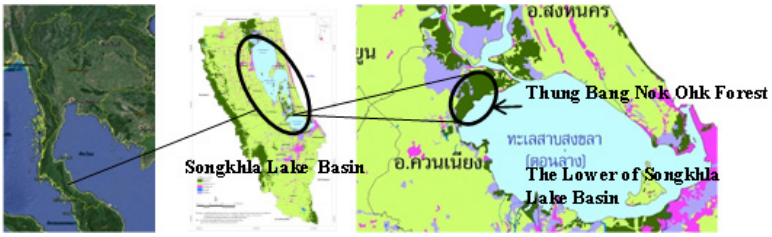
This relationship is the same for that between Thung Bang Nok Ohk forest, which is the largest melaleuca forest of Songkhla Province located in the Songkhla Lake Basin, and people living in communities around it. Khuan So Community, Khuan So Sub-district, Khuan Niang District, Songkhla Province and other nearby communities utilize the forest in many ways directly and indirectly, especially hunting for wild honey, which is important utilization of forest resources to make good extra income. Melaleuca flowers are major nectar sources for giant honeybees that feature unique smell of honey from this forest. Thus, it can be said that giant honeybees are a natural indicator of the ecosystem and connect lives in the forest and people in the community so that they continue to exist with the forest. Nevertheless, amidst many changes, especially climate change, the Melaleuca forest of Thung Bang Nok Ohk and biodiversity in the forest, particularly, giant honeybees, have been affected. Giant honeybees are insects that play an important role in forest fertility and the way of life in the community that depends on the forest for their occupation in wild-honey hunting using local wisdom. Therefore, this study aims to investigate what villagers learn from the changes, and how the changes affect wild honey production, income the villagers make from the production, the existence and the trend of the change of local wisdom in hunting for wild honey. These issues will be important knowledge for cooperation among stakeholders in finding ways for sustainable melaleuca forest management by the community.

Materials and Methods

Study Area

Khuan So Sub-district is located in the administrative area of Khuan Niang District of Songkhla Province. It is in the Lower Songkhla Lake Basin and consists of 11 villages. Most villagers have agricultural occupations. 70 percent of them are farmer, 20 percent small-scale fishers, and 10 percent are in other occupations. In the past, the important agricultural occupation was rice farming (Khuan So Sub-district Administrative Organization, 2014). The important resource of the area is Bang Nok Ohk Melaleuca Forest which is the only melaleuca forest that is still fertile and with the most area in Songkhla Province. It is a national reserved forest according to the National Reserved Forests Act B.E. 2007/A.D. 1964 (Figure 1) with an area of 6,250 Rai or one fourth of the total area of Khuan So Sub-district covering 6 villages.

Figure 1: Thung Bang Nok Ohk Melaleuca Forest, a national reserved forest in Khuan So Sub-district, Khuan Niang District, Songkhla Province (Informatics Research Center for Natural Resource and Environment, Prince of Songkhla University, 2010 : 39)



Methodology

The data for this qualitative study were collected from 40 informants through various data collecting methods as follows. 1) The data were collected through interviewing 30 out of a total of 45 members of a Khuan So Giant Honeybee Conservation Group who had 10-year experience in wild honey hunting. The data collected included the number of local wild-honey-hunting tools as call Bank Kad, the

number of honeybee hives, the amount of honey collected, and the amount of income made from selling wild honey. 2) The data were collected through go-along-in-depth interviews with the same group of 30 informants as in while doing activities together with the researcher, in which interviewing was flexible, and the atmosphere was friendly between the informants and the researcher (Carpiano, 2009). The activities involved the use of wild honey-hunting tools made with local wisdom, and honey collection using conservation methods. In addition, the interviews were conducted with 10 informants consisting of the chairman of the Khuan So *Apis dorsata* Conservation Enterprises, elderly people in the village, and honey buyers who bought it for selling and those who bought it for their daily consumption. 3) The data were collected from focus group discussions and participant observations directly and indirectly such as participating in the opening ceremony of the Khuan So *Apis dorsata* Conservation Enterprises , and participating in a demonstration of catching honeybee swarms. 4) The data were collected through forest survey and evaluation by surveying the density of melaleuca trees (*Melaleuca Cajuputi*) in certain areas of the forest such as in areas that were fertile, wetland areas, wildfire areas, and areas with Bang Kad made for honey hunting. 5) The data were also collected from related documents and research reports. The data from all these sources were then analyzed using content analysis and using Microsoft excel for sources no. 1.

