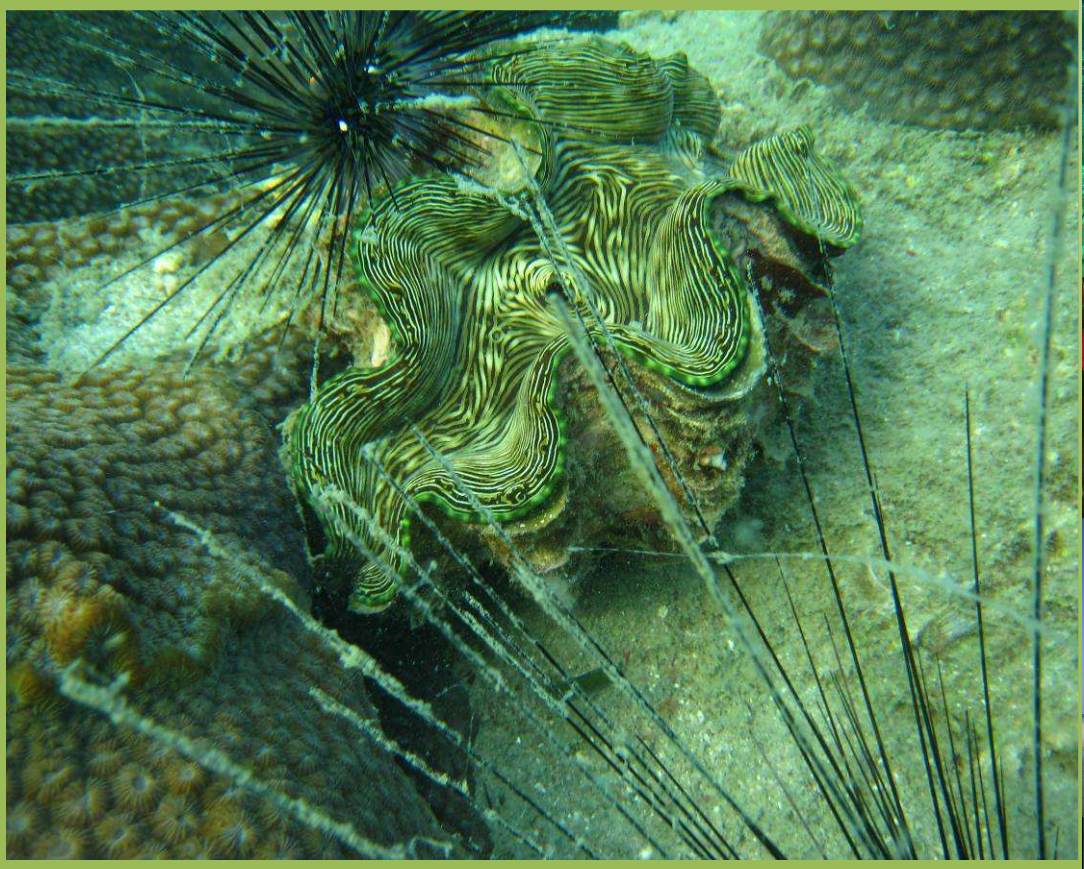
# FISHERIES ACTION COALITION TEAM



## Socio-economic Monitoring of Coral Reef in Koh Rong Island, Preah Sihanouk Province, Cambodia

2010

**An Assessment Report**
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# FORWARD

The Fisheries Action Coalition Team (FACT) is a coalition of local and international NGOs, established in 2000, that focus on environmental issues around the Tonle Sap Lake and in particular monitor the fisheries sector.

FACT works closely with fishing dependent communities around coastal region and Tonle Sap, in Cambodia's upper and lower Mekong regions, and the coastal provinces supporting them in building their organizations and networks so that they can advocate effectively for themselves on issues that affect them. FACT also advocates to decision makers to explore alternatives for fishing communities in order to improve their livelihoods.

FACT is presently implementing five programs, with an underlying emphasis on human rights, sustainable livelihoods, education, and awareness raising. FACT also involves in gathering information on fisheries issues, collecting facts and opinions, analyzing and distributing it to governmental line agencies, donors, and other relevant people, as a mean of advocating them for the supports of fishing communities. Furthermore, FACT facilitates dialogues between NGOs, CCFs and other relevant stakeholders (local authorities, specialized institutions etc.) to debate, discuss and find solutions on fisheries issues and conflicts.

Recently FACT is playing a crucial role in working to empower the local people in order to protect and manage natural resources in properly way. Mangrove forest, coral, sea grass, sea weed are the important shelter for marine spices. On the contrary, this kind of shelter is damaged day to day due to the illegal behaviours and privatization in Cambodia. By looking this issue in coastal region, FACT is now working on natural resources managing by empowering community.

We hope that this assessment can be a good baseline for this area for under taking any projects. It will be also useful for managing of concerned stakeholders in this area. Some recommendations and lesson learnt can help the authority, community and others who are working in this area to make a good plan for managing the natural resources. Therefore this result is important for study, research, and developer also.

We also hope this result can use to apply in other area in Cambodia to conduct the assessment, especially the lesson learnt which we found during field work.

Yours sincerely,
Fisheries Action Coalition Team

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## 1. Site description

The island of Koh Rong is located offshore about 34 Km from and northwest of the mainland of Sihanoukville port. It lies between the coordinates of UTM 1178 to 1192 N, and 3028 to 3165 E. Geographically, Koh Rong is the second largest island in Cambodia covering an area of approximately 9,997 ha after the island of Koh Kong (in Koh Kong province), and lies between the well-known touristic destination islands of Koh Rong Samlem (toward the south) and Koh Ta Team and Koh Mneas (to the north). Koh Rong has three subordinated small islets locally known as Koh Oun (lady), Koh Bang (man) and Koh Daung.

Administratively, Koh Rong hosts four villages: Daem Thkov, Koh Toch, Prek Svay and Sok San, but only the former three were legally registered with the Ministry of Interior. Daem Thkov is located east of the island, Koh Toch on the south, and Prek Svay on the northeast end (Fig 1). The boundary among the four villages has not been clearly demarcated. The population is concentrated on the southern and eastern coast of the island as most people are fisherman. This area is mostly flat, forming a slightly small estuarine area of the island. The northern and southern parts of the island are geologically characterized as having many cliffs and are inappropriate for settlement.

The village of Prek Svay was reportedly established a long time ago, probably since the King Norodom Sihanouk regime (1953-1970). A number of old planted coconut trees indicate the presence of a few established houses during this time. From 1975 to 1979 during the Pol Pot era, local inhabitants were totally evacuated to the mainland, mostly to Botum Sakor district of Koh Kong province. The village as well as the whole island was then used as a military base. Interestingly, during the period of 1979-1990, in addition to becoming a naval base, the island was also used as the stop off point for smugglers trading illegal commodities from Thailand which were being sent to Kampong Som town (which is now legally named Sihanoukville). After 1990, approximately 40 families of original inhabitants who survived the Pol Pot era returned to the village, some settling on land lots left from their parents or grandparents.

Since then the number of households have tremendously increased. Most likely this is due to an abundance of natural resources (eg fish) and the many livelihood opportunities the island offers. Most new immigrants came from the provinces of Kampot, Koh Kong, Kampong Speu, Takeo, Prey Veng, and Svay Rieng. As of February 2010 statistics from the village head state that the total number of households is as many as 148 with a total population of 677 persons, of which 319 persons are female. However, during household surveys conducted in early March 2010, we found the exact number of households currently having permanent residents within the village of Prek Svay accounts to only 122 households. The village head explained that those who were not present at the time of survey emigrated to other provinces in search for jobs, they returned during the election events (national and commune).

Due to awareness of increasing depletion of natural resources on the island, the villagers in Prey Svay initiated a community fishery in 2003 with the assistance of Fishery

Cantonment in Sihanouk Province. The community is legally entitled "Phumi Prek Svay Community Fishery" and registered with the Ministry of Agriculture, Forestry and Fisheries with lawful recognition from local authorities (commune to provincial levels). The community was provided with a total sea area of 7,447 ha for sustainable exploitation and conservation of fishery resources, including coral reef, sea grass and mangrove.

Since the establishment, the community had not moved in a smooth manner mainly due to a lack of technical and financial support as well as inexperience in community fishery projects. However, in 2008 with assistance from Danida-DFID funded Project through Fisheries Administration (FiA), the community appeared to have had remarkable progresses and it is recognized a modal community fishery within the coastal provinces of Cambodia. Among these achievements are those of demarcation of community fishing ground by plastic buoyants (paid by community members), crab bank (for hatching the egg bearing crabs captured wild), aquaculture (snappers supported by the above project), building community office and a wooden port connecting cages of crab bank (community contribution). In addition to support of the cage, the project also procured the community with a speed boat for conducting patrols in order to suppress illegal activities.

Although, there is much support from the relevant government agencies, NGOs and donors, the community, particularly executive committee, is still facing a lack of technical skills over organization and management of the fishery. Furthermore, the capacity to tackle against large scale illegal fishing activities like push-nets and trawls has remained a significant issue. There is a need to provide them with sufficient training on capacity building so that they are able to tackle newly emerging issues and problems within their community. Community education and awareness raising on the significance of coastal/marine resources would definitely encourage community people to take part in conservation and protection activities.

## 2. Goals and objectives of the assessment

The primary purpose of this assessment is to collect baseline information about the socio-economic situation of the local community involved marine resource conservation in Koh Rong island and perhaps uses this information a representative case study of the whole population of coral reefs within Cambodia. Moreover, the specific objectives of this study were confined to:

- Assess the perspectives of local people on coral reef and other associated species
- Assess the socio-economic status of community fishery on the island
- Evaluate the awareness of local people on natural resources and law/regulation

The research findings will be used to strengthen the capacity of community fishery in better management of coastal and marine sources for sustainable utilization within the community. Beside this, the results will be used to inform the concerned government officials for proper support, especially to fight against the anarchical fishing activity committed by powerful people within their fishing ground. Also, concerned NGOs and

donors will use the results for expansion of their activities to the community with concerted common efforts of conservation of coastal and marine resources.

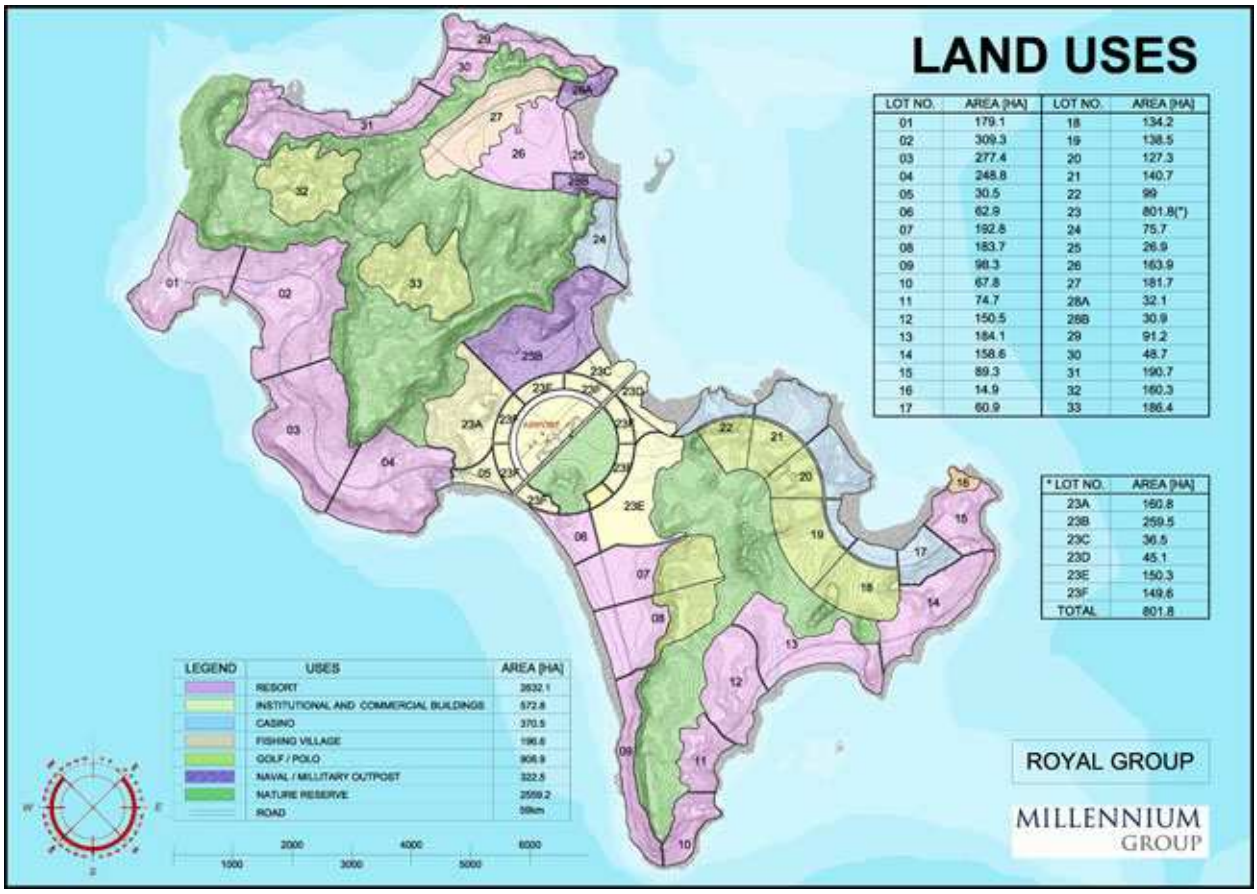


Figure 1. Land use map of Koh Rong (a temporary map, it will be inserted once administrative one is completed) (Royal Group, 2009)

## 3. Indicators Selected

The indicators employed for this assessment are solely based on the standard guideline of SocMon developed for the ease of use. As can be seen in the guideline, all the indicators listed are appropriate to the social, political and ecological context of Cambodia's coastal community. Although, there is a minor rearrangement of indicators listed in secondary source/key informant and household interviews, it is a matter of need to make the data collection process easy due to time and finance constraint. The table 1 below summarizes selected indicators used in this study.

