The Guideline Development for Sustainable Livelihood Indicators of Village Marginal Mangrove Forest in the Satun Province, Thailand

Wirongrong Duangjai¹, Arin Ngamniyom¹, Kan Silprasit¹ & Patarapong Kroeksakul¹

¹ Faculty of Environmental Culture and Ecotourism, Srinakharinwirot University, Thailand

Correspondence: Patarapong Kroeksakul, Faculty of Environmental Culture and Ecotourism, Srinakharinwirot University, Thailand. Tel: 66-8-4265-4985. E-mail: kekosakull@hotmail.com; patarapong@swu.ac.th

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Abstract

The study of guideline development for sustainable livelihood indicators of a village's marginal mangrove forest in the Satun province has an aim to understand livelihood systems for guideline development of sustainable livelihood indicators in the community. The three villages, Houtang, Tanamkemtai, and Khokkphayom of the Satur province, were used as a study area. Qualitative methodology was mainly used because the local people had to recall most of the data, which significantly focused on the interrelationship of the parameters involving the roles of sustainable livelihood indicators via key informants, such as the village's senior, headman, and fisherman. The tools for corrected data were applied form rapid rural appraisal (RRA). It found that mangrove forests in the Satun province are recovered forests because of government concession and villagers' deforestation in the past. Almost all villagers are Muslims and can communicate in Pattani Malay, southern local and national languages. At present, villagers are formulating a group for the protection and conservation of mangrove forests, which a government organization supports. Villagers' perceptions about mangrove forests' benefits can be classified as both direct and indirect. The studies' indicators were divided into four dimensions and 17 items: social (four items), natural resource (four items), economic (four items) and productivity (five items). However, this research merely developed indicators of sustainable livelihood in the community around the mangrove forest at the community level without generating a scale or score with which to weigh the indicators. Therefore, it is very significant to carry out further research and to apply the approach in other areas in order to check the completeness of the indicators and to develop suitable weights.

Keyword: sustainable livelihood, mangrove forest, Satun province

1. Introduction

Sustainable livelihood approaches are based upon evolving thinking about poverty reduction, the way that the poor live their lives, and the importance of structural as well as institutional issues. Chamber (1989, p. 181) presented to perception of farmer will be accepted the practice of technology with harmony to livelihood system. Nerveless, outside factors can effect to put farmer behavior adoption and perception for decision (Chamber, 1985). One important reason for the success of the sustainable livelihood approach in finalizing the attention of key policymakers in donor institutions was that it offered a fresh vision of a holistic and/or integrative approach with the capacity to analyze and understand the complexity of rural development (Knutsson, 2006; Solesbury, 2003). The Department for International Development (DFID) developed the concept of a sustainable livelihood framework in 1999; it presented the relationship of activity with livelihood assets in the community as well as human capital, natural capital, financial capital, physical capital, and social capital. Nevertheless, the concept of a sustainable livelihood has to outsiders' perception views inside the community, because in community is complicated relate to livelihood systems. However, the evaluation principle of sustainable livelihood systems is very important for understand in content and condition of community before assess the main indicators, so related to the natural resource and culture (Macdonald et al., 2012).

This research was a case study to demonstrate sustainable livelihood indicators in the community of the marginal mangrove forest. The main purpose for using this zone was because mangroves are among the most productive ecosystems on Earth and occupy the brackish water zone along the tropical and subtropical coasts (Datta et al., 2012; International Topical Timber Organization (ITTO), 2002). Mangrove ecosystems are widely recognized for their habitat functions for fish and crustaceans that have commercial value as well as for effective sediment

trapping, nutrient recycling, and protection of shorelines from erosion (Food and Agriculture Organization of the Unit Nations (FAO.), 2007), and mangrove forests are also sources of community food and fuel sources. Thailand's mangrove zone is dynamic in the history because the government gave concession to private management until 1961, and then the government recovered the forests. At present, the community marginal mangrove zone plays an important role in supporting local people.