Results

The results of the study covered the following: 1) Perception in the changes of the melaleuca forest, the climate and the effects; 2) Wisdom in hunting for wild honey under the changing situation; and 3) the trends of change in honey production from the melaleuca forest amidst changes.

Villagers' Perception in the Changes of the Forest

Villagers in the community perceived the changes in the

following: 1) an increase in forest encroachment for oil palm and rubber plantations. 2) More frequency of forest fires caused by carelessness on the part of people hunting for wild items, people in the community burning weeds to turn the forest into agricultural land and to intentionally occupy the land. 3) More severity of natural disasters, especially storms. 4) Drier overall condition of the forest perceived by locals to result from the increase of oil palm plantations around the forest. 5) More heavy rain in the rainy season during the past decade resulting in a longer period of floods and wet conditions in areas where mushrooms grow. 6) Fewer varieties of mushrooms can be found because of frequent forest fires and unseasonal rain. 7) The decreasing number of giant honeybees in the forest due to uncertainty and intensity of rainfall, and severity and velocity of the storm. 8) The increasing number of red jungle fowl during the past 4-5 years, which could be because of forest fires in nearby forests. As a result, they migrate to Thung Bang Nok Ohk forest, the only forest with most fertility in the Lower Songkhla Lake Basin area, and red jungle fowl consumption among locals has been reduced and there are only 1-2 hunters left in the community.

Villagers' perception in the climate change and the effects

Villagers perceived the climate change that affects their way of life as follows: 1) They perceived the seasonal change, especially the longer rainy season or an increase of rainfall, uncertain seasons such as rain or flooding in summer. 2) The warmer and stuffier weather than that in the past. 3) More frequent floods and more frequent and severe storms. 4) Water in Songkhla Lake has changed in quantity and quality, and the seasons for aquatic animals have changed as well. 5) The amounts of catch from the lake have reduced. 6) The amounts of wild items or productions obtained from the melaleuca forest such as mushrooms and giant honeybees (*Apis dorsata F.*) have been reduced. It can be seen that the climate change is one main cause of the decreases in mushrooms and giant honeybees. For example, the seasons of the

year have changed and become uncertain; rain has become unseasonal, and storms are more severe. These factors have causal effects, that is, when the storm is severe, giant honeybees emigrate from the forest. At the same time, the severe storm contributes to forest fires by blowing flames from burning weeds to the forest. Smoke and fire have impacts on giant honeybees, mushroom spores, and other wildlife in the forest that affect the ecosystem of the forest.

Data, information and knowledge about climate change are disseminated to villagers on television and by community leaders in community meetings. Community leaders receive information from attending meetings organized by the government sector.

As can be seen, various changes have affected the way of life and the melaleuca forest, particularly, giant honeybees that are important natural resources in the melaleuca forest that have provided income for people in the community who have carried on the honey-hunting occupation using local wisdom for more than 100 years. Nevertheless, the question is how have such changes in the community and the melaleuca forest changed the local wisdom used in honey hunting.

Wisdom in hunting for wild honey amidst the changing situation

People in Khuan So Community have been wild-honey hunters for over a century, a period of time evidenced by a local who had been in this occupation for all her life who was 102 years at the time of data collection for this study. Every year, giant honeybees migrate to Thung Bang Nok Ohk Melaleuca Forest with many of them at the beginning of the rainy season or in August, the time when melaleuca flowers begin to bloom. The two main species of giant honeybees (*Apis dorsata F*) found are "Hu Chang" or elephant ear because their hives look like an the elephant ear, and "Ngu Lueam" or phyton because their hives are long and look like a python. Honey from the meluleuca forest smells like meluleuca flowers. In hunting

for honey, hunters claim ownership of beehives in trees and make nests imitating nature for honeybees to live in. These manmade nests are called "Bang Kad" (Figure 2).