Table 1. Summary of selected indicators

| ***Category*** | ***Indicators*** |
|---|---|
| *Demographics* | *Study area*<br>*Household size*<br>*Age and Sex*<br>*Ethnicity*<br>*Religion*<br>*Language*<br>*Education*<br>*Occupation and Sources of Income* |

| | |
|---|---|
| | *Migration* |
| *Community infrastructure* | *Major infrastructures existing in the study site* |
| *Coastal/marine activities* | *Coastal and marine activities*<br>*Goods and services and their values*<br>*Market orientation of goods and services*<br>*Household uses of goods and services*<br>*Types of use and use patterns*<br>*Types and levels of impact*<br>*Level of use by outsiders* |
| *Governance* | *Management body*<br>*Management plan*<br>*Enabling legislation*<br>*Resource allocations*<br>*Formal tenure and rules*<br>*Informal tenure and rules*<br>*customs and traditions*<br>*Institutions and stakeholders* |
| *Threats* | *Perceived threats to coastal management* |
| *Attitudes and perceptions* | *Household attitudes and perceptions towards coastal/marine resource management*<br>*Awareness of rules and regulations*<br>*Compliance and enforcement*<br>*Participation in coastal management rules and regulations* |
| *Perceived problems, challenges and their solutions* | *Perceived coastal management problems and their solutions*<br>*Perceived community problems and their solutions*<br>*Success in coastal management*<br>*Challenges in coastal management* |
| *Material style of life* | *Types of household buildings* |
| | |

# 4. Methods

By following the SocMon data collection guideline, the tools for data gathering which were employed for this study are those of: 1) key informant/secondary source and focus group discussion, 2) Household survey, and 3) Observation (See Appendices 1A and 1B).

### 4.1 Key Informant/secondary source and Focus group discussion

The secondary source of data such as laws and regulations, past study's on the coral reef including related coastal/marine resources, maps and formal documents of Phumi Prek Svay community fishery, and previous study document relevant to coastal/marine resource management were also considered for this study. These were almost all collected from Fisheries Administration headquarter in Phnom Penh and online sources.

Key informant interview checklist merely followed the standard indicators mentioned within the SocMon guideline, although several new indicators such as history of the study

area, geographical patterns and status of natural resources were also added for the in-depth understanding of community settings. In order to collect adequate data based upon the stated indicators within time constraint, two methods of key informant interview and focus group discussion were employed. The field work was carried out during 26-28 Feb 2010. The key informant interviews were made with village chief of Prek Svay, head of community fishery, experienced elder fishers in the village, and fishery officials of FiA at Phnom Penh on community formality, rule and regulation on resource management and conservation.

The focus group discussion was also undertaken separately from key informant interview, with approximately 20 active members of the community, including the community head and community committee members. The opened questions of household indicators such as H9, H17, H18, H21, H22, H23, H24, H25, H26, and H27 were included in focus group discussions as well. This particularly helped us grasp the overall answers towards each question given by the community and allowed for a kind of standardisation of results from the individual household surveys.

In this regard, the group discussion was divided into three sub-groups mainly pursuant to categories of set indicators and experiences each participated member has had. The arrangement allowed the members to be concentrated on the issues with which they were most familiar. The three groups are those of working on 1) KS indicators, 2) participatory community mapping, and 3) H indicators aforementioned. Each group was actively facilitated by experienced researchers, making sure each participant had an equal opportunity to express their opinions with thorough consideration of gender balance. However, each group mutually exchanged information if any question could not be addressed by another. Participatory community mapping was specifically employed in order to gain an in-depth understanding of and map out geographical settings, infrastructure, locations of particular natural resources (like coral reef, sea grass, mangrove, freshwater, upland forest, etc), boundary of community fishery area, and fishing activities.

**4.2 Household survey**

By using the data from the first field work exercise of key informant interview and focus group discussion, the household survey questionnaire was carefully manipulated and prepared with inclusion of answers of above stated household questions into the finalized questionnaire (Appendix 1B). This would allow the field enumerators as well as respondents to easily to fill in and answer questions accordingly, but there was room for household respondents to address additional answers that were not raised.

Because the community people in the studied village were largely homogeneous in terms of occupations (fishing and farming), no special sampling method was necessarily employed to select the sample for interviews. The sample size was randomly selected by applying the rule of thumb (30 percent of the total households within the village). Random sampling methods by lucky draw with assistance of household lists provided by village chief, was used. Based on these statistics, 43 households were randomly drawn from the total number of 148 households legally registered in the village.

Seven student enumerators were carefully trained to handle the household interview questionnaire. During the field work (5-9 Mar 2010), each enumerator was also assisted by one field assistant (chosen from local fishers) in order to identify the selected households for interview, locating where they stayed in the village. During lunch and dinner time, already filled in questionnaires by individual enumerators were thoroughly checked for consistency of data entered during individual household interview. It was also ensured that each question was properly filled in. Hence, it was also a good opportunity to share fresh experiences of methods used to ask questions and obtain very concise answers from respondents.

### 4.3 Observation

This tool was mainly employed to record the hidden data or information respondents were afraid of expressing freely during the open interviews and discussion groups. In addition, this was used to get some indication of local customs, traditions, fishing gear used and economic activities including illegal fishing activities occurring within the community fishing ground.

Figure 2. Participatory community mapping and Focus group discussion

## 5. Results

### 5.1 Community Demographics

During the course of the field survey, the total population currently residing in Prek Svay village accounts for 677 persons, of which 319 persons are female, forming a total number of 148 households (families). By computing the percentage of population based on the distinct age groups, it was estimated that 25 percent of the population was at the age of 0-18 years old, 15 at 19-30, 45 at 31-50, and 15 percent at the age of over 50. Therefore, the labour force of the working population at age of 19-30 is relatively low, which places most working households in a difficult position.

As the village is relatively isolated from the urban area and mainland, the average household size is not large, and estimated to be as low as 4.8 persons including spouse, children, grandparents (little numbers of relatives who stay temporarily for seasonal earnings). The minimum household size was 2 persons (mostly spouse), whilst the maximum was 8.

The majority of the population inhabiting in Koh Rong island were Khmer, although there is one family representing a Muslim (Cham) ethnicity and another Vietnamese who is now registered as Khmer national as well. In term of religion, Buddhism encompasses approximately 99 percent of people on the island, while only one family were Muslim. However, and there is no significant indication of discrimination.

Although, the island is offshore and with little educational facilities, including school buildings, teachers and teaching materials, about 90 percent of the whole population has at least a rudimentary proficiency in reading and writing Khmer. There are three primary schools on the island, one of those is located in Prek Svay village. Better off families were able to send their children to secondary, high schools and even university in Sihanoukville or Phnom Penh.

After 1990, in addition to the returnees coming back to their homeland, many people immigrated into the island from many provinces of the country, beginning with the first 40 households and now arising up to 148 as of March 2010 statistics. During past several years the migration rate was relatively low, because people realized that fishery and island forest resources were no longer free and available. Immediately earlier 2010, three families immigrated into the village, and during 2009 some 23 families sought a livelihood opportunity outside the island, but their residences were retained in the village and so were their names.

### *5.1.1 Occupation*

As the community people are heavily dependent upon natural resources, their main occupations are much more engaged in fishing and farming than other communities on the mainland. According to a village chief, as high as 90 percent of total households (148) made their living from fishing and farming and approximately 15 families in Prek Svay village were involved in full time fishing.

The table below shows the occupation by each household member. Fishing and farming are the major occupations and accounts for 24 percent of the total numbers. Ten percent of them said petty grocery and food vendors as their occupation and 8 percent as workers. Within households, about half the members do not generate any income as they are either old or students (Table 2).

Fishing and farming are interchangeable economic activities of most households in the village. As Cambodian people are accustomed to use rice and fish as a staple food, fishing provides animal protein consumption, while rice is a major source of daily energy consumption. Likewise, as the island is far from the mainland, the islander people have adapted the self-dependent sufficient economy via engaging in fishing and farming and

they are not concerned about how to search for rice at, and transport from, the mainland. Moreover, there are favourable conditions including ferrite soil, high rainfall and suitable temperature which are excellent enabling factors for farming.

Outside work included casual and garment work. Only three persons were reported to have sought jobs in Phnom Penh as garment workers. The casual workers were reportedly finding their jobs within private companies (Pro Corn and Royal Groups for development of tourism facilities) on the island as security guard, construction workers, cleaners, house maids, etc. Pro Corn (an Australian company) is currently developing Koh Oun and Koh Bang islands opposite Prek Svay village. Royal Groups owned by Oknha Kit Meng in joint venture with a American firm, works on the main island of Koh Rong, especially on road construction, and resort facilities for tourists. Although, as observed during the course of field work, the speed of construction and preparation for touristic activities appeared to be slow, thus at this time this development may not sufficiently benefit the local people rather than employing little number of villagers as casual workers.

In term of tourism, there is one family who run a guesthouse as a secondary occupation. It served all types of tourists, but catered predominantly to local tourists (offering only basic services)

Table 2. Occupation of villagers in Prek Svay

| Occupations | Primary | | Secondary | | Total percent of community members dependent on primary and secondary occupation |
|---|---|---|---|---|---|
| | Number of household listed as primary occupation | Percent of household members listed as primary occupation | Number of household listed as secondary occupation | Percent of household members listed as secondary occupation | |
| Fishing | 37 | 17.29 | 14 | 7.25 | 23.83 |
| Farming | 28 | 13.08 | 23 | 11.92 | 23.83 |
| Worker (garment and casual worker) | 15 | 7.01 | 3 | 1.55 | 8.41 |
| Fishery trading (middleman) | 5 | 2.34 | 0 | 0.00 | 2.34 |
| Petty Grocery and food vendor | 12 | 5.61 | 10 | 5.18 | 10.28 |
| Transportation | 5 | 2.34 | 3 | 1.55 | 3.74 |
| Logging and woodfuel collecting | 6 | 2.80 | 3 | 1.55 | 4.21 |
| Government servants | 5 | 2.34 | 0 | 0.00 | 2.34 |
| Boat and house building/repairing | 3 | 1.40 | 3 | 1.55 | 2.80 |
| Tourism | 0 | 0.00 | 2 | 1.04 | 0.93 |
| Others(old people, student) | 98 | 45.79 | 132 | 68.39 | 107.48 |
| ***Total*** | ***214*** | ***100.00*** | ***193*** | ***100.00*** | ***190.19*** |

By working on age groups and educational levels (Table 3), 61.5 and 69.2 percent of respondents at the age of 31-45 and with primary education, respectively, have primary occupations as fishermen. However, 54.5 percent of respondents at an age over 45 years

old were engaged in farming as their primary occupation, with63.6 percent having had primary education. This indicated that people with older ages were more interested in farming than fishing as they may be unable to go away from home and no longer able to physically conduct fishing activities.

Workers at ages of 20-45 years old and with primary education represented some 86 and 71.4 percent of respondents, respectively, that were employed by the private firms on the island. People at age of over 45 were rarely employed by private firms, because their manual labour strength is relatively week, being unable to handle heavy work.

Fishery trading (middleman) and petty grocery/food vendor attracted 100 and 50 percent of villagers at age of over 45 and 20-30 years old, respectively, who noted as primary occupation. Petty grocer and food vendors had pursued education from primary (33.3%), secondary (50%) and university (16.7% of total respondents) levels. On the other hand, fish traders had no education at all. This is because only one household (total three households in village) who had a chance of having been chosen for questionnaire interview.

All respondents who were involved in the transport sector or collected wood fuel or did logging, as their primary occupation, were over 45 years old. This is because in the village studied, transportation is operated by only one household. Both respondents have primary education.

