

# **Fisheries Co-management :**

## **an effective coastal fishery management in Thailand**

*Ruangrai Tokrisna*

Department of Agricultural and Resource Economics, Faculty of Economics  
Kasetsart University, Bangkok, Thailand  
[ruangrai.t@ku.ac.th](mailto:ruangrai.t@ku.ac.th)

### **Abstract**

In spite of being a leading exporter of fishery products as well as a leading fishing country, Thailand had encountered the problem of degraded fishery resources due to rapid fisheries development and lack of effective fisheries management. The impact of fishery resource degradation had most impact on coastal small scale fisheries in lack of alternative fishing grounds. Fishery co-management has been promoted in an attempt to improve fishery management thus renew fishery abundance to uplift coastal fishermen living conditions. This paper reviewed the success of fishery co-management development in Thailand. Key indicators of success included the supportive legal framework, fishing ground boundary, and effective community organization in the fishing villages.

**Keywords:** co-management, costal fisheries, fishery management, Thailand

### **Introduction**

Thailand had been one of the top fisheries exporters and the fishing nations recently. Nevertheless, Thai marine fishery resources had been degraded. Catch per unit effort decreased from nearly 300 kg/hr in later half of 1960s to less than 20 kg/hr recently. Most of foreign exchange earnings had been from coastal shrimp aquaculture since the rapid development which started in early 1970s. The impact of degraded fishery resources had been most on small-scale fisheries that did not have alternative other than fishing in Thai waters, mostly along the coastlines. Ineffective fishery management led to over fishing especially in the commercial scale fisheries, thus fishery resource degradation. To survive, some of the coastal fishing villages, especially in southern Thailand, tried coastal fisheries resource management. The success was limited by lack of legislation and lack of power in controlling the outsiders to fish in coastal community fishing grounds. Thus the government put effort on co-management for a better fishery management for small-scale coastal fisheries.

## **Development of Thai fisheries: a success or a failure**

The total production from fisheries was nearly four million ton recently of which nearly half was fish production mainly for human consumption, followed by nearly one-fifth trash fish for animal feed including cultured shrimp. Shrimp production share was more than one-tenth in term of volume but more than half by value while fish value share was one-third. In term of share in gross domestic production, fisheries share was about two percent while the share in food consumption was about one-tenth.

In the world trade Thai fisheries exports share was about four percent in term of volume but only one percent share in value indicating that Thailand had been exporting at low price. In term of production Thai fisheries share was about three percent.

Thai fisheries in earlier years focused on pelagic species. Chinese purse seine was introduced in 1925 with the main catch being Indo-Pacific mackerel. In 1930 this fishing gear was developed using Japanese engine. In 1959 otter board trawl was first introduced in Thai fishing grounds, targeting at demersal species, a non-selective gears. As demersal resources were abundant by that time, catch per unit effort was 298 kg/hr. the high profitability led to rapid increase in number of otter board trawlers, as well as motorized push netters. Both were non-selective targeting for demersal species but also caught juvenile economic species as by catches, sold as low price trash fish.

In 1972, due to less resource abundance as a result of over fishing capacity in Thai waters, especially in the Gulf of Thailand which was the main fishing ground, fishing vessels of 24 m long and over started fishing outside Thai waters. Many small fishing vessels turned to squid fisheries. Catch per unit effort decreased to 63 kg/hr. In response to less abundant demersal resources, the fishermen developed light luring purse seine. In 1977 the catches reached over 2 million ton after which decreased. Economic pelagic species were over fished.