Figure 2: A Bang Kad and a natural beehive

The knowledge used in wild-honey hunting by people in Khuan So Community from the past to the present has remained the same over the past century. The knowledge has been reproduced with the same materials and form of Bang Kad, the method of driving bees out of their nests, the beliefs, and the knowledge transfer to the next generation. However, the knowledge tends to change in some ways as a result of people in this occupation gathering themselves in a group called the Khuan So *Apis dorsata* Conservation Enterprises in 2012. The objectives of the group are to conserve *Apis dorsata F.* for sustainable utilization, and for group members to exchange knowledge. The group encourages its members to realize the importance of honeybee conservation by advising them not to destroy larva bees so that they can harvest honey from the same Bang Kad several times. The advice includes how to use a torch carefully to drive away bees and not to set a fire that would damage the Bang Kad and the forest. One of the possible changes is using other material for a part of the Bang Kad, that is the wooden beam for bees to build their nest has been replaced by a concrete beam to make it more durable and to reduce the use of natural wood, which

is regarded as one way of conserving the forest of the community. However, there is concern about using concrete beams because concrete is not in harmony with nature and can affect the ecosystem if concrete beams are left unused in the forest because they are not degradable like wood. Nevertheless, this is still in the experimental stage that has not been successful, and wood is still used as ever before. When experiments with other materials are successful, and if they are not degradable, or if the use of concrete is improved in some ways that makes it usable, the effects of using them should be studies. In addition, the group has defined the word "Bang Kad" by comparing it with a homestay for bees or a resort for bees, which may depict the use of Bang Kad, and it is possible that these words might be used instead of Bang Kad. These are issues of concern for the melaleuca forest management by the community.

Wild Honey Production from the Community's Melaleuca Forest in the Changing Situation

Honey is an important production from the community forest with a high value, and it is a source of extra income for people in the community. However, in the changing situation in which there are forest encroachments, forest fires, and climate change, the Songkhla Lake Basin area is directly affected by windstorms, intensity of rainfall, and higher level of seawater (Thai Meteorological Department, 2013). Annual rainfall data in Khuan Niang District, Songkhla Province during 2000 – 2014 (Table 1) (Southern Meteorological Center (East Coast), 2014) shows the variability of rainfall and number of rainy days. In addition, areas with storm surge risks covers the south-eastern coast of Thailand from Petchaburin to Songkhla. Songkhla and Phatthalung are two provinces through which 75 percent of storms move in December (Thai Meteorological Department, 2014). The maximum wind speeds measured in Songkhla in different seasons vary from from 124 to 141 kilometers per hour

(Thai Marine Meteorological Center, 2006), which would possibly damage bee habitats, as they could tolerate the average wind speed of 29 km per hour maximum. According to a number of villagers, the weather extremes have damaged the forest, including Melaleuca trees and wild honey – their main sources of income. These changes have affected the diversity of life in the forest and people who utilize the forest as mentioned in the changes that locals perceived. Diagram 1 shows data on the number of Bang Kad, beehives that bees made in the Bang Kad, and beehives found in trees. During the past 10 years (2005-2013), the number of beehives found in trees and in Bang Kad has decreased while the distance between the number of Bang Kad and that of beehives found in the Bang Kad became larger. In 2005, the number of Bang Kad people made and that of the beehives were close to each other. However, at present, the number of Bang Kad has increased while that of beehives has decreased. This means that villagers have to make more Bang Kad in order to have more chances to get the same number of beehives as they used to get in the past. Diagram 2 shows the amounts of wild honey harvested, and incomes from selling wild honey. It can be seen that the decreases might be due to the decreasing number of beehives as well as the decreasing sizes of beehives. When the amount of wild honey decreases, its price increases. The price for a 750 mm bottle of wild honey is in the range of 500-700 baht. During the normal season, it is 500 baht a bottle but during the fifth lunar month when wild honey is scarce, the price can go up to 700 baht a bottle. Therefore, wild honey is a wild product with a high price from which locals can make more income than from other wild items, and its high price motivates more villagers to make Bang Kad. This is very different from the situation during 2005 – 2007 when the amount of production was high but the price was low in the range of 200 – 300 baht a bottle (Diagram 3). Nevertheless, in 2014 the price for honey increased to 700-800 Baht per bottle because the amount of honey that could be collected has declined due to the above-mentioned factors.