About 50 percent of villagers in each age group of between 31-45 and over 45 are government servants. Half of them have primary education while the other half has no education. However, a low illiteracy rate (10%) indicates that many villagers received informal training. Boat and house building/repairing made up 100 percent of respondents within age groups of 20-30 and 31-45 years old who could deal with heavy duty, whilst people at age of over 45 was not good at this work.

Table 3. Primary occupation arranged by age groups and education levels

| **Primary Occupation** | **Percent Responses** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Age 20-30 | Age 31-45 | Age over 45 | Primary school | Secondary school | High school | University | No Education |
| Fishing | 15.4 | 61.5 | 23.1 | 69.2 | 7.7 | 7.7 | 0.0 | 15.4 |
| Farming | 27.3 | 18.2 | 54.5 | 63.6 | 18.2 | 9.1 | 0.0 | 9.1 |
| Worker (garment and casual workers) | 42.9 | 42.9 | 14.3 | 71.4 | 0.0 | 0.0 | 0.0 | 28.6 |
| Fishery trading (middleman) | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 |
| Petty Grocery and food vendor | 50.0 | 33.3 | 16.7 | 33.3 | 50.0 | 0.0 | 16.7 | 0.0 |
| Transportation | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Logging and wood fuel collecting | 0.0 | 0.0 | 100.0 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Government servants | 0.0 | 50.0 | 50.0 | 50.0 | 0.0 | 0.0 | 0.0 | 50.0 |
| Boat and house building/repairing | 50.0 | 50.0 | 0.0 | 50.0 | 0.0 | 0.0 | 0.0 | 50.0 |
| Tourism | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |

In traditional Cambodian society, men are usually responsible for heavy work while woman work at home (sale of fishery products, repairing nets, cooking, washing, etc). For fishing occupations, men occupy as high as 77 percent of the labour force within households interviewed, while woman as low as 23 percent. Similarly, approximately 64 percent of men were engaged in farming, whereas 36 percent of women were. In term of religion, among the 43 households interviewed (the whole village), one family is Cham and were Muslim, engaging in fishing and farming, and the rest were Buddhist.

Interestingly, fishery trading and petty grocery/food vendors have a higher percentage of women amounting for 100 and 66.7 percent, respectively.

Transportation, logging/wood fuel collecting, and boat and house building/repairing commanded labour forces specifically served by men who are able to manage heavy work. Whilst, government servants (comprising of village committee members, police, navy and teacher living within the studied village) required labour force each half from man and woman, as they are mostly involved in operation of administrative works.

Table 4. Primary occupation arranged by sex and religions

| **Primary Occupation** | **Percent Responses** | | | | |
|---|---|---|---|---|---|
| | Male | Female | Buddhism | Muslim | Christian |
| Fishing | 76.9 | 23.1 | 99.3 | 0.7 | |
| Farming | 63.6 | 36.4 | 99.3 | 0.7 | |
| Worker (garment and casual worker) | 71.4 | 28.6 | 100.0 | | |
| Fishery trading (middleman) | .0 | 100.0 | 100.0 | | |
| Petty Grocery and food vendor | 33.3 | 66.7 | 100.0 | | |
| Transportation | 100.0 | 0 | 100.0 | | |
| Logging and woodfuel collecting | 100.0 | .0 | 100.0 | | |
| Government servants | 50.0 | 50.0 | 100.0 | | |
| Boat and house building/repairing | 100.0 | .0 | 100.0 | | |

### *5.1.2 Household Income sources*

The income sources in the village included fishing, farming, garment and casual labour, small merchandise, boat/house construction/repairing, logging and wood fuel collection, transportation, government jobs and tourism (only one 6 room guesthouse in the village centre). Among those, fishing and farming make up about 60 percent of primary income sources for the villagers, followed by garment/casual work and petty grocery/food vendor. Three quarter of families obtain a certain percentage of income from either fishing or farming. House and boat construction/repairing, government jobs, logging and wood fuel collecting, and transportation have small amounts of people who undertake them as a primary occupation. Within the village, one household operated boats construction and repairing yard with several workers from within the village. Similarly, there is also one household conducting transportation as a primary occupation, which

transported passengers to and from Sihanoukville and Koh Rong island at one trip per two days.

Table 5. Household income sources

| Occupation | Percent noted as primary source | Percent noted as secondary source | Percent noted as tertiary source |
|---|---|---|---|
| Fishing | 30.2 | 14.0 | 4.7 |
| Farming | 30.2 | 16.3 | 4.7 |
| Worker (garment and casual worker) | 18.6 | 2.3 | 2.3 |
| Petty Grocery and food vendor | 11.6 | 2.3 | 2.3 |
| Boat and house building/repairing | 4.7 | 0 | 0 |
| Government servants | 2.3 | 9.3 | 0 |
| Logging and wood fuel collecting | 2.3 | 4.7 | 0 |
| Transportation | 2.3 | 0 | 0 |
| Tourism | 0 | 2.3 | 0 |

**Types of household buildings**

Zinc is the most popular material for roofing in the area followed by thatch. Over 90 percent of household buildings used either of these two materials. Tile and plastic roofing was relatively minor. For the structural walls, wood is the most common material being used. 77 percent of household buildings were using wood for the outside structural walls. Zinc, brick and concrete, thatch and bamboo and tree bark are other materials being used by the respondents. There are many houses without windows (35 %) and those equipped with windows are using wood (40 %) and use 'hall' in the wall as window (14 %). Glass or plastic windows are not very common in the village. Over 85 percent of houses are using wood and plastic as floors, because they have long lifetime against the salinity. Tile, bamboo and dirt are occasionally used for flooring (2 to 5 %).

Table 6. Material style of life

| Types of Household Buildings | Material | No. of HHs | Percent respondents noted |
|---|---|---|---|
| Type of roof | Tile | 1 | 2 |
| | Zinc | 33 | 77 |
| | Wood | 0 | 0 |
| | Thatch | 6 | 14 |
| | Plastic | 1 | 2 |
| Type of outside structural walls | Zinc | 1 | 2 |
| | Brick and concrete | 1 | 2 |
| | Wood | 33 | 77 |
| | Thatch and bamboo | 2 | 5 |

| | | | |
|---|---|---|---|
| | Plastic and tent | 0 | 0 |
| | Tree bark | 3 | 7 |
| Windows | Glass | 1 | 2 |
| | Wood | 17 | 40 |
| | Open | 6 | 14 |
| | None | 15 | 35 |
| | Plastic | 1 | 2 |
| Floors | Tile | 2 | 5 |
| | Wood and plastic | 37 | 86 |
| | Concrete | 0 | 0 |
| | Bamboo | 1 | 2 |
| | Dirt | 1 | 2 |

Figure 3. Type of household buildings with wood and zin

## 5.2 Community Infrastructure

### *5.2.1 Basic infrastructure*

Infrastructure in the island has been poorly developed due to isolation from the mainland and a small population. After the government granted the island to private firms for the touristic destination concession, the infrastructural facilities like road networks and resorts are under planning and construction by those private firms. When completed, roads could be used by the community as well. As could be seen during the survey and results generated by participatory community mapping, there are roads (constructed by Royal Groups in Daem Thkov village), primary schools, healthcare centre, commune office, communal police office, community fishery office, local port, guesthouse, one typical pagoda, potential tourist sites and mobile phone antennas which can be seen from the distance.

**Road:** There is only one main road in the island situated in Daem Thkov village, southeast of island, and being constructed by **Royal Groups** in early 2010. The company has reportedly traced and demarcated the forested straits around the island for road construction. Boat is the only single means of transportation for people on the island.

Local authority offices such as **commune office, commune police office, and a healthcare centre** are located in Daem Thkov village (where the navy base is located).

**Local ports and community fishery office:** There are eight local ports for transportation (uploading and unloading daily passengers and commodities shipped from Sihanoukville and elsewhere) operated by different owners. One village is equipped with at least one port. But Prek Svay has two (one of these built by Community Fishery) and unregistered village of Sok San (southern part of island) has three which were used for tourist and passenger transportation purposes. Marine border police unit stationed in Koh Toch village (south) has built a port and a naval unit locate in between Daem Thkov and Prek Svay villages.

In order to facilitate the organisation, function and proper management, Community Fishery in Prek Svay has constructed a typical wooden building sitting on the coast, with a shared cost from its members.

Figure 4. Local port and cottage for crab bank built by community people in Prek Svay

**Schools:** There are basically three primary schools; one in Daem Thkov village, one in Sok San village, and another in Prek Svay village. In addition, two pre-primary schools (kindergarten) are also available in Daem Thkov and Prek Svay villages. However, there is neither secondary school nor high school in the island. Students who want to continue to these levels have to go to Sihanoukville or Koh Kong provincial town.

**Tourism site**: The main tourism site in the Koh Rong is located in Sok San village. The shoreline covers with the beautiful beach which can be developed into a resort. Other sites included Koh Toch and Koh Sangsa (Koh Oun-Koh Bang islands) immediately opposite Prek Svay village. Moreover, there are several locations of beautiful beaches for tourists around the island. There is a are six room guesthouse operated by household members of village chief of Prek Svay (premium price at 5 USD per night).

**Mobile phone antennas**: In Prek Svay territory, there are three mobile phone antennas being operated by distinct firms Mobitel (012), Mfone (011) and Hello (016). Whilst, two Metfone (097) antennas are positioned on the southern part of the island.

**Electricity:** There is no regular electricity supply in the assessed area, the electricity is generated by small diesel generators run by local people. The lightening time is available during night time from 6:30pm to 9:30pm.

**Resettlement areas, market and religious temple:** People in the island settle mostly on the beaches and estuary where they have easy access to transportation and livelihood activities. Sok San, Koh Toch and Prek Svay villages sit on the beaches, while Daem Thkov is located in the reef area where it is more populated than other villages on the island.

There is no major market on the island, although sale and purchase often take place at individual houses acting as a typical shop. In Prek Svay village, there are several typical food shops situated in the village centre, and some of those offer grocery sale as well, including fishing gear. The grocery as well as fishing gears and other commodities for basic needs are taken from Sihanoukville. It was reported that a commune chief of Koh Rong has controlled this business and is the only powerful merchant on the island.

There is one Buddhist temple in Prek Svay village, that is used by followers (most of villagers are Buddhist) for various Buddhist related festivals. Traditionally, the temple also plays an important role for education of villagers, especially for conservation of localized resources.

### *5.2.2 Geographical Patterns*

The island extends diagonally northwest to southeast and is geographically divided into two interconnected parts of hills by slightly flat plains in the centre. The hills have patchy and fragmented forest cover as the forest has reportedly been logged for commercial timber since the 1980s. With the stable increase of population into the island since 1990s, many parts of forested area have been clear-cut for agricultural purposes including rain fed rice and upland crop farming which takes place mostly on coastline of eastern part of island. Several small streams flow to the east, particularly to the areas which form the beach. Beaches surround almost the entire island, except locations with reefs.

Prek Svay village extends on a beautiful beach which might be formed by sand deposition by natural process through a stream originating from nearby hills. The beach extends about 500 m down into the sea and can be distinguished clearly during the low tide.

Figure 5. Beach in front of Prek Svay village during low tide (March 2010), Koh Bang and Koh Oun at the distance

There are ten small streams scattering in the island, which are sources of freshwater for domestic use during raining season. There are three streams in the studied village. One of them namely Prek Bang Oun flows across the village centre where populated settlement area takes place. Other two (Prek Bet and Prek Svay) are located outside the resettlement area. These three streams perhaps form an estuarine area to support a mangrove area of about 57 ha in the community.

Total area of farmland was not known, but area for rain fed rice reportedly covers approximately 6 hectares and upland cropping farms scattered on hills of perceived Prek Svay territory (separate from 6 ha rice field). Coconut trees are popular upland crops amongst people on the island, and can be found on most of beaches.

### 5.3 Coastal/marine natural resources

Natural resources in the area such as fishery, coral reefs, sea grass, mangrove, upland forest and wildlife play a very important role in sustaining livelihoods of the local communities and development of local economy.

Little was known about fishery resources in the studied island, but a recent rapid assessment conducted by a team of scientists for Cambodia Reef Conservation Project (CRCP) from Coral Cay Conservation, Fisheries Administration (Cambodia) and the Dive Shop have identified several commercial fish species. Those are groupers, snappers, butterfly fish, and yellowfin Barracuda, which are frequently found around the island (van Bochove et al, 2009). However, according to the 1982-1986 study by scientists from the former Soviet Union and Fisheries Administration (formerly Department of Fisheries), 474 species from 105 families have been identified from Cambodian offshore marine waters (Touch and Todd, 2003).