During 1979 – 1981 according to the United Nations Convention on Law of the Sea, the economic exclusive zone (EEZ) was announced, limiting Thai fishing ground due to the overlapping with neighboring countries. During 1980s Thai catches fluctuated, partly due to fishing in non-Thai waters. By 1989 catch per unit effort reduced to 20 kg/hr. In 1990s increasing number of Thai vessels fished in non-Thai fishing grounds. Recently the catch per unit effort reduced to less than 20 kg/hr.<sup>1</sup>

Fishery resources in Thai fishing grounds were degraded due to increasing number of non-selective as well as illegal fishing gears; especially otter board trawl and pus net. The fishing of these gears within three km from shoreline, which had not been allowed, led to

---

<sup>1</sup> More details in Ruangrai Tokrisna (2006)

conflicts in resource utilization between commercial scale and small scale coastal fisheries.<sup>2</sup>

In 2000 total number of fishing vessels as reported in Marine Fishery Census was 58,119 vessels of which 13,263 were inboard engine, mainly otter board trawlers. Number of outboard engine was 44,856, most were small scale fisheries mainly gill net. Average fishing income of small scale fisheries in 2000 was US\$1,898/household/year ranging from as low as US\$1,849 for crab gill net to US\$2,485 in case of push net. The average household income was US\$2,579 and the poverty line was US\$1,769. In 2004, the average income for small scale otter board trawl was US\$1,449 and for push net it was US\$3,126 while the average Thai household income was US\$4,281 and the poverty line was US\$1,917. These reflected the increasing poverty among small scale coastal fisheries in Thailand.<sup>3</sup>

### **Poverty eradication**

Thai government attempts on fishery resource management included controlling number of fishing vessels, gear restriction, season and area closure, and development on community based fishery management (CBFM) which became co-management (CM). The more effective ones were season and area closure while CBFM/CM was targeted on strengthening local community organization in fishery management, targeting the benefits for small scale coastal fisheries. Together with the coastal fishing villages attempts were on renewal fishery resource abundance via artificial reef, stock enhancement, and environment control.

For commercial scale fisheries, the number of fishing vessels in Thai waters should be effectively reduced and those Thai vessels fishing in non-Thai waters should be registered, in order to control fishing effort at the optimum level. Biological information on available fish stocks as well as physical fishing grounds, number of fishing vessels, fishing cost and returns were important to determine the optimum effort level. Collaboration should be sought from the commercial fishermen via the existing associations of fishermen for an effective control on the fishing effort.

For small scale coastal fisheries, CBFM/CM should be promoted. Capacity of community organization should be strengthened. Fishing right should be given over fishing ground among coastal community organization, beginning from the community with existing management capacity while management capacity of coastal community organization should be enhanced. Collaboration with relevant agencies, both government and non-government should be sought.

---

<sup>2</sup> Example on conflict use in Thai fisheries could be found in Ruangrai Tokrisna (2000).

<sup>3</sup> See Ruangrai Tokrisna (2005:B).

## **Economic instrument for marine fishery resource management**

Problem in fishery resource management could have been the results of market failure in reflecting the true cost of fishery resources, lack of well defined property right over fishery resources, and the externalities from fishing on which the non-selective fishing gears had on the others. Economic instruments involving such resource management could be tradable permit, bond and deposit refund, granting property right regime, liability system, fiscal instrument, financial instrument, and charge system. For Thai fishery management the efficacy of these instruments were varied.

For Thai commercial fisheries, the target would be on renewal fishery resource abundance by reducing fishing capacity to the optimum level. Recommended economic instrument was granting fishing right through tradable permit on fishing quota. Constraints were on the lack of existing number of fishing effort to determine appropriate level on individual fishing quota, thus the quota allocation among the fishing vessels. System of landing should be improved to support quota control. Liability system and charge system at rational fee could be adopted on the consent among commercial fishermen. Relevant agency for this instrument could be Department of Fisheries, on quota management and control. Supporting agencies were Fish Market Organization, Harbor Department, local authorities, and most important Thai Fisheries Associations.

For small scale coastal fisheries there should be resource abundance renewal for sustainable utilization among coastal fishing communities. Granting property right regime should be undertaken through CBFM/ CM. Fishing right should be granted to capable coastal fishing communities to justify physical, legal and social conditions. Responsible agencies were Department of Fisheries and Local administration authorities. Local fishery management capacity should be enhanced. Co-management could be developed through supportive legislation and effective enforcement.<sup>4</sup>

## **Key factors for success CBFM/ CM in Thailand**

Five important key factors to select the coastal fishing village where CBFM/ CM were more likely to be successful, thus being the pilot projects to be extended the success to other coastal fishing villages. They were supportive physical conditions, institutional framework, fishing right, basic infrastructures, and socio-economic conditions.