This research question was: "What is the content of the community, and what are the sustainable livelihood indicators in community marginal mangrove forests?" The study areas consist of three villages of the Satun province: 1) Houtang village, the Phiman sub-district, and the Maung district; 2) Tanamkemtai village, the Thapea sub-district, and the Thapea district; and 3) Khokphayom village, the La-ngu sub-district, and the La-ngu district, where the communities are located around the mangrove forests. The villagers who are the representative sample of this study still use natural resources from mangroves and have the perception of the need to conserve them. This research have objective to study livelihood systems and the guideline development of community sustainable livelihood indicators around mangrove forests in the Satun province.

2. Methodology

The qualitative methodology was mainly used because the local people had to recall the local data, which significantly focused on the interrelationship of the parameters that involved the roles of sustainable livelihood indicators (beliefs, natural resource core values, and socio-economic indicators). However, although some quantitative data are used to support findings, triangulation through site selection, types of key informants and their activities, and the level of the social structure, such as the individual, household, and community levels, are used in data collection and verification.

2.1 Study Sites

Criteria for site selection were:

1) With regard to the community's margin of the mangrove zone in the Satun province, the mangrove areas are primary classified into three zones [Zone A, Zone B, and Zone C] (Figure 1).

2) The people in the community around the margin of the mangrove zone practice activities associated with wetlands, such as fishing and aquaculture.

3) The community formulates a group for caring and protecting mangrove forests.

The study sites in 1) Houtang village, the Phiman sub-district, and the Maung district limited universal time meters [UTM] Zone 47 limit N620325.34 E73068.40) is zone A, 2) Tanamkemtai village, the Thapea sub-district, and the Thapea district limited universal time meters [UTM] Zone 47 limit N608189.69 E749638.04 is zone B and 3) Khokphayom village, the La-ngu sub-district, and the La-ngu district limited universal time meters [UTM] Zone 47 limit N590009.85 E753076.34) is zone C (Figure 1).



Figure 1. Studies cite three zones in the Satun province

2.2 Data Collection

The data for collection:

1) Secondary data were collected from the local government, including a map online and the document of the village headman.

2) Primary data were collected from main key informant interviews, such as those with the village senior, headman, and fisherman. All of the information will be checked via a group interview. The tools for corrected data were applied from rapid rural appraisal (RRA), such as a field note, records, and semi-structured interviews (SSI) (Simaraks & Suphatera, 1980).

2.3 Concept of Analysis

After data were collected from fieldwork, they were analyzed and reviewed. Incomplete or conflicting data were filled and clarified, respectively, during further interviews. Thus, the content analysis technique was used to analyze data, and the triangulation technique was also used to cross-check the data with literature reviews. The sustainable livelihood framework from DFID in 1999 was applied in the components of human, natural, financial, physical, and social capital combined with the perception of outsiders' views and insiders' views of villagers in the community (Chamber, 1985). The conceptual framework to analyze is presented in Figure 2.



Figure 2. Concept for analysis in sustainable livelihood indicators

3. Result and Discussion

3.1 Content of Villages

The study sites are located on the Satun province of Thailand.

1) The Houtang community is located in the Phiman sub-district and the Maung district; so is an urban. Present are about 104 households and 500 people in the population, and most of them are Muslim. They migrated from Phamoung villages in the Trang province to this area. Villagers' occupations include being city employees, aquaculture, fishing, and oil palms planting. The area is about 80 hectares for the community mangrove forest.

2) The Tanamkemtai *village* located in the Thapae sub-district and the Thapae district features about 200 households with 1420 populations. Most of them are Muslim. The area is about 892 hectares, which villagers use to plant rice fields as well as for rubber, and oil palms, and some of them are fishermen. About 240 hectares serve as community mangrove forests.