Coral reefs and sea grasses are considered a productive tropical forest ecosystem and known to support high biological diversity of aquatic fauna, serving as feeding, spawning and sheltering habitat for fish and variety of marine life forms. The coral reefs and sea grasses intermingle with one another, particularly around islands (MOE, 2005; Mam, 2002), which was also reportedly found in Koh Rong. According to the Asian Development Bank (ADB) survey (1999), the coral reef area was estimated to be approximately 476 ha and sea grass is about 175 ha within Cambodia marine waters. There has not been extensive studies to document the number of coral species, species composition, and its ecology all over the Cambodia sea, but in Sihanouk province, about 24 species of common hard coral and 14 species of soft ones were recorded (Sihanoukville Municipality, 2001). Furthermore, it was reported that eight species of sea grasses were recorded in Cambodia (Mam, 2002) and perhaps these same species exist in an area around Koh Rong, which was confirmed by local fishers in the studied village. According to van Bochove et al (2009), the coral diversity was dominated by *Massive Porites* and *Diploastrea heliopora* species which were found abundant in an area between islands of Koh Rong and Koh Rong Sanlem.

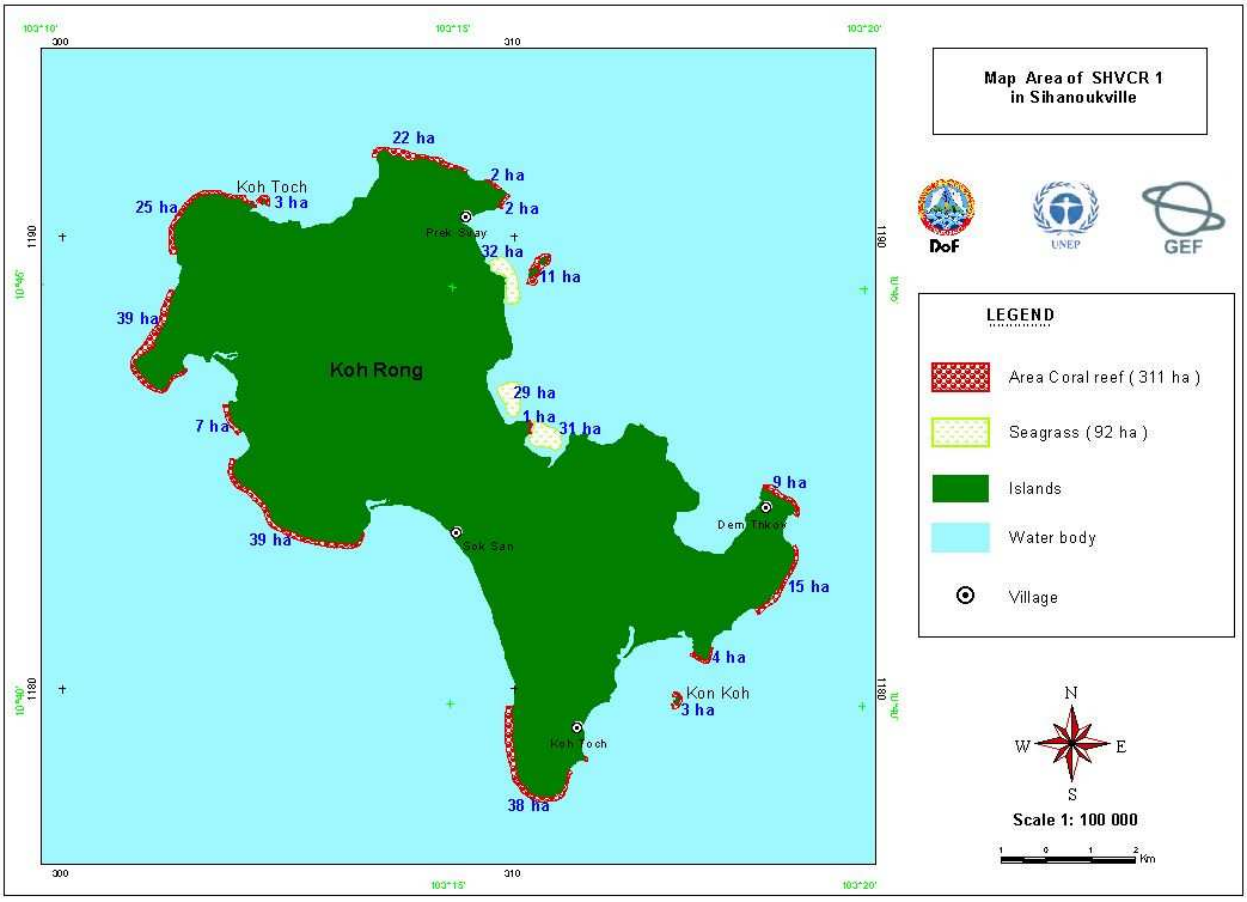


Figure 6. Map of coral and sea grass in Koh Rong (Source: DOF, 2002)

The mangrove forest area is relatively small due to small area of estuary on the island as well. Community people, however, reported that the existing mangrove area was estimated to be about 15 ha and about six dominant species could be identified easily via

local names which were then cross-checked for scientific ones. These are *Rhizophora apiculata, R. mucronata, Avicennia marina, Bruguiera gymnorrhiza, B. sexangula and Ceriops* spp (MoE/IDRC, 1995).

Detail about species composition and structure in upland forest were not known. Although, according to responses on perception of resource conditions in the studied area, upland forest is overall in good condition (ca 54%) and wildlife is neither good nor bad.

***Perceptions of Resource Conditions***

The perception of resource conditions in the area including fish, coral reefs, sea grass, mangrove, wildlife, freshwater and upland forest is examined. For coral reefs, mangroves and freshwater environment, about 90 % of the respondents said that they were above average conditions (answered either 'good', 'very good' or 'excellent'). For fish, sea grass and upland forests, the number is around 70 %. On the other hand, nearly 50% of respondents said that wildlife was either in bad or very bad conditions while none of them answered it was in the excellent condition.

Table 7. Perceptions of Resource Conditions

| Resources | Percent Responses That Describe Resource Conditions As: | | | | |
|---|---|---|---|---|---|
| | Excellent (5) | Very Good (4) | Good (3) | Bad (2) | Very bad (1) |
| **Fish** | 0 | 4.8 | 66.7 | 26.2 | 2.4 |
| **Coral reefs** | 7.7 | 61.5 | 20.5 | 10.3 | 0 |
| **Sea grass** | 5.3 | 15.8 | 50.0 | 26.3 | 2.6 |
| **Mangroves** | 4.7 | 48.8 | 37.2 | 7.0 | 2.3 |
| **Wildlife** | 0 | 13.2 | 39.5 | 34.2 | 13.2 |
| **Fresh water** | 14.3 | 28.6 | 45.2 | 9.5 | 2.4 |
| **Upland forests** | 2.4 | 12.2 | 53.7 | 26.8 | 4.9 |

## 5.4 Coastal/marine resource utilization

### *5.4.1 Costal and marine activities/good and services*

Fishery and farming are identified as the two of the most important activities in the investigated area: 61 percent of the respondents engage in fishery and 51 percent in farming. A household may engage in both fishing and farming, but rain fed rice farming might be conducted irregularly when facing insufficient rice supply. Other main activities are garment and casual work (21 %), petty grocery and being a food vendor (14 %). Relatively minor activities include government servant, house/boat building and repairing, logging and wood fuel collection, fishery trading and transportation. As results of these activities, 33 percent of respondents catch crabs and 21 percent catch fishes. 21 percent said that they cultivated upland crops, 19 percent rain fed rice and 11 percent

vegetables. The table below also shows types of use for each marine/coastal good and service.

It was reported that during the past several months corals and sea grasses were also exploited for trade and the harvest was carried out mostly by outsiders from the nearby provinces, and especially from Vietnam. The marketable value of these resources, however, was not known.

Table 8. Coastal and marine activities

| Coastal and Marine Activities | Percent respondents noted |
|---|---|
| Fishery | 60.5 |
| Farming | 51.2 |
| Worker | 20.9 |
| Petty grocery and food vendor | 14.0 |
| Government servant | 7.0 |
| House/boat building and repairing | 7.0 |
| Logging and woodfuel collection | 4.7 |
| Fishery trading | 2.3 |
| Transportation | 2.3 |
| Aquaculture | 0.0 |
| Tourism | 0.0 |
| Coral reef collection | 0.0 |

***Fishing***

Table 9 shows the coastal and marine goods/services, and types of use by distinct activities. The fishery activities are destining on four main items of commercial value: crab, fish, squid and sea cucumbers/earthworm. Crab fishing was ranked to be dominant of other items with 32.6 percent of respondents, followed by fish (ca 21%) and finally squid of 7 percent. Although, sea cucumber and earthworm capturing was not noted by any respondents selected for interview within the community, the activity was occupied by Vietnamese seasonal fishers (from Vietnam) who reportedly paid a certain amount of money to local authorities (including community fishery head) in return for permission. The products commanded a high price and can be sold internationally. In terms of types of use, crab was caught mostly by locally made crab trap and gillnet (28.9%), fish by gillnet, hook and line (25.6%) and squid by local traps (Fig 7), and hook and line as well. While, sea cucumber and earthworm have no specific gear, they depended upon skill of Vietnamese fishers. Moreover, pushnet and trawl were also reportedly used by fishermen from Sihanoukville (mainland) with secret support of high ranking government officials, but individual respondents were afraid to disclose the case during focus group discussion and household interview due to personal security problems.


Figure 7. A typical squid trap used by fishers in Prek Svay Community Fishery

Because the island has mountainous features, upland farming accounted for the livelihoods of about 21 percent of respondents, followed by wet season rice farming (ca 19%) and vegetable (ca 12%). It was observed and noted that the farming work still used traditional means of draught animal (buffalo) and manual labour for home garden to grow vegetable of local herbs. Animal husbandry was uncommon for the villager. Pork, beef and chicken were all taken from mainland markets of Sihanoukville.

***Aquaculture***

Aquaculture was not common among fishermen, as they have not had experience on culture techniques. The aquaculture occupation depicted in Table 9 below was practiced in two forms: cage culture of snapper and crab bank which are being collectively done by committee members of Phumi Prek Svay community fishery as communal property. As it is at the demonstration phase, no households had taken this as either a primary or secondary occupation.

The two culturing systems were first introduced to community in mid 2009 by FiA officials, reportedly providing relevant farming techniques, and Danida did financial support through FiA. The purpose was to diversity the livelihood opportunities for community people with a prime attempt to reduce pressure on fishery resources. The project was for Community Fishery to manage and it was expected that other community members would consider their alternative occupations.

For the cage culture of snapper scheme, Danida has financed about 7,000 USD for the investment cost, including materials for building cages (12 cages of 3x3 m dimension) and seed (13,000 snapper fingerlings); whilst, operational cost was at the community's own expense such as feed (trash fish). Before commencing the project, the community

members had undertaken a study tour to Stung Hav coastal district where cage culture has been practiced for a long time. The purpose was to solicit necessary experiences on know-how techniques of culture. The daily management was under committee members at rotational intervals of time. As of early March 2010, each individual fish reached a weight of more than 1 Kg and approximately 8,000 fishes survived. Once fish reached marketable size, market was likely to be another problem due to a sharp drop in prices (at a time of stocking, 5 USD per Kg, but now decreasing to between 3-3.5 USD a Kg).

The crab bank was initiated to increase the natural crab population within the community water. It encouraged fishers to release the egg bearing crabs, when captured from wild, into community crab cages until they completely hatched. Fishers then caught those marked crabs for the purpose.

Table 9. Coastal and marine goods and services, types of use

| **Coastal and Marine Activities** | **Goods and Services** | **% response** | **Types of Use** | **% response** |
|---|---|---|---|---|
| Fishery | Crab | 32.6 | Crab trap, gillnet | 28.9 |
| | Fish | 20.9 | Gillnet, hook and line (pushnet and trawler) | 25.6 |
| | Squid | 7.0 | Squid trap, hook and line | 7.0 |
| | Sea cucumbers and earthworm | 0.0 | Manual (Vietnamese fishers) | |
| Farming | Upland crops (fruit crop: coconut, mango, etc) | 20.9 | Upland cropping and Draught animal (buffalo) | 23.3 |
| | Rain fed rice | 18.6 | Rain fed rice farming and Draught animal (buffalo) | 20.9 |
| | Vegetable | 11.6 | Home garden | 7.0 |
| Aquaculture | Snapper | 0.0 | Cage (12 cages of 3x3 m) | CFi |
| | Crab bank | 0.0 | Cage for hatching | CFi |
| Worker | Casual worker | 16.3 | Unskilled labour | 16.3 |
| | Garment worker | 4.6 | Sewing labour | 4.6 |
| Petty grocery and food vendor | Grocery items | 11.6 | Household shop | 11.6 |
| | Food vendor | 2.3 | Village centre shop | 2.3 |
| Government Servant | Local authority (village and commune) | 4.7 | Administration | 4.7 |
| | Seaman (navy) | 2.3 | Security guard | 4.7 |
| | Ranger | 0.0 | Law enforcement | 0.0 |
| | Fishery officer | 0.0 | Law enforcement | 0.0 |
| | Police | 0.0 | Security guard and law enforcement | 0.0 |
| House/boat building and repairing | Boat | 4.7 | Carpenter instruments | 4.7 |
| | House | 2.3 | Carpenter instruments | 2.3 |
| | | | | |
| Logging and woodfuel collection | Timber | 2.3 | Chainsaw and axes | 2.3 |
| | Charcoal | 2.3 | Kiln | 2.3 |
| | Firewood | 0.0 | Chainsaw and axes | 0.0 |
| Fishery trading | Fishery products | 2.3 | Boats and handling facilities (freezers, etc) | 4.7 |
| Transportation | Shipping | 2.3 | Local boat (20-30 passengers) | 2.3 |

| | | | | |
|---|---|---|---|---|
| Tourism | Resort development | 4.7 | Building siting and construction, road building | (Private co.) |
| | Guesthouse | 2.3 | 6 room guesthouse | 2.3 (1HH) |
| | Beach sight seeing | 0.0 | Tour guide | (0.0) |
| | Diving | 0.0 | Snorkeling, scuba | (0.0) |
| | Recreational fishing | 0.0 | Boat rental | (0.0) |
| | Recreational boating (rental) | 0.0 | Local boat (5-20 tourists) | (0.0) |

***Workers***

Workers include casual and garment workers. The casual workers represent some 16 percent of respondents and are involved in construction, security guard work, and house maids with Royal Groups and Pro Corn. Their typical salary is in between 80-120 USD a month. There were several young villagers who sought outside job as garment workers in Phnom Penh.