Physical conditions included three main features. First, the villagers were likely to pay more attention and willing to collaborate in the areas where fishery resources had been degraded due to realization on constraint on the limited resource abundance. If fishery resource were their mainstay since they had to rely most on this resource abundance. It would be best if the villagers had indigenous knowledge on their fishing grounds such

---

<sup>4</sup> More details in Ruangrai Tokrisna (2002).

that they could plan a better management for their fisheries. Second, the fishing ground with seemed closure were more easier in excluding the outsiders in fishing in their fishing ground, thus provide more incentive in community management. There should be some barriers or natural boundaries for the encroachment from the outsiders. Third, CBFM/CM were more appropriate and likely to be more successful in fishing villages where fishing activities were multi-species and multi-gears, being heterogeneous. The local themselves could have a better knowledge and information for management planning.

Institutional framework included two main features, institutional framework and village organization. For institutional framework, Thailand had 1947 Fisher Law for fishery regulation and management. Section 7 of this Law granted authority to the provincial committee to announce specific fishing regulation in terms of sanctuary, auction or permission. For village organization, there were sub-district administration committees (called Tambon Administration Organization, TAO). If CBFM/CM were adopted in the coastal fishing communities where fisheries was the dominant, with capable village organization; the success would be more likely. Moreover, if CBFM/CM were adopted in the fishing villages where norms, customs and religion were strong; it would be more likely that the consent and the compliance would be greater. Examples were the Muslim fishing villages in southern Thailand where the Muslim leaders were highly respected among the villagers.

For fishing right to be granted to the fishing communities, this should begin in the fishing villages where most of the key factors were satisfied. The success in the selected village could be pilot projects to be extended to the other fishing communities. Nevertheless government support on legislation and enforcement were required.

Basis infrastructures should be provided by the government. These included public provision on landing piers, fishing gear repair shop, and coastal rehabilitation via artificial reef. The landing piers could be useful in controlling the landings. Fishing gear repair shop would get the fishers to work together thus might reduce the repair cost. Artificial reef besides being fish attractive device, thus renewing resource abundance, could also serve as boundary making it difficult for trawlers and push netters to fish in the community fishing ground. Technical extension on appropriate fishing gears should be given in order to replace the non-selective/destructive/less efficient one. There was also Enhancement and Conservation of Natural Environmental Quality Act 1992. This Act should be promoted for renewing coastal resources, with the support and collaboration among local communities, Non- Government Organizations, Public Organizations, and relevant government agencies. The scheme on the governor being Chief Executive Organization and the Provincial Administrative Organization as well as Tambom Administrative Organization, where appropriate, could assist in development of CBFM/CM.

For socio-economic conditions, adopting CBFM/CM in Thailand would be more likely successful if it was developed in the communities where they were small-scale/ coastal / artisanal fisheries, with long history of fishing, people had indigenous knowledge on their fishery resources and fishing, where community organization was strong, with

financial support at least during the period of resource rehabilitation which constrained fishing activities, and with market outlets to lessen the debt-tied with fish traders.

Once the fishing community had been selected according to the above criteria, checkpoints for adopting CBFM/ CM could be useful. Benefits and beneficiaries should be checked in order to draw most of the participation in CBFM/ CM. Community needs and capacity should be reviewed. The community should need CBFM/ CM and they should be capable in fishery management, otherwise strengthening scheme was required but this improvement could take time. The communities themselves should need changes in physical conditions and fishery management capacity. Community key persons should be looked for. Their effective roles would be important. Roles of Government Organizations (GOs) and Non-Government Organizations (NGOs) should be sought and reconciled. There should be appropriate outreach program for empowerment and extension for effective fishery management. There should also be appropriate outreach program and extension to empower coastal fishing communities in effective fishery management. Investment on building up community capacity should be one of the priorities.<sup>5</sup>

### **Development of CBFM/CM in Thailand**

In early 1990s in collaboration with the United Nations Food and Agriculture Organization in the Bay of Bengal Project, in selected coastal fishing villages in Phangnga Bay in Andaman Sea information on fishing villages were collected. Attempts were on strengthening community capacity in effective fishery management, as a basis for adopting CBFM for coastal fisheries. Being an FAO project Department of Fisheries in Ministry of Agriculture and Cooperatives played a leading role. Along which Department of Fisheries undertook the Small-scale Fishery development Project focusing on development of infrastructure including landing points and gear repair shops, development of local saving group, and co-management.