3) The Khokphayom village is located in the La-ngu sub-district and the La-ngu district. About 154 households with 1,200 members are present in the village. A total of 90% are Muslim, and 10% are Buddhist. Villagers use 168 hectares for para rubber, oil palms, and a rice plantation. Some villagers are also fishermen. The area featuring the community mangrove forests is about 400 hectares.

| Item | Houtang | Tanamkemtai | Khokphayom |
|----------------------------|---------------------------|------------------------|------------------------|
| Settle in sub-district, | Phiman, Meang, and | Thapae, Thapea, and | Langu, Langu, and Zone |
| district, and limit (UTM*) | Zone 47 limit | Zone 47 limit | 47 limit N590009.85 |
| of the Satun province | N620325.34 E73068.40 | N608189.69 E749638.04 | E753076.34 |
| Number of Households | 99 | 200 | 154 |
| Population | 500 | 1420 | 1200 |
| Religion | Almost Muslim (95%) | Almost Muslim (90%) | Almost Muslim (98%) |
| Temple | | | |
| Masjid | 1 | 1 | 1 |
| Primary school | - | 1 | 1 |
| Land (hectare) | NA. | 892 | 168 |
| Mangrove forest (hectare) | 80 | 240 | 400 |
| Agriculture | Palm oil, Para rubber | Palm oil, Para rubber, | Palm oil, Para rubber, |
| | | Rice | Rice |
| Aquaculture | Soft craft and Barramundi | - | Barramundi |
| | (Latescalcarifer) | | (Latescalcarifer) and |
| | | | Grouper (Serranidae) |

Table 1. Content data of study sites

*UTM = Universal Transverse Mercator coordinate system, NA. = not available

3.2 Education

In the study sites, about 10% of villagers, more than 65 years old, cannot read the Thai alphabet but can read and write in the Pattani-Malay language. Hence, the villagers can use three languages to communicate—Pattani Malay, southern local, and national languages. Nevertheless, villagers support their children in learning both the national education system and the religion education system (Mohammedanism School). Almost all of the villagers who are 50–60 years old are educated in primary school, and those who are 30–40 years old are educated in high school. At present, villagers prefer to support their children in studying in the university setting.

3.3 Economic

Handling para rubber and rice plantations are the main occupation of villagers in Khokphayom and Tanamkemtai. Their occupations include being city employees and aquaculture (local fisheries). The income of a villager in each household is about 400–667 US\$. per month (approximately 1 US\$ = 30 Thai baht). Soft crafts (70%), being a city employee (20%), and local fisheries (10%) are the main sources of income of Houtang village. The income of a villager in each household is about 500–700 US\$ per month (approximately 1 US\$ = 30 Thai baht).

3.4 History of Mangrove Forest

The Houtang community and Khokphayom village can be divided three times:

Before concession: Many trees and aquatic animals, such as fish, craft, and shrimp, existed. Villagers used trees for making a fire for cooking and for making charcoal. The products of aquatic animals were important food, and when a surplus remained after consumption, they would be sold in the local market.

Duration concession: The government project opened concession in 1967 to private sectors for making charcoal until 2000; after the end of concession, the government planted to recover the mangrove zone.

After concession: The government established the Department of Marine and Coastal Resources for reforestation of the mangrove zone and a community setup group for conservation.

In Tanamkemtai, the mangrove forest had never been the target of concession, but it was deforested in 1989 because many people from outside of the village used the land for feeding Kuladum shrimp (Tiger prawn, Penaeusmonodon). Villagers reforested and set up a group for protection of the mangrove forest in 2002.

3.5 Resources in Mangrove Forest

1) Plant: Not many species could be planted in the mangrove zone because the area was just reforested about 10 year ago. The trees in the mangrove forest consist of Rhizophoraapiculata, Rhizophoramucronata, Sonneratiacaseolaris, Melaleucaleucadendron, and Nypafrutican.