***Petty grocery/food vendor and Fishery trading***

Petty grocers represented about 12 percent respondents, while food vendors represented some 2.3 percent. It is sometimes difficult to distinguish between these two occupations as some households have intermittently been involved in both occupations. The grocery items are supplied from Sihanoukville and reportedly regulated by the commune chief.

Within the village of Prek Svay, there are three households primarily engaged in fishery trading and they were considered rich households in the village, since trading needs relatively high investment costs (like motorized boats, freezing facilities, and cash in hand to supply their partnering fishers). Each trader has networked between 30-50 fishermen who sold the catch to the trader. In other circumstance, the traders loaned fishing gear and supplies to fishermen. The trader then sold the collected catches to whole sellers in Sihanoukville with a returned benefit of between 3-4% over the farm gate prices (from fishers). However, before the border dispute with Thailand, many of the traders in the island sold the fish products to Thailand.

***Transportation***

As the number of villagers is relatively small, there is one household who is engaged in transportation of a passenger shipment from and to the island and Sihanoukville. It is a locally made boat equipped with sufficient horsepower engine to carry between 20-30 passengers per trip and it operated every two days. It costs 13,000 Riel (ca 3 USD) per adult passenger for a single trip. The boat did not only serve the passengers in Prek Svay village, but also people in other villages of the island including navy, marine police and staff of private firms.

***Tourism***

Because the island has not yet been developed to fully function the touristic destinations, there is little number of tourists including national and foreign tourists coming to visit the island. Therefore, not many household members are involved with this occupation, except a six room guesthouse operated by village chief of Prek Svay. If there are tourists wishing to pay a visit to the island, the service including boat and guide was prepared by the tour operators at Sihanoukville. By seeing this opportunity, the community fishery leader indicated that he has planned to establish the tourist centre which would give his members an opportunity to generate additional income from the services such as boat rental and eco-guide.

Approximately 4.7 percent of respondents admitted that resort development was being under construction, but they might be involved as workers in construction and road building activities for private firms. Other tourism activities such as beach sightseeing, diving, and recreational fishing did not occur in the community area, but they might take place casually in Sok San and Koh Toch villages southward of the island. It was expected that tourists would gradually arise once the facilities are available.

***Government servants***

The government servants include local authorities (commune chief, village chief and their deputies), navy (seaman), rangers, fishery officers and commune police. Ranger and fishery officers did not originate in the village, they came from the mainland and were assigned to work on the island as part of law enforcement duty. None of villagers chosen for household interview worked as local police, they came from separate villages, but had an obligation to oversee the security and partially involved with law enforcement other offences of natural resource exploitation. It was reported that two local policemen joined the patrol team of community fishery. One battalion of naval soldiers are stationed on the island (their base is located on a hill between Daem Thkov and Prek Svay villages) with major duty of protection of water sovereignty of Cambodia, but they were involved in law enforcement as well when requested by competent authorities. The navy troops reportedly tactically backed the illegal fishers (operating pushnet and trawler). As navy was the first to be on island since the collapse of the Pol Pot regime (1979) and their family members registered with village, therefore two households had a chance to be chosen for interview.

***House/boat building and repairing, logging and woodfuel collection***

There is one household who owns a boat building yard, but required nearly ten workers from other households to help complete the task as well. The boat yard is located on the bank of Prek Svay stream where boats could be moved in and out easily during the high tide. The yard did not only provide services to fishers within villages, but also to seasonal fishers from the mainland of Sihanouk, Koh Kong, Kampot provinces and Vietnam. As found during the field work, one household earned their living as house builders who have close connections with loggers and who supplied sawn timber for house building and a boat yard as well. There are a few households involved in wood fuel collection that includes charcoal and firewood which were for local use only. The charcoal was

reportedly made not only from upland forest, but also mangrove trees. This might cause severe damage to aquatic faun habitats, if the mangrove trees are still harvested for the purpose.

### *5.4.2 Market Orientation and Household Consumption*

Market orientation is predominantly local for such goods and services as vegetables, timber, charcoal, casual work (Table 10). Some of the grocery items go to national markets, but the majority of them (83 %) are sold in local markets. Many kinds of catch such as crabs and squids are sold in national markets. In fact, crab, one of the main catches in the area, is transported to and sold at Sihanoukville. Some crabs (8 %) and fishes (11 %) are even sold in the international market. Three quarters of crab and fish are sold in national markets and the rest in local markets. All fishery products are sold in the national market, but there was a possibility that these products were then exported to international markets by whole sellers in Sihanoukville. Agricultural products are mainly consumed at the local market, but some upland crops (11 %) go to the national market as well. The resort development was likely to be prepared for foreign tourists rather than local ones, thus it is oriented to international market.

Table 10. Household Market Orientation

| **Coastal and Marine Goods and Services** | **% Noted International market** | **% Noted National Market** | **% Noted Local Market** |
|---|---|---|---|
| Crab | 8.3 | 75 | 16.7 |
| Fish | 11.1 | 77.8 | 11.1 |
| Squid | 0 | 66.7 | 33.3 |
| Fishery products (trading) | 0 | 100 | 0 |
| Vegetable | 0 | 0 | 100 |
| Rain fed rice | 0 | 0 | 100 |
| Grocery items | 0 | 16.7 | 83.3 |
| Upland crops (fruit crop: coconut, mango, etc) | 0 | 11.1 | 88.9 |
| Resort development | 100 | 0 | 0 |
| Shipping | 0 | 100 | 0 |
| Timber | 0 | 0 | 100 |
| Charcoal | 0 | 0 | 100 |
| Casual worker | 0 | 0 | 100 |
| Seaman (navy) | 0 | 0 | 100 |
| Local authority (village and commune) | 0 | 0 | 100 |
| Boat | 0 | 0 | 100 |

Table 11 shows household uses of the coastal and marine goods and services. The greater part of crabs, fishes, squids and fishery products are sold while household consumption

seems minor. Charcoal and timber are for sale only. So are shipping, grocery items and boats. 40 percent of vegetables, 13 percent of rice and more than 60 percent of upland crops are sold in the market. The remains of such agricultural products are consumed in the household. Table 11 gives an indication of the wages of government and different labourers in the service sector.

Table 11. Household Uses

| Coastal and Marine Goods and Services | % Sold | % Household Consumption | % Donation/ Leisure |
|---|---|---|---|
| Crab | 90 | 10 | 0 |
| Fish | 100 | 0 | 0 |
| Squid | 100 | 0 | 0 |
| Fishery products (trading) | 100 | 0 | 0 |
| Vegetable | 40 | 60 | 0 |
| Rain fed rice | 12.5 | 87.5 | 0 |
| Grocery items | 100 | 0 | 0 |
| Upland crops (fruit crop: coconut, mango, etc) | 66.7 | 33.3 | 0 |
| Resort development | 100 | 0 | 0 |
| Shipping | 100 | 0 | 0 |
| Timber | 100 | 0 | 0 |
| Charcoal | 100 | 0 | 0 |
| Casual worker | 100 | 0 | 0 |
| Seaman (navy) | 0 | 100 | 0 |
| Local authority (village and commune) | 0 | 50 | 50 |
| Boat | 100 | 0 | 0 |

## 5.5 Impact, threat and problem of Coastal/marine resource use

### *5.5.1 Threats to coastal management*

The two major perceived threats in the area are overfishing and solid waste. More than 80 percent of respondents noted both as threats. Overfishing in a Cambodia context can be described as the use of illegal gear and destructive capturing practices. The severely destructive fishing gears as noted by the community people are those of push net and trawl reportedly operated by powerful commercial fishers supported by armed forces. These two types of gears have caused serious damage to coral and sea grass beds. The community emphasized that they were unable to tackle these problems.

In fact it was observed during the site visit that non-degradable waste such as plastic bags were littered in certain parts of the coastal area. About half said clearing of mangrove forests was a threat and 40 percent answered that anchor damage and sand dredging were threats. 28 percent worried about pollution in the area as wastewater from

settlement buildings directly discharged into the sea, and 19 percent said coral bleaching is a threat to the health of coastal resources. The coral bleaching was believed to have been caused by concentrated sediments via push net and trawler fishing.

Table 12. Threats to coastal management

| Identified threats | Percent noted this threat |
|---|---|
| Overfishing | 86 |
| Solid waste | 84 |
| Clear cutting mangrove | 49 |
| Anchor damage | 40 |
| Sand dredging | 40 |
| Pollution (wastewater, oil spill, etc) | 28 |
| Coral bleaching | 19 |
| Others | 26 |

### *5.5.2 Resource use conflict*

Because the island is relatively large and rich in aquatic resources of its surrounding waters, the many fishers from neighbouring provinces have preferred fishing around the island. Some of those, however, may realize the community fishery area, but there are no alternative places to fish. As the current capacity of community fishery's executive committee is weak and lacking of patrolling resources, they were unable to carry out regular patrols over large areas of community fishing ground. As such there have been frequent encroachments by outside fishermen. For instance, buoyant deployed in order to mark the boundary of community fishery area are frequently devastated by outsiders, above all for those who operated push net and trawler gears.

When asked, the community people said that they were uncertain about their formal tenure. This is because the whole island was granted by the government to the Royal Groups for development of touristic facilities. Since the company came to the island, it has not made any clear indication as to whether the existing community is permitted to stay or relocated to another part of the island. Likewise, conversion of forest land into hotel, resort and leisure grounds is likely to cause large scale deforestation which subsequently accelerates soil erosion and finally suffocates corals leading to widespread bleaching. These uncontrolled development activities and their side effect would cause serious environmental effects on local people whose livelihoods are entirely reliant upon marine fishery resources.

## 5.6 Coastal and Marine Resource Governance

### *5.6.1 Existing legal framework*

There appeared to be sufficient legal framework for marine and coastal resource management in Cambodia. These laws and regulations have their valid effect over the

nation. For the case of our studied site of Koh Rong, these existing laws and regulations are worthwhile to consider, but most relevant ones are briefed in the following.

- Recent Anukret (sub-decree) on designation of fishery resources under endangered status (August 2009). The sub-decree has listed 28 marine fauna species as endangered animals largely according to CITES. Among those, coral and sea anemones were also included. According to this sub-decree, the coral was categorized into two common groups, hard and soft, with about 70 species (*Anthozao spp.*) which were found in the waters around the islands of Koh Rong, Koh Rong Sanlem, Koh Sdach, and others, covering a total area of approximately 2,800 ha.
- Preach Reach Kret (Royal Decree) on Creation of Community Fishery (2005) and Anukret (sub-decree) on Management of Community Fishery (2005). These have legally permitted local people to form and establish community fishery for sustainable utilization and conservation.
- Law on Protected Areas (2008) which can be applied on both terrestrial and aquatic ecosystems. Marine Protected Area can also be under this law.
- Law on Fisheries (2007) enforced over fishery resources management and protection of critically endangered aquatic fauna and flora. It was reported that FiA is currently undertaking assessment and a study in order to designate a marine fish sanctuary in area around Koh Rong and Koh Rong Sanlem islands.
- Land Law (2001) applicable for land tenure and title.
- Law on Environmental Protection and Natural Resource Management (1996) applicable for terrestrial and aquatic resources.
- Law on Forestry (2002)
- Law on Commune/Sangkat Administrative Management (2001)
- Anukret (Sub-decree) on Environmental Impact Assessment (1999)
- Anukret (Sub-decree) on Water Pollution Control (1999)
- Anukret (Sub-decree) on Solid Waste Management (1999)

### *5.6.2 Informal tenure and rules, Customs and traditions relevant to coastal/marine resource management*

For the present mechanism of natural resource management in Cambodia, formal and informal rules and regulations are often practiced in combination for highly effective enforcement. As observed during the site visit, there were no noticeable informal tenure rules over resource use rights. Fishermen in the area are able to go fishing anywhere they can in order to obtain adequate catch to support their subsistent living. However, outside fishermen are not allowed to do fishing in the community fishery area, if the permit was not granted by a community leader.