In early 2000s, Department of Fisheries received a support from the European Union for the Project Coastal Habitat and Resource Management (CHARM). The emphases of the project were on uplifting the coastal ecosystem, human resource development, and strengthening collaboration between the relevant government agencies, especially Department of Fisheries and local government authorities, and the community organization targeting at Tambon Administrative Committees (TAOs) in various selected coastal communities.

To build up capacity of coastal fishing communities, CHARM started from collecting information from in-depth interview and secondary data collection from the selected villages. The secondary data were gathered by TAO. The in-depth interview was

---

<sup>5</sup> Example of successful community-based fishery management in tropical coastal fisheries was the Seto Inland Sea, Hyogo Prefecture, Japan. Efficient fishery cooperative was one of the key successes. The regime could be adopted for coastal fishery management in Thailand, provided that there are capable community organizations. See Ruangrai Tokrisna and Seiichi Fukui (2004)

undertaken with local administrators, key informants, GOs and NGOs at the village level. Rapid Rural Appraisal together with interviewing village headman, occupation group leaders and key informants were carried out to determine the selected study sites. Then questionnaire interview with relevant villagers was undertaken.

Collected information were on geographical information system (GIS), geographical location, and resource utilization, development and impacts on coastal communities, conflict in coastal resource utilization, economic dependence on coastal habitats, collaboration at community level, community perspectives, and community organization.

CHARM Project worked on both side of Thai fishing grounds, along the Gulf of Thailand and along the Andaman Coast. Examples were Ban Pa Klog in Phuket in Phangnga Bay on the Andaman side and Takiem Thong in Ban Don Bay (near Phun Phin in the map), upper Gulf of Thailand.



Figure 1: Map indicating locations of the two selected coastal communities in CHARM Project

In Ban Pa Klog, there was a large conserved forest area up hill in the central of the village and also conserved mangrove forest mainly at the end of northeastern of the village. Some of the coastal areas were mangroves in the zone called economic “Gor” where economic forestry such as mangrove forestry could be allowed under approved concession. Further inside, along the coastline there were para rubber/palm oil plantations. Coastal aquaculture (mainly shrimp culture) could be found in economic

forest “Khor” which were deteriorated mangrove areas. There were also other coastal aquaculture including sea bass culture and grouper culture. The villagers also grew paddy, mainly for domestic consumption, in limited areas. There were also fruit orchards near the conserved forest uphill. In the southern part of the village, the area was urbanized due to the development in Phuket which was import tourist spot in Thailand.