Table 1: The Statistics of Rainfall in Khuan Niang. District

Year	Rainfall (mm)	Number of Rainy Days (Days)
2000	1,614.00	71
2001	1,039.80	69
2002	1,839.50	97
2003	1,878.00	93
2004	1,437.20	77
2005	831.10	72
2006	1,452.10	79
2007	920.60	84
2008	1,543.00	72
2009	1,840.40	89
2010	1,519.70	77
2011	1,328.00	78
2012	800.30	82
2013	1,482.50	63
2014	1,632.70	83

Source: Southern Meteorological Center (East Coast)(2014)

Figure 3-4 : A survey by the researchers found that melaleuca trees (*Melaleuca Cajuputi*) in the forest had fallen down in the direction that the windstorms blew.

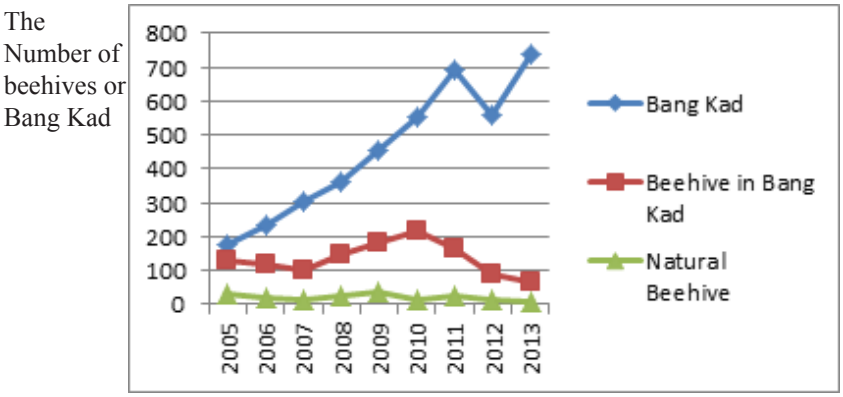


Diagram 1: The number of Bang Kad, giant-bees' hives, and beehives found in the forest during a 10-year period

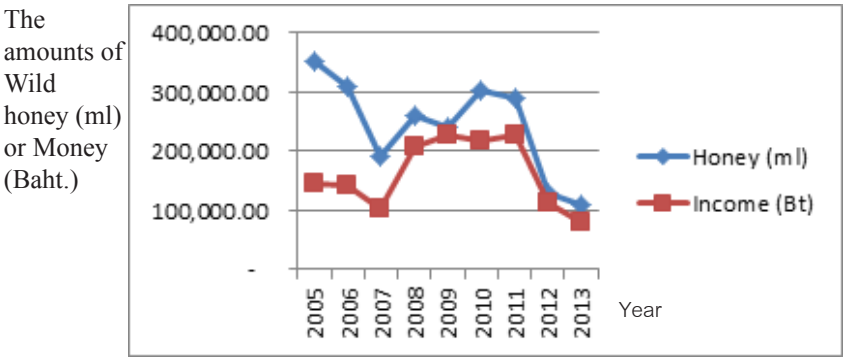


Diagram 2: The amounts of income from wild honey from the community forest during a 10-year period