Fishers of Khmer ethnicity have got along amongst themselves, while Muslim (Cham) was likely to be socialized with Khmer, since there is one household within the community. Vietnamese fishers have a preference to work within their ethnicity, as they have

targeted different fish species like sea cucumber and marine earthworm, whereas the former two have had no skill on the species. For tenure over farmland, the existing people always follow their ancestors' practices and properties and simply cultivated the land cleared by the ancestors (parents or grandparents, etc). While, the new immigrants could claim upland forest area for agricultural purposes by permission from local authorities (village or commune chiefs).

As many of the inhabitants emigrated from the mainland of various provinces and more than ninety percent are ethnic Khmer, customs nor tradition are far different from the mainland. However, in regard to fishing practices, fishers have organized small festivals for Neak Ta and Yeay Mao (spirit) in the area, by offering food including chicken, pork and cake, and spray for good catch. This festival is usually organized before the fishing season, particularly during the early raining season during which the main catch occurs.

### *5.6.3 Institutions and stakeholders*

In terms of coastal/marine resource management, Cambodia seems to have plenty of management bodies laid down from the central to the grassroots level. The central ones that have direct control include Fisheries and Forestry Administrations of Ministry of Agriculture, Forestry and Fisheries; and Ministry of Environment. At the provincial level, there are line departments whose staffs (fishery officer, forester, and ranger) work closely with local authorities and community on protection and conservation of the resources.

The total sea area allocated to community fishery covers an area large as 7,447 ha, including coral reef, sea grass bed and mangrove, of which some 15 ha were allocated for strict protection (coral and sea grass). Until present, the community has the total supported members of 173 households from Prek Svay and unregistered Sok San villages. The community is governed by an elected group of committee members encompassing 9 persons who have distinct functions such as chief, vice chief, secretary, cashier, patrol team leader, etc. In order to have a smooth implementation, the community was teamed up into 1) patrol, aquaculture (cage culture), and crab bank. The patrol which is a slightly dangerous task required a strong cooperation of two local policemen, making up the team of six persons (four from community). As noticed during the site visit, there was an imbalance of gender in the committee members of the organization, but there is currently one women. Furthermore, community people expressed the interest of forming the education team in order to deal with littered solid waste and intended to establish an incinerator for combustion of non-degradable waste, avoiding direct dumping into the ocean.

By interpreting the data from the household survey, formal and informal organizations appeared to exist. Many of them (>70 %) held memberships for a community fishery association and religious worship groups. 16 percent join a fishery trade group and 12 percent are in a self help group. 9 percent is involved in a saving group, local NGOs such as CCS Italy and FACT, and tour network (probably from Sihanoukville). 23 percent of the respondents said they were associated with private companies, for instance, Pro Corn, Royal Groups and Marine Conservation Cambodia. In the mean time, FACT (Fisheries

Action Coalition Team, local NGO) has undertaken the appraisal of community situations for potential support of community capacity building and networking. While, CCS Italy was reportedly supporting educational infrastructure for children on the island. In addition, the Marine Conservation Cambodia, a local private firm administered by Englishmen, has helped community fishery in Koh Rong Samlem island for conservation of marine resources, and supported healthcare services. At the same time, the firm also operated ecotourism, especially diving. The firm, however, has extended its services of health care to community fishery in Koh Rong as well.

As the two islands of Koh Rong and Kong Rong Samlem are home to a variety of corals, the Coral Cay Conservation based in Philippines on the invitation of Fisheries Administration has launched a project entitled "Cambodia Reef Conservation Project". The overall project goal was intended to establish the long term conservation measure of no-take zone in the area. During the pilot phase of August to September 2009, the project conducted extensive survey to assess the current status of coral resources, fish, sea grass and mangrove forest.

Table 11. Membership in stakeholder organizations

| **Noted organizations for membership** | **Percent respondents** |
|---|---|
| Community fishery | 72 |
| Religious worship (belonging to local temple) | 88 |
| Fishery trade group (Eg. village middleman, outside trader, etc.) | 16 |
| Self help group | 12 |
| Saving group | 9 |
| Local NGOs (Eg. CCS Italy, FACT, etc.) | 9 |
| Tour network (informal) | 9 |
| Private company (Eg. Pro Corn, Royal Group, Marine Conservation Cambodia)* | 23 |

*Private company includes Pro Corn owned by Australia is developing Koh Oun island and Royal Group owned by Oknha Kit Meng for Koh Rong, Marine Conservation Cambodia run ecotourism (diving) by Paul Freber in Koh Rong Samlem island.

### *5.6.4 Household attitudes and perceptions towards coastal/marine resource management*

In this section, household attitudes and perceptions towards coastal/marine resource management are analyzed. The first three questions are designed in order to assess how the respondents consider the indirect non-market value. 67 percent of the respondents considered that the reefs were important for protecting land from storm waves. 73

percent said clearing coral reefs could reduce the quality of fishing while 58 percent of them answered that mangroves were important to marine ecology and clearing them could adversely affect the fish habitat. Question (4) is related to existence non-use value. 67 percent of the respondents think that coral reefs are important not only for fishing, but also for diving. Question (5) and (7) assess the perception of bequest value. More than 95 percent said that the future generations should also enjoy the mangroves and coral reefs and 88 percent admitted that they should restrict development in some coastal areas so that the future generations would be able to have natural environments. These figures clearly indicate that the residents place high bequest value to the marine and coastal environment. Question (6) and (8) are about existence value. 95 percent of the respondents answered that fishing should be restricted in certain areas even if no one ever fishes in those areas just to allow the fish and coral to grow, while 67 percent of them think sea grass beds have value to people. Question (9) asks about direct non-market value. More than 95 percent of people think that an area with diverse coral reef could lead to an increase of tourists to the area. Finally, almost all respondents answered that they were willing to participate in protection and conservation of coastal and marine resources. This is chief reason why they join community fishery.

Table 12. Non-market and Non-use Values

| **Value Statements** | **PERCENT RESPONSES** | | | | |
|---|---|---|---|---|---|
| | **1 = disagree strongly** | **2 = disagree** | **3 = neither** | **4 = agree** | **5 = agree strongly** |
| **(1) The reefs are important for protecting land from storm waves.** | 0 | 4.7 | 27.9 | 32.6 | 34.9 |
| **(2) In the long-run, fishing would be better if we cleared the coral.** | 62.8 | 11.6 | 9.3 | 14.0 | 2.3 |
| **(3) Unless mangroves are protected we will not have any fish to catch.** | 0 | 2.3 | 39.5 | 2.3 | 55.8 |
| **(4) Coral reefs are only important if you fish or dive.** | 2.3 | 9.3 | 23.3 | 53.5 | 11.6 |
| **(5) I want future generations to enjoy the mangroves and coral reefs.** | 0 | 2.3 | 0 | 27.9 | 69.8 |
| **(6) Fishing should be restricted in certain areas even if no one ever fishes in those areas just to allow the fish and coral to grow.** | 0 | 2.3 | 2.3 | 55.8 | 39.5 |

| | | | | | |
|---|---|---|---|---|---|
| **(7) We should restrict development in some coastal areas so that future generations will be able to have natural environments.** | 0 | 2.3 | 9.3 | 53.5 | 34.9 |
| **(8) Seagrass beds have no value to people.** | 37.2 | 30.2 | 18.6 | 14.0 | 0 |
| **(9) An area with diverse coral reef, there is an increase of tourists to the area** | 0 | 0 | 4.7 | 44.2 | 51.2 |
| **(10) Are you willing to participate in protection and conservation of coastal and marine resources?** | 0 | 0 | 2.3 | 39.5 | 58.1 |

### *5.6.5 Awareness of rules and regulations*

High awareness (>70%) of rules and regulations was observed for fishing, fishery trading, marine transportation and residential developing. More than 60 percent said they were aware of regulation in logging and wood fuel collection. It appears that people are well aware of rules and regulations for activities rooted in their daily life. On the contrary, even though farming and small business are common income sources in the area, only slightly over 20 percent of the people realized that there were rules and regulations for such activities. About half of the respondents are aware of the rules and regulations in aquaculture, coral reef collection and tourism.

Table 13. Awareness of rules and regulations

| **Coastal and Marine Activities** | **Percent Awareness** |
|---|---|
| Fishing | 95 |
| Aquaculture | 54 |
| Farming | 23 |
| Fishery trading (middleman) | 70 |
| Tourism (hotel/resort/guesthouse development, tour guide operating, recreational fishing) | 56 |
| Residential development (building a house) | 70 |
| Petty Grocery and food vendor | 23 |
| Coral reef collecting | 53 |
| Marine Transportation | 78 |
| Logging and woodfuel collecting (upland forest and mangroves) | 61 |

| | |
|---|---|
| Worker (garment and casual worker) | 35 |
| Boat building and repairing | none |
| Others | none |

### *5.6.6 Compliance and enforcement*

Over 50 percent of the respondents answered that they were perceived to be complying with rules and regulations and that rules and regulations were enforced (above 4 in 1-5 scale with 5 being full compliance/enforcement and 1 being no compliance/enforcement).

Table 14. Compliance and Enforcement in decision making

| | **Percent Responses** | | | | |
|---|---|---|---|---|---|
| | **5 (full compliance/ Enforcement)** | **4** | **3** | **2** | **1 (no compliance/ Enforcement)** |
| **Compliance** | 21 | 35 | 37 | 2 | 2 |
| **Enforcement** | 7 | 51 | 33 | 7 | 0 |

### *5.6.7 Participation in coastal management rules and regulations*

More than 60 percent said that they have participated in public awareness raising activities and 50 percent said that they were in the management planning process (above 3 in a 1-5 scale with 1 being no participation and 5 being full participation). However, overall, the perceived participation in coastal management rules and regulations is not very high. More than 50 percent of the respondents felt that they have not participated in preparation of local by-laws, patrolling, suppression of illegal activities (law enforcement), advocacy, networking and fundraising.

Table 15. Percentage of respondents perceived each scale of participation with coastal management rules and regulations

| **Participation Processes** | **Percent Responses** | | | | |
|---|---|---|---|---|---|
| | 5 (full participation) | 4 | 3 | 2 | 1 (no participation) |
| Management planning | 12 | 28 | 12 | 5 | 44 |
| Boundary demarcation of community/conservation area | 21 | 9 | 7 | 42 | 2 |
| Preparation of local by-laws (internal regulation, agreement, statute, etc.) | 7 | 21 | 7 | 5 | 61 |
| Public awareness raising | 7 | 26 | 28 | 5 | 35 |
| Patrolling | 16 | 9 | 7 | 2 | 63 |
| Suppression of illegal activities (law enforcement) | 14 | 12 | 7 | 5 | 61 |
| Advocacy | 2 | 14 | 5 | 5 | 56 |

| | | | | | |
|---|---|---|---|---|---|
| Networking | 5 | 14 | 12 | 2 | 61 |
| Fundraising | 2 | 12 | 21 | 0 | 61 |

### 5.6.8 *Perceived coastal management problems and their solutions*

70 percent of the respondents said that poor law enforcement was the problem in coastal management. Lack of fund and technical support (67 %) and lack of participation and commitment (63 %) were also found to be the perceived problems. 30 percent identified that poor coordination, collaboration and integration of resources among competency authorities was the issue. The respondents thought that while condemning officials committing illegal activities is important to ensure law enforcement, salary should be increased in order to give less incentive for officials to commit such activities. Education would be important not only to encourage residents to participate and commit coastal management, but also to strengthen law enforcement.

Table 16. Perceived coastal management Problems

| **Major problems** | **Percent respondents noted** |
|---|---|
| Poor law enforcement | 70 |
| Lack of participation/commitment | 63 |
| Lack of fund and technical support | 67 |
| Poor coordination, collaboration and integration of resources among competency authorities | 30 |
| Others | 5 |

Table 17. Perceived Coastal Management Solutions

| **Major problems** | **Perceived solutions** | **Percent respondents noted** |
|---|---|---|
| Poor law enforcement | Condemn officials committing illegality | 35 |
| | Increase salary | 14 |
| | 1 and 2 | 7 |
| | Educate on coastal law | 2 |
| Lack of participation/commitment | Incentive and encouragement | 7 |
| | Education on importance of coastal and marine resources | 23 |
| | 1 and 2 | 19 |
| Lack of fund and technical support | Seek government support | 5 |
| | Seek support from NGOs, Donors and private firm | 14 |
| | 1 and 2 | 40 |
| Poor coordination, collaboration and integration of resources among competency authorities | Define clear role and responsibility | 12 |
| | Partnership and network building | 14 |
| | 1 and 2 | 0 |

### *5.6.9 Perceived community problems and their solutions*

Perceived community problems are (1) lack of participation and commitment (59 % of the respondents), (2) lack of fund and technical support (63 %), (3) conflict with outsiders (56 %) and (4) limited competency to suppress illegal activities (35 %). For the problems (1) and (2), they consider that it is important to give incentive for participation and commitment, to have advice from elder, and to give sufficient public education opportunities. Financial and technical support from public and private sectors and NGOs are essential to solve the problem (2). Possible solutions for confliction with outsiders (problem 3) include informing outsiders about boundary and in some cases, legal solutions would be necessary. In order to increase competency to suppress illegality (problem 4), possibilities of cooperation with concerned authorities should be sought.