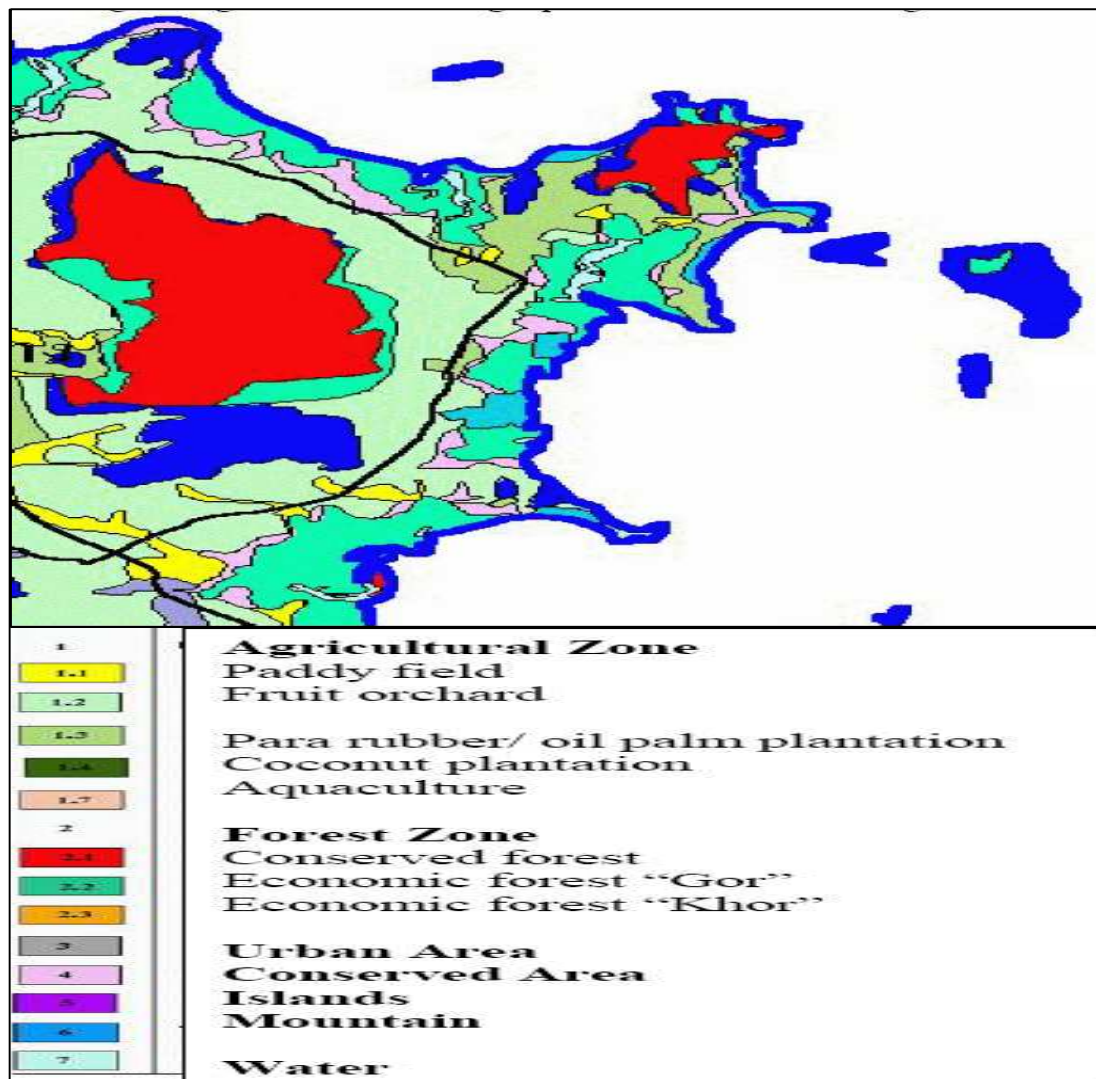


Figure 2: Land use in Ban Pa Klog, Phuket, on Andaman Coast  
Source: Ruangrai Tokrisna (2005: A)

Most of the villagers in Ban Pa Klog were Muslim where the religious leaders were respected. There had been groups of villagers serving the communities in various aspects including saving group, credit for occupation improvement, eco/agro tourism, cage culture which was environmental friendly, mangrove conservation, and school for young generations, and people’s market. Nevertheless due to being on the coastline of Phangnga Bay, one of the world most beautiful Bay, some of the coastal areas had been turned to be

resorts for tourists. Job opportunity was available in tourism, but the local were mainly employees while the owners were non-local. In some of the areas there had been a contrast between modern resort and the poor coastal fishermen. Some of the coastlines had been turned into shrimp farms. In Ban Pa Klog there was also Coastal Fisheries Center ran by Department of Fisheries. The villagers could get advice and assistance on environmental monitoring from the Station upon their request.

