Aquatic Resources Valuation and Policies for
Poverty Elimination in the Lower Mekong Basin

Profile for Aquatic Resources Management:

Kdol Chrum, Bourei Cholsar and Sangkum Mean Chey Villages

Kampong Krasaing Commune, Bourei Cholsar District, Takeo Province, Cambodia

Danilo C. Israel, Mahfuzuddin Ahmed, Nao Thuok and Ek Heng

DFID Department for International Development

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Contents

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Drawing a Village Profile for

The stage is set for the formal implementation of community-based management in the aquatic-resources dependent villages of the country with the passing of the Sub-Decree on Community Fisheries in Cambodia. Together with this welcome development, useful data and information have become even more important to support stakeholder-based planning and overall aquatic resources management at the village level.

The preparation of this village profile is one of the activities of the Aquatic Resources Valuation and Policies for Poverty Elimination in the Lower Mekong Basin Project, known as the Mekong Valuation Project. The project was funded by the DFID and implemented by the WorldFish Center and the Department of Fisheries (DoF) of Cambodia. The purpose of the profile is to gather and present important data and information useful for community-based aquatic resources management in the villages.

This publication is part of a collection of three profiles covering nine aquatic resources-dependent villages in the provinces of Stung Treng, Takeo and Siem Reap. The profiles are important because in most, if not all, of the aquatic-resources villages of Cambodia, critical data and information useful for planning and management are not available in a documented form. The development of the village profiles is viewed as a basic requirement for planning and overall management. It is only an initial step to identify future programs and projects related to aquatic resources.

The profiles depict the present state of the villages and their aquatic resources. In general, the villages have limited infrastructure and other physical resources. In the villages of Takeo and Siem Reap, total flooding occurs in the wet season and villagers must rely on transportation by boat. In Stung Treng villages, partial flooding is also a problem as it makes the few existing roads significantly impassable during the wet season.

In terms of social concerns, health care services are limited in all villages and thus sickness is common. Many households have no toilets and so water bodies and open fields are used for discharging domestic wastes. Many villagers are unable to read and write due to the lack of education, and educational services in the villages are limited to primary schools.

Most villagers derive their income from occupational sources, rice farming and fishing being the main primary and secondary occupations. Many of them, particularly those belonging to lower income groups, have few or no alternative occupations and those in dire need of money usually borrow at prohibitive rates of interest, mainly from private lenders.

Community Fisheries Management

In general, villagers are dependent on aquatic resources not only for fishing but also for other livelihood activities including fish processing and the gathering of aquatic plants, animals and wood among others. The majority of households in the villages that belong to the lower wealth category depend to a significant extent on available aquatic resources for subsistence and survival.

The villages have access to vast aquatic resources including the Mekong River in Stung Treng, floodplains in Takeo, and the Tonle Sap Lake in Siem Reap as well as other smaller water bodies. Some villages have flooded forests and fishing lots that are now either fully or partially converted for public use. Flooded forests are also sources of wood for villagers. In general, the villages that are entirely flooded in the wet season in Takeo and Siem Reap provide areas for fishing and other aquatic resources-based livelihoods for the villagers.

The villagers face important management issues related to the use of aquatic resources that include illegal fishing, increasing number of fishermen, clearance of flooded forests, poor monitoring and enforcement by authorities and other issues. They also face direct access issues related to the use of aquatic resources including the payment of access fees, the presence of fishing lots, the presence of fish sanctuaries and/or the imposition of closed seasons. For the most part, villagers are to some extent aware of overall aquatic resource conditions in their villages and have proposed certain measures to improve on their management.

At present, many of the villages have already formed Community Fisheries Committees tasked to manage these resources. However, these committees have been unable to fully discharge their intended duties and functions because of limitations in financial resources and inadequate knowledge among members in aquatic resource management. Other than these committees, the villages have existing common administrative organizational structures that attend to management matters.