Table 18. Perceived community problems and their solutions

| **Community problems** | **Perceived solutions** | **Percent respondents noted** |
|---|---|---|
| Lack of participation/ commitment (community level) | incentive and encouragement of committed members | 19 |
| | Work with elder and education on importance of CMR | 21 |
| | 1 and 2 | 19 |
| Lack of fund and technical support | Commit to a model CFi | 14 |
| | Seek support from Govt., NGOs, private firm, donor and charity | 28 |
| | 1 and 2 | 21 |
| Conflict with outsiders (fishers from nearby communes, Koh Kong, Kamport, etc.) | Inform outsiders about boundary of CFi | 14 |
| | Solve conflicts with outsiders legally | 23 |
| | 1 and 2 | 19 |
| Limited competency to suppress illegal activities | Seek cooperation from concerned authorities and report to central govt. for solution | 26 |
| | Give CFi a role as judicial police | 7 |
| | 1 and 2 | 2 |

### *5.6.10 Success in coastal management*

72 percent of the respondents said that the success in coastal management in the area was because of the clear definition of role and responsibility for management members. 65 percent said that support from NGOs and stakeholders was the key to the successful management. 53 percent answered that clear and appropriate time arrangement was a factor for the success as well, 44 percent said that adequate support for the legal framework was the important factor and 28 percent, fair benefit sharing that was applied for the case of snapper cage culture.

Table 19. Success in coastal management

| **Success factors** | **Percent** |
|---|---|

| | respondents noted |
|---|---|
| Define clear role and responsibility for management team members | 72 |
| Clear and appropriate arrangement of time over tasks to each member | 53 |
| Fair benefit sharing | 28 |
| Support from NGOs and concerned stakeholders | 65 |
| Adequate support of legal framework | 44 |
| Others | 16 |

### *5.6.11 Challenges in coastal management*

70 percent considered that lack of facility for patrolling and management was the challenge in coastal management. More than 60 percent said that competency was limited to suppress illegal activity of large scale. Around the same number of people answered that they were feeling that knowledge and skill levels on resource protection and conservation were low. The results imply that the better coastal management should involve capacity building as well as installation of adequate facilities for patrolling and management.

Table 20. Challenges in coastal management

| Challenges | Percent respondents noted |
|---|---|
| Lack of facility for patrolling and management | 70 |
| Limited competency to suppress illegal activity of large scale (e.g. trawling, pushnet, etc) | 67 |
| Low knowledge and skill on resource protection and conservation | 63 |
| Others | 9 |

## 6. Discussion and conclusions

Fishing and farming were identified as the two of the most important activities in the investigated area. In fact, farming and fishing account for 60 percent of primary income sources for the households in the village. They catch crabs, fishes and squids, and cultivate upland crops, rain fed rice and vegetables. Although most of those goods and services are sold in the local market, crabs and fishes are sold in the international market as well as in the national market, implying that fishery brings important income to the village from outside the community.

It appears that the residents are not concerned too much with resource conditions in the area except for wildlife. However, the residents feel that the two major potential threats in the area could be overfishing and solid waste. Especially, successful management in fishery seems to be essential given the fact that it is the most important income source to the community. Solid waste management is a big challenge as well since there is no proper solid waste treatment and/or damping site on the island and non-degradable solid wastes are found to be scattered on the beach. Poor law enforcement, insufficient fund and technical support, participation and commitment are the perceived problems to overcome in order to tackle the major threats in the area.

We further break down perceived problems into the community and the management levels. At the community level, major perceived problems are lack of participation and commitment, lack of fund and technical support, and confliction with outsiders. At the management level, people considered that the successful coastal management has been achieved by defining role and responsibility for management members clearly and the support from NGOs and stakeholders. However, challenges remain in the area of facility for patrolling and management, competency to suppress illegal activities and skill and knowledge level.

Despite of those challenges and problems, some of the figures are encouraging. In the community, more than half of the respondents recognize non-market value, existence non-use value, bequest value, existence value and direct non-market value of the marine and coastal goods and environment. Especially, people consider bequest and direct non-market value very significant. The area that needs to be improved is how to relate relatively high awareness of those values to concrete actions in coastal management. Many people have been involved in public awareness raising activities, which is one of the possible reasons why the community has relatively high awareness, and management planning process. However, overall, the perceived participation in coastal management rules and regulations, preparation of local by-laws, patrolling, law enforcement, advocacy, networking and fundraising are not at a sufficient level. In fact, even though rules and regulations for fishing, fishery trading, marine transportation and residential developing are widely recognized, less number of people answered that they were well complied and enforced.

# 7. Recommendations for management

## 7.1 Law enforcement

The residents of the village perceived that the law enforcement was not sufficient. This is due to lack of capability in the enforcement organization. In order to increase capability of the organization, technical support and capacity building will be necessary. For example, patrolling and enforcement mechanism should be strengthened by collaborating with the public and private sectors and NGOs. At the same time, public education on rules and education will continue to be important.

Some respondents indicate that the low salary level of officials could have led insufficient law enforcement. We stress here that along with moral and legal approaches, the market based approach should not be ignored.

## 7.2 Education

For a long run, education will be one of the central issues in coastal management. Education would be important not only to publicize rules and regulations and to encourage residents to participate in and commit coastal management, but also to strengthen law enforcement.

In the village, people considered bequest and direct non-market values significant. Therefore, one idea is to imply in public education and training procedure that such values can be maximized by participating in and committing management. Another point is that it is found that many of them hold memberships of a community fishery and religious worship groups. Those two types of organization could be potential locations for public education in the future.

### Technical and Financial Support

Technical and financial support, and Low knowledge and skill on resource protection and conservation were considered one of the challenges facing community from a smooth implementation of coastal/marine resource management. Therefore, the opportunity is still allowed for the community to address the challenges through:

1. Capacity building for community fishery members, especially management members, on resource protection and conservation, including enhancement of their necessary skill on monitoring resources, and results generated by such monitoring would help strengthen their capacity in resource management.
2. Diversification of their income sources in order to reduce pressure on fishery resources (fishing as primary source for most of residents). The potential livelihood activities should be explored and introduced where appropriate, such as ecotourism.
3. Community based solid waste management should be introduced so as to deal with the issue of solid waste littering within the village.

### 7.4 Institutional framework

Installation of appropriate institutional framework should be considered. We found that almost all the respondents answered that they were willing to participate in protection and conservation of coastal and marine resources. We should think about taking advantage of the positive attitudes of the residents toward the coastal management.

### 7.5 Possible future impacts

A 2 billion dollar development has been planned for the island. The detailed plan is yet to be decided and therefore its impacts are not yet assessed. However, it is apparent that impacts of the development will not be negligible in the region. Careful planning and involvement of the local residents in the planning process are important in order to minimize the adverse impacts of the development and to raise awareness of the residents to the changing environment. Such local involvement would facilitate the future coastal management as well.

## 8. Lessons Learned

The SocMon method has been developed specifically for the Asian context as a resource guideline. However, it may not fill in all situations of each country, as others have inherently born slightly different forms of management, legal framework, policy and law, livelihood activities, formal/informal resource management, and tradition and custom. Hence, the method might be adapted slightly according to each country if sound appropriate.

As discussed in methodology section, for KS1, it should be included with new indicators such as history of the study area, geographical patterns and status of natural resources were also added for the in-depth understanding of community settings. We also introduced the community mapping (participatory mapping) in order to quickly craft the data on above indicators.

As time and budget constraint, we used an additional data gathering method of focus group discussion in combination of key informant interview and secondary sources. However, key informant interview was also employed in order to glean additional data for specific purpose and in-depth understanding of local issues to complete and cross-check the data generated by the focus group discussion.

For the indicators of coastal and marine activities that are definitely needed to simplify so that community members (participants joining focus group discussion) are able to easily understand and fill in the form. In this regard, this may entirely be dependent upon individual researcher or facilitators' skills in order to extract as much information as possible from the participants with careful manner.

The opened questions of household indicators such as H9, H17, H18, H21, H22, H23, H24, H25, H26, and H27 should be considered to include in exercise of focus group discussion. This would particularly help us collect the overall answers towards each question given by

the normal community people. The answers should be scrutinized carefully in order to standardize the answers once applied during the household survey. By doing so, it would save us a lot of time for entering and cleaning data as well as analysis.

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## Appendix 1 A: Checklist for Key Informant Interview/Focus Group Discussion

### I. Community Level Demography

KS1. Study area:

- Boundary (including periphery (m))
- Area (ha)
- History of the area
- Infrastructure (road, buildings, settlement area, school, market, clinic, temple, hotel-resort-guesthouse, electricity, navy base, police office, marine ranger office, mobile phone antenna, etc)
- Geographical patterns (settings): Mountain, plateau, lowland, pond, stream, gallery, sea channel, farmland (rice, upland crop)
- Resource mapping: forest, wildlife, coral reef, mangrove, fish spawning ground, marine protected area, fishing activities take place, transportation way, community area, etc.

*Tools:* group discussion and participatory resource mapping with village head and elder people.

*Materials:* Flip chart, pen, clippers, scissors, photocopied map with large or medium scales (50.000, 100,000), plastic bags,

KS2. Population: total……Female……..
KS3. Number of households:……..(Families)……
KS4. Migration rate (2009):

KS4.1. Percentage of people moves in…….From where…….?
KS4.2. Percentage of people moves out……..To where……?

KS5. Age: What percent of the people in the study area are currently: _____0-18; _____19-30; _____31-50; _____ over 50

KS6. Can be calculated based on KS2

KS7. Education level of people in percentage

| Age classes | Primary School | Secondary | High | University |
|---|---|---|---|---|
| 16-18 | | | | |
| 19-30 | | | | |
| 31-50 | | | | |
| Over 50 | | | | |

KS8. Literacy: What percentage of population is literate (can read and write)?

KS8.1. Can read……..?
KS8.2. Can write……..?

KS9. Ethnicity: What is the ethnic make-up of the study area (percent of each major ethnic group in the study area):

| Ethnicity | Percentage |
|---|---|
| Khmer | |
| Muslim | |
| Thai | |
| Vietnamese | |
| Others | |

KS10. Religion: What is the religious make-up of the study area (percent of each major religious group in the study area)?

| Religion | Percentage |
|---|---|
| Buddhism | |
| Muslim (Ala) | |
| Christian | |
| Others | |

KS11. Language: What are the major languages spoken in the study area (percent of each major language in the study area)?

| Language | Percentage |
|---|---|
| Khmer | |
| Thai | |
| Vietnamese | |
| Others | |

KS12. Occupation: Complete the following table

| Major occupations in community | Percent of working population conducting this occupation as primary occupation | Number of people conducting this occupation as primary occupation | Percent of working population conducting this occupation as secondary occupation |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

**II. Community Infrastructure**

KS13. Community infrastructure as listed KS1

III. Coastal and Marine Activities

KS14–23. Activities, Goods and Services, Types of Use, Value of Goods and Services, Goods and Services Market Orientation, Use Patterns, Levels of Impact, Types of Impact, Level of Use by Outsiders, Household Use:

| Coastal * and Marine Activities | Coastal and Marine Goods and Services | Types of Uses (primary) | Value of Goods and Services | Goods and Services Market Orientation (primary) | Use Patterns | Level of Impact | Types of Impact (primary) | Level of Use by Outsiders | House-hold Use (primary) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

* Brainstorm to list all possible activities in the area and then fill in next to columns

KS24. Stakeholders in coral reef and other marine resource management

| Coastal activity | Stakeholder group 1 | Stakeholder group 2 | Stakeholder group 3 |
|---|---|---|---|
| | | | |
| | | | |

**IV. Governance**

KS25–29. Management Body, Management Plan, Enabling Legislation, Resource Allocations, Formal Tenure and Rules:

| Coastal Activity | Management Body(s) (Yes/No) & Name | Management Plan (Yes/No) | Enabling Legislation (Yes/No) | Number of Staff | Budget | Formal Tenure Arrangements (Yes/No) | Relevant Rules and Regulations (Yes/No) |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

KS30. Informal Tenure and Rules, Customs and Traditions
Complete the following table:

| Coastal Activity* | Customs and Traditions | Informal Tenure Arrangements | Informal Rules |
|---|---|---|---|
| | | | |
| | | | |

* Based on KS14

KS31. Stakeholder participation

| Stakeholders/Activities | Meeting | Awareness Raising | Patrol | Crackdown illegal activity | Etc. |
|---|---|---|---|---|---|
| | | | | | |

KS32. Stakeholder and community organization

| Community organization | Formal or informal | Main function | Influence (on coastal management, community issues, both, none |
|---|---|---|---|
| | | | |
| | | | |

H9. Household income sources

| Sources/Ranks | Primary | Secondary | Tertiary | Other |
|---|---|---|---|---|
| Source 1 | | | | |
| | | | | |

H17. Perceived threats

| Threats (only five) | Level of severity* |
|---|---|
| Overfishing | |
| Coral breaching | |
| Etc | |

* High (3), medium (2), low (1)

H21. Participation in decision making (1= no participation, 5 = fully active participation)

- H21.1. Management planning
- H21.2. Boundary demarcation of community area
- H21.3. Preparation of local by-laws (internal regulations, agreement, statute)
- H21.4. Public awareness raising
- H21.5. Patrolling
- H21.6. Suppression of illegal activity
- H21.7. Etc.