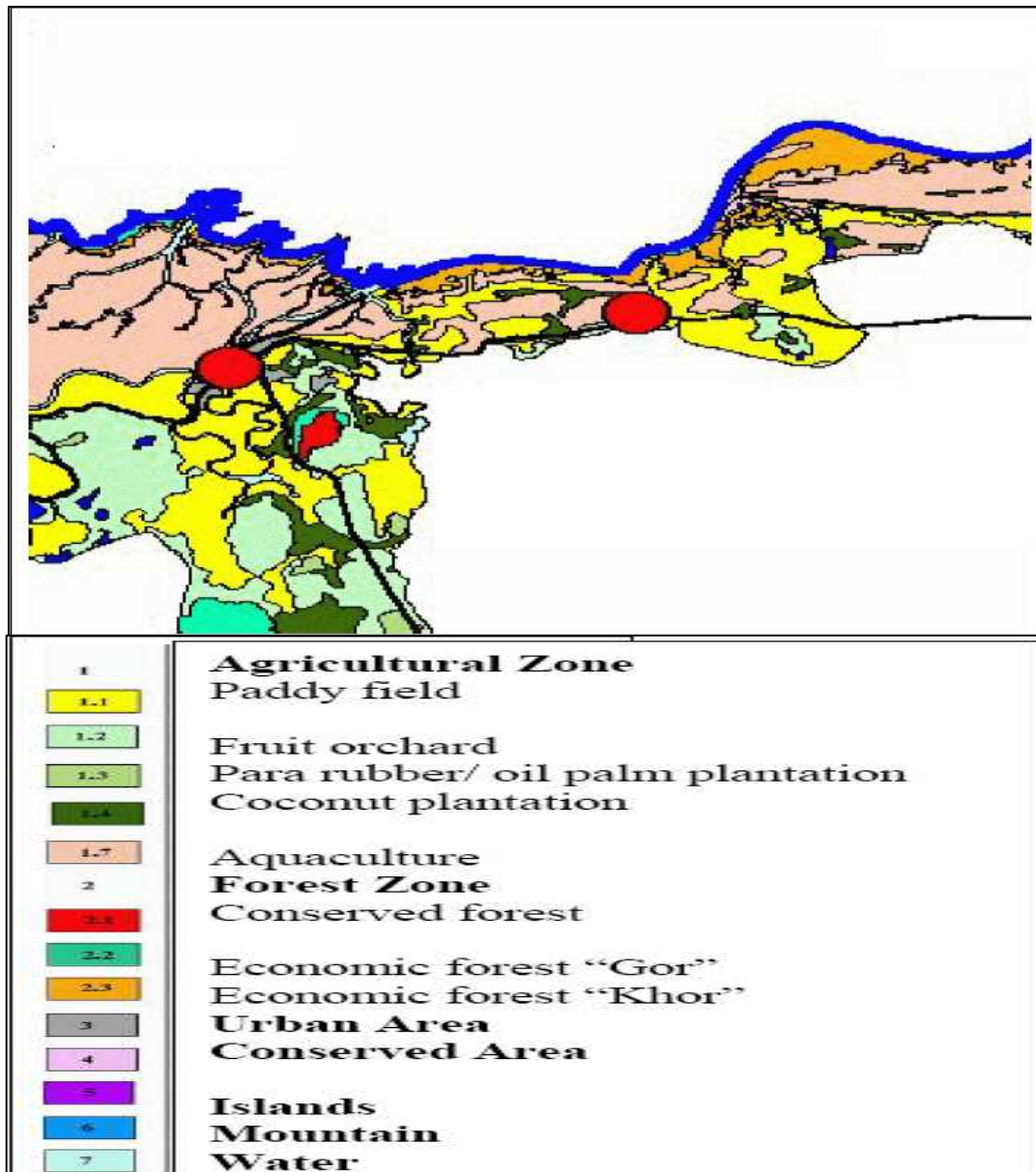


Figure 3: Land use in Takien Thong, Ban Don Bay, in upper Gulf of Thailand  
 Source: Ruangrai Tokrisna (2005: A)