2) Animal: An interview revealed that craft, shrimp, and fish are present. However, according to the report of Patarapong (2013, p. 1474-1479) 45 species of fish exist: 31 families; one species of Carcharinidea, Dasyatidae, Batrachoididae, Carangidae, Cynoglossidae, Echeneidae, Harpodonitidae, Mullidae, Ophichidae, Plotosidae, Pomacentridae, Scatophagidae, Siganidae, Sillaginidae, Soleidae, Sphyraenidae, Toxotidae, and Trichiurdae; two species of Hemiramphidae, Lutjanidae, Mugilidae, Platycephalidaw, Sciaenidae, and Tricanthidae; three species of Serranidae; and four species of Gobiidae in the mangrove forest and coastal zone

3.6 Direct Benefit of Mangrove Forest

1) Food bank support: Villagers used the mangrove zone to find raw material—craft, shrimp, and fish—for food supporting their families. However, the villagers had the knowledge necessary to keep production in the mangrove forest by not collecting finger fish or harder material. The perceptions of villagers in three villages—what they think about the mangrove forest—include food banks because the area is a habitat and provides supporting for animal and fish. The data are related to the report of The World Conservation Union (ICUN) (2006) to find the value of the mangrove base on local use, such as timber and fish. However, the product from the mangrove forest can reduce villagers' food expenditures.

2) Source of income: About 20% of fishermen are present in three villages, with a villager gaining income from local fisheries of about 300 US\$ per month. However, an ITTO (2006) report to Panama that featured the value of fish in the mangrove forest was between 14.8 to 39.5 US\$/month/hectare. However, the income of villagers will vary based on the product and the season for keeping.

3.7 Indirect Relation with Mangrove Forest to Villager

1) Windbreak: The mangrove forests are a barrier against wind because they are a buffer zone between community and sea. The perceptions of villagers are similar to the report of the World Rainforest Moment (WRM) (2008) if the mangrove forest can protect a village from the 2006 tsunami in Ecuador, conforming with ITTO that the mangrove forest is a buffer zone for windbreak and for waves from the sea.

2) Coast erosion: The trees are grown around the delta zone of the river, and their roots can help to protect against erosion in the mangrove zone. Vermaat and Thampanya (2006) reported that mangroves can reduce coastal erosion. It is a strongly significant correspondence of positive accretion with the presence of dense mangrove stands and an expanding river mouth, which is related to Thampanya et al., (2006) if the mangroves reduced these erosion rates when comparing them with a less-mangrove forest zone.

3) Habitat of small animals: The mangrove wetland is a unique area that provides a habitat or home for various animals that depend on the value of nutrients and the biodiversity associated with the forest (Laegdsgaard & Johnson, 2006). The villagers in three villages notice that the number of young animals in the mangrove zone is increasing when compared with 10 years ago.

3.8 Productivity in Mangrove Forest

Productivity in the mangrove forest, according to the perceptions of villagers in the study sites, the number of fish, shrimp, craft, and trees is compared with 10 years ago. The perception of productivity in mangrove forests is similar to Robertson et al., (1991) report to productivity increasing variance form rate of natural resource. However, in the dimension of villagers' concentration with primary productivity only, it does not cover to biomass carbon absorption issue (Amarasinghe & Balasubramaniam, 1992).

3.9 Right of People to Natural Resource in Community

The three communities considered that the villagers are first-priority users of the mangrove forest. However, the agreement of villagers involves trying to control the value of the forest only; thus, the villagers' main agreement is not just on tree cutting and is under the control of a local committee. The right situation is similar to that of the north Brazilian coast zone because villagers have an overflow in resources (Marion & Oliveira, 2003). Nevertheless, villagers will try to find systems for natural resource management in the mangrove forest in the future.