H22. Membership of stakeholder organizations:

- H22.1. community fishery or Community marine protected area
- H22.2. Local NGOs
- H22.3. Religion association (worship)
- H22.4. Tour association
- H22.5. Self help group
- H22.6. Saving group
- H22.7. Fishery trade group,

H23-24. Perceived coastal management problems and solutions:

| Problems (H23) | Solutions (H24) | Remarks |
|---|---|---|
| H24.1. No legal status | | |
| H24.2. Lack of people participation | | |
| H24.3. Lack of funding and technical support | | |
| Etc. | | |

H25. Perceived community problems:

| Problems | Solutions | Remarks |
|---|---|---|
| H25.1. Conflict with others | | |
| H25.2. | | |
| H25.3. | | |
| Etc. | | |

H26. Success in coastal management

Factor 1
Factor 2
Factor 3, etc.

H27. Challenges in coastal management

Factor 1
Factor 2
Factor 3, etc.

H28. Material style of life

Types of house: Concrete, wood, boat
Type of roof: tile, tin, wood, thatch, plastic
Type of outside structural walls: tiled, brick/concrete, wood, thatch/bamboo
Windows: glass, wooden, open, none
Floors: tile, wood, cement/concrete, bamboo, dirt, plastic

*Tool: observation and record*

**Additional data to be considered for collection by Focus group discussion:**

1. Coastal and marine resources (H16): Fish, coral reef, seagrass, mangrove, freshwater, etc, and ranking of their conditions (5-very good, 4-good, 3-not good not bad (normal), 2-bad, 1-very bad) (illustrate in table)
2. Species of coral reef
3. Timeline for resource harvesting
4. Fishing gear for particular species
5. Marketing channel and arrangement of exploited resources

## Appendix 1B. Household Interview Standardized Questionnaire Survey

### I. Community Level Demographics

H1-8. Age, Gender, Ethnicity, Education, Religion, Language, Occupation, Household Size:

| Household Members* | Age | Gender | Education Level Completed (only ask if >16 yr) | Religion | Ethnicity | Language | Primary Occupation | Secondary Occupation |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| *identify all living in house by name or role (e.g. grandmother) | | | | | | | | |

H9. Household Income:

| | Sources/Ranks | Primary | Secondary | Tertiary | Estimated amount |
|---|---|---|---|---|---|
| H9.1 | Fishing | | | | |
| H9.2 | Aquaculture | | | | |
| H9.3 | Farming | | | | |
| H9.4 | Fishery trading (middleman) | | | | |
| H9.5 | Tourism | | | | |
| H9.6 | Petty Grocery and food vendor | | | | |
| H9.7 | Coral reef collecting | | | | |
| H9.8 | Transportation | | | | |
| H9.9 | Logging and woodfuel collecting | | | | |
| H9.10 | Worker (garment and casual worker) | | | | |
| H9.11 | Government servants | | | | |
| H9.12 | House/boat building and repairing | | | | |
| H9.13 | Others_____ | | | | |

### II. COASTAL AND MARINE ACTIVITIES

H10–14: Household Activities, Household Goods and Services, Types of Household Uses, Household Market Orientation, Household Uses:

| Coastal and Marine Activities | Coastal and Marine Goods and Services | Types of Household Uses (Methods) | Household Market Orientation | Household Uses |
|---|---|---|---|---|
| 1 | | | | |
| | | | | |
| | | | | |
| 2 | | | | |
| | | | | |
| | | | | |
| 3 | | | | |
| | | | | |
| | | | | |

**III. ATTITUDES AND PERCEPTIONS**

H15. Non-market and Non-use Values:
Indicate degree of agreement with the following statements using the scale: agree strongly (5); agree (4); neither agree nor disagree (3); disagree (2); disagree strongly (1).
_____ H15.1. The reefs are important for protecting land from storm waves (indirect non-market value).
_____ H15.2. In the long-run, fishing would be better if we cleared the coral (indirect non-market value).
_____ H15.3. Unless mangroves are protected we will not have any fish to catch (indirect non-market value).
_____H15.4. Coral reefs are only important if you fish or dive (existence non-use value).
_____ H15.5. I want future generations to enjoy the mangroves and coral reefs (bequest non-use value).
_____ H15.6. Fishing should be restricted in certain areas even if no one ever fishes in those areas just to allow the fish and coral to grow (existence value).
_____ H15.7. We should restrict development in some coastal areas so that future generations will be able to have natural environments (bequest value)
_____ H15.8. Seagrass beds have no value to people (existence value)
_____ H15.9. An area with diverse coral reef, there is an increase of tourists to the area (direct non-market value)
_____ H15.10. Are you willing to participate in protection and conservation of coastal and marine resources?

H16. Perceptions of Resource Conditions:
How would you describe current coastal resource conditions on a scale from very good (5), good (4), not good not bad (3), bad (2) to very bad (1):
Fish_____; Coral reefs_____; Seagrass_____; Mangroves _____; wildlife_____; Fresh water _____; Upland forests _____; Others_____

H17. Perceived Threats: What are the top 5 major threats to the health of coastal resources? Yes/No

| | |
|---|---|
| H17.1. Overfishing | H17.5. Anchor damage |
| H17.2. Solid waste | H17.6. Sand dredging |
| H17.3. Pollution (wastewater, oil spill, etc) | H17.7. Coral bleaching |
| H17.4. Clear cutting mangrove | H17.8 Others: |

H18. Awareness of Rules and Regulations:
Are there rules and regulations related to (yes or no)?

| | Coastal and Marine Activities | Yes | No |
|---|---|---|---|
| H18.1 | Fishing | | |
| H18.2 | Aquaculture | | |
| H18.3 | Farming | | |
| H18.4 | Fishery trading (middleman) | | |
| H18.5 | Tourism (hotel/resort/guesthouse development, tour guide operating, recreational fishing) | | |
| H18.6 | Residential development (building a house) | | |
| H18.7 | Petty Grocery and food vendor | | |
| H18.8 | Coral reef collecting | | |
| H18.9 | Marine Transportation | | |
| H18.10 | Logging and woodfuel collecting (upland forest and mangroves) | | |
| H18.11 | Worker (garment and casual worker) | | |
| H18.12 | Boat building and repairing | | |
| H18.13 | Others | | |

H19. Compliance:
On a scale of 1 to 5 (1 =no compliance, 2=little compliance, 3=compliance, 4=medium compliance, 5=full compliance), to what extent do people comply with coastal management rules and regulations? _____

H20. Enforcement:
On a scale of 1 to 5 (1 =no enforcement, 2=little enforcement, 3=enforcement, 4=medium enforcement, 5=full enforcement), to what extent are the rules and regulations enforced? _____

H21. Participation in Decision-making:
On a scale of 1 to 5 (1=no participation, 5=fully active participation), to what extent do you participate in coastal management decision-making of the following processes?

| Processes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| H21.1. Management planning | | | | | |
| H21.2. Boundary demarcation of community/conservation area | | | | | |
| H21.3. Preparation of local by-laws (internal regulation, agreement, statute, etc.) | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| H21.4. Public awareness raising | | | | | |
| H21.5. Patrolling | | | | | |
| H21.6. Suppression of illegal activities (law enforcement) | | | | | |
| H21.7. Advocacy | | | | | |
| H21.8. Networking | | | | | |
| H21.9. Fundraising | | | | | |
| H21.10. Others_____ | | | | | |

H22. Membership in Stakeholder Organizations: Is someone from your household a member of a stakeholder organization? Which organization?

| Organizations | Yes | No |
|---|---|---|
| H22.1. Community fishery | | |
| H22.2. Religious worship (belonging to local temple) | | |
| H22.3. Fishery trade group (Eg. village middleman, outside trader, etc) | | |
| H22.4. Self help group | | |
| H22.5. Saving group | | |
| H22.6. Local NGOs (Eg. CCS Italy, FACT, etc.) | | |
| H22.7. Tour association | | |
| H22.8. Private company (Eg. Pro Corn developing Koh Rung island owned by Oknha Kit Meng, Marine Conservation Cambodia run by Paul Freber in Koh Rong Samlim island) | | |
| H22.9. Others_____ | | |

H23. Perceived Coastal Management Problems: Aside from threats, what do you see as the three major problems facing coastal management in the community?

| Major Problems | Check only three |
|---|---|
| H23.1. Poor law enforcement | |
| H23.2. Lack of participation/commitment | |
| H23.3. Lack of fund and technical support | |
| H23.4. Poor coordination, collaboration and integration of resources among competency authorities | |
| H23.5. Others_____ | |

H24. Perceived Coastal Management Solutions: What do you see as solutions to these problems? Check only three by following H23

| Major Problems | Solutions |
|---|---|
| 24.1 Poor law enforcement | 1. Condemn govt. officers and others who commit illegal activities<br>2. Provide sufficient salary |
| 24.2 Lack of participation/commitment | 1. Provide incentive/encouragement (appreciation letter, plaque, medal, etc)<br>2. Education on importance of coastal resources to their livelihood and their |

| | |
|---|---|
| | children |
| 24.3 Lack of fund and technical support | 1. Seek government support<br>2. Seek targeted NGOs, donors and private firm support |
| 24.4 Poor coordination, collaboration and integration of resources among competency authorities | 1. Define clear role and responsibility<br>2. Encourage partnership |
| 24.5 Others_____ | 1._____<br>2._____ |

H25. Perceived Community Problems: What are the three major problems facing the community? Check only three

| Major Problems | Solutions |
|---|---|
| H25.1. Lack of participation/ commitment (community level) | 1. Provide incentive/encouragement (appreciation letter, plaque, medal, etc) for recognition of outstanding work devoted to community<br>2. Work with elder people in community and education on importance of coastal resources to their livelihood and their children |
| H25.2. Lack of fund and technical support | 1. Conduct ourselves as a modal community, thus govt. and donor will support (help ourselves first, then ask others later)<br>2. Seek support from govt., NGOs, private firm, individual donors |
| H25.3. Conflict with outsiders (fishers from nearby communes, Koh Kong, Kamport, etc.) | 1. Tell them about community fishery exist<br>2. Solve this problem according to law |
| H25.4. Limited competency to suppress illegal activity | 1. Support from relevant competent authorities via reporting to central govt.<br>2. Confer rights a judicial police |
| H25.5. Others_____ | 1._____<br>2._____ |

H26. Successes in Coastal Management:
What three things do you think have worked well for coastal management in the community?

| Factors | Check |
|---|---|
| H26.1. Define clear role and responsibility for management team members | |
| H26.2. Clear and appropriate arrangement of time | |

| | |
|---|---|
| over tasks to each member | |
| H26.3. Fair benefit sharing | |
| H26.4. Support from NGOs and concerned stakeholders | |
| H26.5. Adequate support of legal framework | |
| H26.6. Others_____ | |

H27. Challenges in Coastal Management:
What three things do you think have not worked well for coastal management in the community?

| Challenges | Check |
|---|---|
| H27.1. Lack of facility for patrolling and management | |
| H27.2. Limited competency to suppress illegal activity of large scale (eg. trawling, pushnet, etc) | |
| H27.3. Low knowledge and skill on resource protection and conservation | |
| H27.4. Others_____ | |

IV. MATERIAL STYLE OF LIFE

H28. Material Style of Life: For each house note:

H28.1. type of roof: 1) tile____, 2) tin_____, 3) wood_____, 4) thatch_____

H28.2. type of outside structural walls: 1) tiled____, 2) brick/concrete___, 3) wood____ 4) bamboo_____

H28.3. windows: 1) glass____, 2) wooden____, 3) open____, 4) none____

H28.4. floors: 1) tile_____, 2) wooden_____,3) cement____,4) bamboo____, 5) dirt_____

## Appendix 2: survey costs

## Appendix 3: survey team members and affiliations

| No. | Name | Organization | Contact Address |
|---|---|---|---|
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