In Takien Thong, Ban Don Bay in the upper Gulf of Thailand, land use was different. Most of the coastal zone had been converted in shrimp farms. There was still economic forest “Khor” on the upper northeastern of the village which nearby located the Coastal Aquaculture Station under supervision of Department of Fisheries. This coastal community was once claimed by the World Bank one of the best area for shrimp farming. Nevertheless due rapid development in lack of effective environmental control, overcrowded shrimp farming, mostly small-scale, lost and had to abandon their farms. Some of the farms were left idle. Some were undertaken by commercial farming who afforded the higher cost of farming. Parts of the village were paddy field. Before turning into shrimp farms this village was self sufficient for rice consumption. After turning paddy field in to shrimp farms and lost, it was difficult to turn the area back to paddy field due higher risk of predator, especially rats. Most were left idle. Recently there were attempts on integrated farming focusing on varieties of local fruits. Further from coastline there were some conserved forests. This village was also famous for coconut plantation and training schools for monkey collecting coconuts. There were also oyster culture, cockle culture, and green mussel culture in this village. Not too far from the village there was fish processing plant. Job opportunity was available for people from this coastal village. It was also noticed that unlike Ban Pa Klog, most of the villagers were Buddhists. For those in the western part of the village, there education was relative higher, thus a better opportunity for non-fishing occupations. Some had a high return from shrimp farming during the period of better environment. They could afford in investment in other occupations. There was also clam boiling for aquaculture feed, including shrimp culture. Along the coastline there were a few shrimp farmers who turned to invest in crocodile farming under the supervision of Chareon Phokaphan (CP), the largest agribusiness firm in Thailand. The villagers were contract farmers with CP. This was a new business in the area which seemed to be profitable.

According to Cowling (2005) there were five key attributes to be kept in good balance in enabling coastal villager to effectively manage coastal resources. They were participation, partnership, building capacity, learning and adaptation, and integrated approaches and method. According to Cowling, development began at the centralized government management. At the beginning the government gave instruction and the community had to listen to the instruction, which had proved not to be effective. What government should do was to consult the community, asked for their advice. Thus there would be better collaboration. Later on the government could give advices and the community, on their thrust, could consult the government. Finally, the government could affirm while the community could inform the success on management and regulation, thus developed co-management scheme.

### **Economic valuation for coastal fishing villages**

Strengthening coastal community capacity in fishery management could take time and incurred investment on human resource development. Nevertheless coastal resources were valuable and should be maintained. The economic value of coastal resources could be divided in to use value and non-use value.

The use values included direct use values, indirect use values, and option values. Examples of direct use values were value of captured fisheries which could be estimated by market value of the potential catches, value of produces from mangroves and other agricultural/ aquaculture production along the coast. These values could be assessed by their market value. Examples of indirect use values were coastline/mangrove ecological function which could be assessed by cost-side approach, surrogate market, or even market value; and recreational/tourism value assessable by surrogate market or contingent valuation method (CVM). For option values which could be also considered as non-use values, examples were biodiversity to be assessed by surrogate market, CVM, choice model, or conditional value of information; and culture/ heritage value to be assessed by surrogate market, CVM, or choice model. Non-use values were those existence/bequest values including biodiversity, culture/heritage, and aesthetic values. These values once could be identified by the analysis on coastal village profile could be estimated using the total economic valuation technique. (Figure 4)