3.10 Network of Mangrove Forest Users

Three villages create a network in the group of mangrove conservation because the government holds a meeting to set up a network for sharing experiences of management in different areas. However, villagers have multiple activities for maintain their lives. The livelihood of villagers adjoins with mangrove forests because almost all of the villagers are fishermen. Many organizations are trying to create a network to connect with ecotourism (Andaman Coast Community Tourism, 2013)

3.11 Sustainable Livelihood Indicators of Village Marginal Mangrove Forests in the Satun Province

The study can set up a frame of indicators input in the dimensions of social, natural resource, economic, and productivity. The following indicators were collected from villagers' perceptions and activities.

Social: knowledge transfer, networking, occupation, agreement of user, setting up group for protection, and saving money

Natural resource: setting up a group for the protection and rights of users, increasing and protecting resources, and covering connection with other organizations for conservation diversity in the forest, source of income, and habitat

Economic: reducing food expenditures in households, inside resource users, direct and indirect resource users, optimum point for use, save production, and frequency of keeping and creating the equilibrium of products from forests

Productivity: group of aquaculture and habitat conservation, direct and indirect impact, income of household, access value of mangrove forests, and popper technology for product collection, such as net size or timing for fisheries etc.

Actually, the list of indicators of sustainable livelihood systems of villagers has a relationship with other components and effects on users in the community, shown in Table 2.

| | Social | Natural Resource | Economic | Productivity |
|------------------|---|---|---|---|
| Social | Knowledge transfer, sharing, and experience of management | Group for protection/conservation (community level) Right of user in community | Reducing food expenditures of households | Group of aquaculture and habitat conservation |
| Natural Resource | Network of community around mangrove forest of the province | Increasing and protecting resource, cover connection with other organizations for conservation Diversity | Inside resource users Direct and indirect resource users | Direction impact Indirect impact |
| Economic | Occupation Group of aquaculture | Income of household, food support | Optimum point for use and capacity of resource | Aquaculture Income of household |
| Productivity | Local raw materials, use for product conservation in mangrove forest, such as finger fish, young shrimp, and craft . | Habitat Diversity | Save production Frequency of keeping Equilibrium of product from forest | Access value of mangrove forest Popper technology for collected product |

Table 2. Matrix relation of indicators for sustainable livelihood consideration

4. Conclusion and Recommendation

This study aims to understand livelihood systems for guideline development of sustainable livelihood indicators in the community around three mangrove forests villages of the Satun province—Houtang village, the Phiman sub-district, and the Maung district; Tanamkemtai village, the Thapea sub-district, and the Thapea district; and Khokphayom village, the La-ngu sub-district, and the La-ngu district. Mangrove forests in the Satun province were recovered because the government gave concession, and villagers deforested them. Almost all villagers are Muslims who can communicate in three languages—Pattani Malay, local southern, and national languages. At present, the villagers have set up a group for protecting and conserving the mangrove forests, which receives support from government organizations. Villagers' perceptions as to the benefits of the mangrove forest can be classified as both direct and indirect. The indicators this study collected can be broken down into four dimensions in a conceptual framework of sustainable livelihood indicators (presented in Fig. 1) and 17 separate items related to improving the livelihood system are in the matrix table (presented in Table 2) shown in Table 3.

However, the research merely developed indicators of sustainable livelihood in the community around the mangrove forest at the community level without generating a scale or score with which to weigh the indicators. Therefore, it is very important to carry out further research and to apply the approach in other areas in an effort to check on the completeness of the indicators and to develop suitable weights.

| Indicators | Items |
|-------------------|---|
| Social | Knowledge transfer |
| | Agreement of user |
| | Group for protection |
| | Network |
| Natural resources | Source of income |
| | Diversity |
| | Habitat |
| | Connection with other organization for conservation |
| Economic | Reducing food expenditures in household |
| | Direct and indirect user |
| | Frequency of keeping production in mangrove forest. |
| | Equilibrium of product from forest |
| Productivity | Group of aquaculture and conservation habitat |
| | Income of household |
| | direct and indirect impact |
| | Access value of mangrove forests |
| | Technology for product collection |

Table 3. Indicators and items for considering sustainable livelihood of villagers around the mangrove forest in the Satun province

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