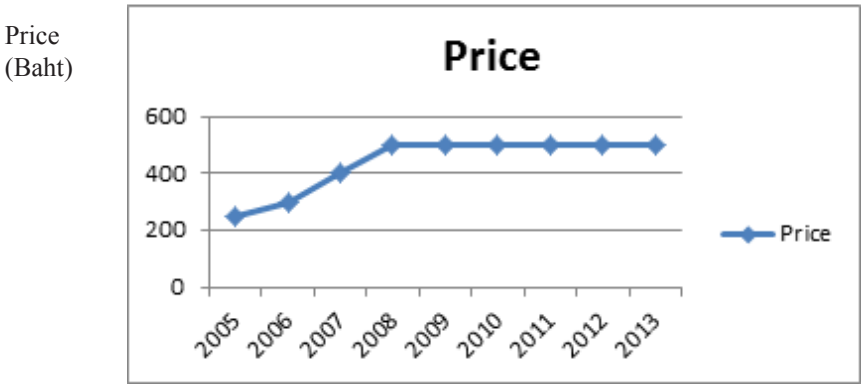


Diagram 3: The prices of honey from the community's melaleuca forest during a 10-year period

The aforementioned data reflect decreases in the migration rates of giant honeybees to this forest and the decreases are indicators that can predict fertility of the forest in the future. There are various causes of the decreases such as climate change and wild fires, etc. Even though there are various factors that affect the occupation in hunting for wild honey, the effects each year are not certain depending on migration of giant honeybees to the forest. Despite all this, villagers still make Bang Kad to make extra income because it is a good source of income. The minimum they can make per year is 10,000 baht and some people who are experts in making Bang Kad and hunting for beehives from other trees can make almost 100,000 bath per year. This indicates that honey from *Apis dorsata F.* is an important source of extra income that helps people to be economically self-dependent utilizing the fertile resources in their community, especially, harvesting wild honey from giant honeybees that migrate to this large melaleuca forest every year. In addition to being a source of income for people in the community, these giant honeybees play an important role in the ecosystem of the melaleuca forest.

Discussion and Conclusion

Wild-honey hunting in the community's melaleuca forest amidst climate change has obviously faced with decreases in the amount of honey and income. People in the community perceive the climate change from the changes of seasons in that they perceive that the weather is warmer and the seasonal periods have changed so much from the past that they cannot be estimated. For example, it rains and floods in summer, or the months that used to be with rain and melaleuca flowers in bloom are now without rain. In addition, people perceive the severity of windstorms blowing to the community and forest that damage melaleuca and other trees including their flowers, which are nectar sources. The strong and high speed winds decrease

honeybees' migrations to the forest and make them emigrate from the forest and result in the decreasing number of beehives in Bang Kad, too. Meanwhile, villagers make more Bang Kad for more opportunities to get more beehives. Another effect of unseasonal rain is on the quality of honey because it gives honey more humidity and less viscosity. As can be seen, people's perceptions of climate change correspond with data on the climate of the Songkhla Lake Basin that is under the influence of the Northeast and Southeast monsoons (Suttiwipakorn, 2008). According to other related organizations, the Southern part of Thailand has frequent storms blowing across it and the rainy season begins earlier than it normally did, with continuous rain and severe storms (Thai Meteorological Department, 2009-2012; Hydro and Agro Informatics Institute, 2013). A survey by the researchers found that melaleuca trees (*Melaleuca Cajuputi*) in the forest had fallen down in the direction that the windstorms blew. This indicates the effect of the climate change on the melaleuca forest and bees' migrations, and this corresponds with the data on follow-ups of giant honeybees' immigrations, which found that the wind speed of 29 kilometers or more per hour can increase migrations of giant honeybees (Thapa, 1998).