## Economic valuation for coastal fishing villages

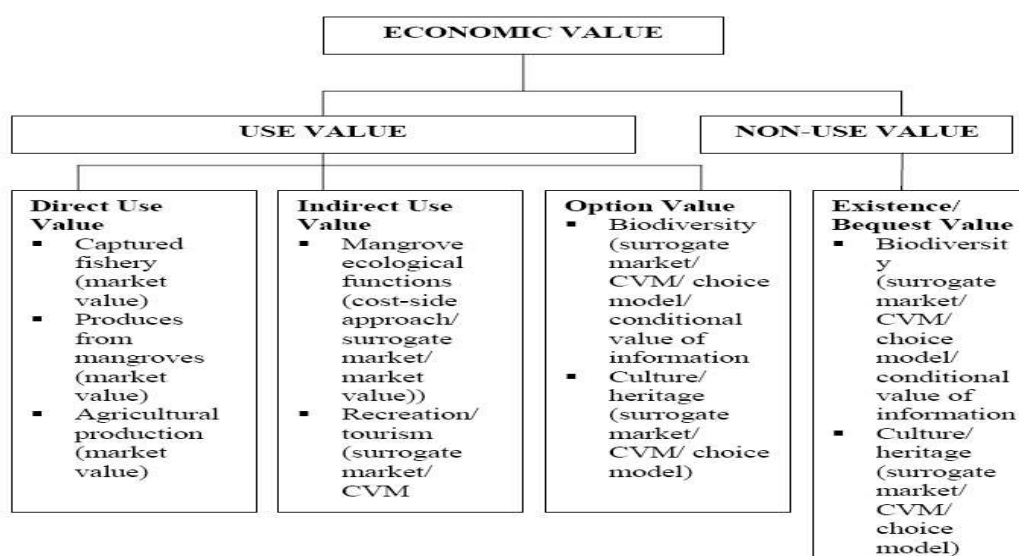


Figure 4: Economic valuation for coastal fishing villages

Source: Ruanrai Tokrisna (2005: A)

## Conclusion

Due to long coastlines of over 2,600 km and limited personnel and budget on fishery monitoring and management, fishery management and enforcement had not been adequately effective for the rapid development in Thai fisheries. Fishery resources, especially in the Gulf of Thailand were degraded due to over capacity. This degradation had been realized by Thai fishermen, both commercial and small-scale fishermen. At present commercial fishermen who still fished in the Gulf of Thailand were willing to

collaborate for fishery resource rehabilitation. The government should seek collaboration from them for a better fishery management. For the small scale coastal fisheries attempts had been on development of co-management regime which was satisfactorily successful at some communities. Capability of local community and the strength of their community organization and leadership were important. Human resource development was important for successful co-management among Thai coastal fishing communities.

## **Bibliography**

Cowling, Victor. 2005. *Co-Management Manual*. Coastal Habitats and resource Management (CHARM) THA/ RELEX/ 2000/ 050. European Union - Thailand Cooperation Project, Bangkok, Thailand.

Tokrisna, Ruangrai. 2000. Conflict in Fishery Resource Utilization: A Case Study of Light Luring Anchovy Fishery in Thailand. *Microbehavior and Macroresults, Proceedings of the Tenth Biennial Conference of the International Institute of Fisheries Economic and Trade*. IIFET 2000. July 10-14, 2000. Corvallis, Oregon USA.

Tokrisna, Ruangrai. 2002. Economic Instruments for Thai Marine Rehabilitation. Fisheries in the Global Economy. *Proceedings of the Eleventh Biennial Conference of the International Institute of Fisheries Economic and Trade*. IIFET 2002. August 19 – 22, 2002. Wellington, New Zealand.

Tokrisna, Ruangrai and Seiichi Fukui. 2004. Community Based Coastal Fishery Management: Lesson Learned from Seto Inland Sea – Hyogo Prefecture, Japan. *Journal of International Cooperation Studies*, Volume 12, Number 1, August 2004. Graduate School of International Cooperation Studies, Kobe University, Japan.

Tokrisna, Ruangrai. 2005: A. *Baseline Investigation and Utilization and Economic Value of Coastal Habitats from Community Perspectives*. Coastal Habitats and resource Management (CHARM) THA/ RELEX/ 2000/ 050. European Union - Thailand Cooperation Project, Bangkok, Thailand.

Tokrisna, Ruangrai. 2005: B. *Thailand Case Study Report*. A report prepared for the Department for International Development (DFID), Project: “The Role of Fisheries in Poverty Alleviation and Growth: Past, Present and Future”. May 2005. CEMARE. May 2005.

Tokrisna, Ruangrai. 2006. Renewal Fishery Resource Abundance and Poverty Eradication for Coastal Fishermen in Thailand . *Proceedings of the Twelfth Biennial Conference of the International Institute of Fisheries Economic and Trade*. IIFET 2006. July 11 – 14, 2006. Portsmouth, The United Kingdom.