Thus, climate change is a factor affecting honeybees directly and indirectly. Direct effects include honeybee behavior, physiology and distribution while indirect effects are on the environments of honeybees such as their food sources and habitats. Therefore, climate change affects the season of nectar that is bees' food while it affects bees' enemies as well. For this reason, honeybees in each area have to adapt differently to the climate change in each different season. For Asia, giant honeybees migrate to their food sources in different forests in each season (Conte and Navajas, 2008; Reddy et al., 2012; Parvu, et al., 2013). In Chitwan Valley, Nepal, giant honeybees are likely to emigrate from forests, and their stays in the forests

become shorter each year because of many factors, namely, climate change and bad weather, increases in the use of agricultural chemicals, an increase in bee-hunting, a decrease in grassland in the forest and a decrease in agricultural land (Pokhrel, 2010). Furthermore, the effects are on people who earn their living by harvesting honey in the community. When the honeybee population decreases, the diversities of ecosystems in the forest and agricultural systems are affected because honeybees play an important role in pollinations of all kinds of flowers. According to Rader et al. (2013), climate warming decreases pollinations because the temperature is not suitable for pollination by honeybees. The suitable temperature is between 24-30 degrees Celsius. Hence, climate change is an important factor that affects honeybees and the ecosystem. The aforementioned phenomena are similar to many areas in Thailand including Thung Bang Nok Ohk Forest of the Lower Songkhla Lake Basin that has been affected by more severe climate that unavoidably affects giant honeybees, which play an important role in this forest and the way of life of the community where wild-honey hunting is an important occupation. This is reflected in the study results that found the number of honeybee hives and the amount of honey that could be collected has increased during the last decade (2005-2013) while villagers have to take risks in hunting for honey by making more Bang Kad. Consequently, the decline in the amount of wild honey has made the price of honey from the melaleuka forest higher. The data from the interviews in 2014 indicated that the price of honey from the melaleuka forest during the normal season (not the fifth-lunar-month honey) from Khuan So Community was 40-60 percent higher than it was. However, the price could depend on the type of customers, too.

Because of the decrease of wild honey production each year, the community needs to find ways to increase the production and give more importance to the forest focusing on

sustainable utilization of the forest. During the last 100 years or more, there has been integration of local knowledge in order to accommodate the changing situation of the world. It can be seen that local wisdom for honey hunting of Khuan So Community has changed in some ways both in knowledge and practice; however, their knowledge and beliefs remain the same. Similarly, in Korea, Ukraine, and Uganda, local knowledge in beekeeping and development of manmade beehives have been changed as time goes by. For example, traditionally, manmade hives were made by drilling holes in tree trunks but later they have been changed to wooden boxes and many others (Kizito, 2010; Park and Yeo-Chang, 2012, Grigoras, 2012). In India, bamboo trunk halves are used in an incubating room for honeybees to build their hives, which takes two hours, and then they are hung on roof edges of houses or huts (Kumar et al., 2012). In France, hives are placed in holes of stone structures (Walker and Crane, 2004). For Khuan So Community in Thailand, the Bang Kad, which is made for honeybees to make their hives, is unique to this community and is not found anywhere else. Thus, it can be said that the local wisdom of honey hunting of Khuan So is knowledge that is a good example of practice in utilization of resources and should be promoted and made known to the policy level for sustainable melaleuca forest management of the community. This will lead to sustainability of the fertile forest and the community even though effects of the increasingly more severe climate change are unavoidable. Conservation of this forest is necessary for it to remain habitats of giant honey-bees, which means conservation of biodiversity, environmental balance, and mitigation of problems and severity of effects resulting from climate change. Even though the Songklhla Lake Basin area is inevitably affected by climate change, which tends to be increasingly more severe (Thailand Research Fund, 2012: 5-6). Additionally, Khuan So locals have observed or perceived such climate change from the income they make from selling

honey, and other ways of utilization of Thung Bang Nok Ohk forest and other forests. However, the researcher reckons that preserving the forest fertility for giant honeybees to make their habitats can be done by preserving its biodiversity and balancing the environment because this could reduce problems and mitigate the severity of the effects of climate change. More importantly, in conservating forest fertility, it is necessary to build cooperation for forest management from stakeholders from all parties concerned, especially people in the community who are affected directly and have utilized this forest for a long time. Therefore, they are very important to the management of the community's melaleuca forest to make its existence with fertility sustainable.

Acknowledgments

The authors would like to thank the Graduate School, Prince of Songkla University for funding this research project.

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