In conclusion, with the inadequacy of documented data and information these village profiles, drawn from the villagers themselves, provide a clearer and more definite reflection of these communities and the aquatic resources to be managed. The data and information presented here provide a general background to the villages and their aquatic resources. It is hoped that these profiles will be useful in future planning and management activities in the villages.

Introduction

This village profile presents a summary of the demographic, socioeconomic, management and other related data and information gathered for the three villages of Kdol Chrum, Bourei Cholsar and Sangkum Mean Chey in Kampong Krasaing commune, Takeo province. The data were gathered using household cross-section surveys, household longitudinal monitoring, participatory rural appraisals (PRA) and provincial workshops conducted in 2003 to 2004.

The data presented in this profile as well as additional information on the villages are also contained in Israel et al. (2005a, 2005b). The objective of the profile is to provide an information base for future research and development activities in the villages, particularly for aquatic resources management. The profile reflects the collective output of collaboration and consultation with village communities.

Takeo province is in southern Cambodia; in 2004 the population was about 860 600. It is bordered in the north by Kandal and Kampong Speau provinces, in the south by Vietnam, in the east by Prey Veng province, and in the west by Kampot province (Figure 1). With a land area of 3 563 square kilometers, Takeo province has a population density of 242 persons per square kilometer; it has 10 districts, 100 communes and 1 116 villages.

Kampong Krasaing commune is located in Bourei Cholsar district (Figure 2). It is bordered in the north by Bourei Cholsar commune, in the south by Chey Chouk commune, in the east by the neighbouring country of Vietnam, and in the west by Koh Angdaet district. Kampong Krasaing commune has four villages and a total population of about 3 600, of which 99 percent are Khmer and 1 percent are ethnic Vietnamese (Figure 3).

This profile provides a background to the three villages of Kdol Chrum, Bourei Cholsar and Sangkum Mean Chey in the Kampong Krasaing commune. The first section of the report provides a description of the physical, natural, human, financial, and social capital as well as the administrative structures of each village while the second section provides a profile of the livelihoods, vulnerability, stakeholders, and access and management issues faced by the villages. Additional data on selected household characteristics is presented in Appendix 1.

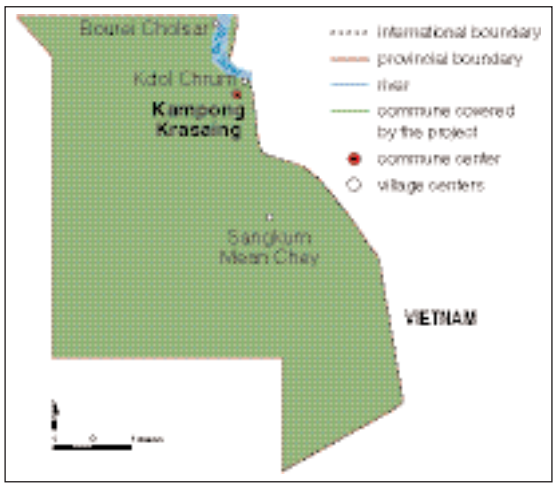

Figure 2: Map of Kampong Krasaing commune

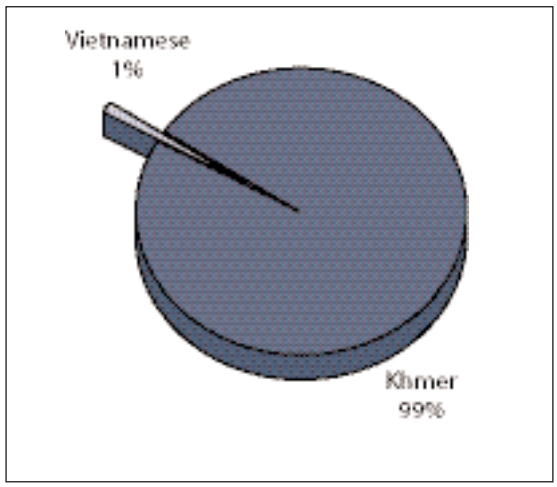

Figure 3: Ethnicity of the Kampong Krasaing commune

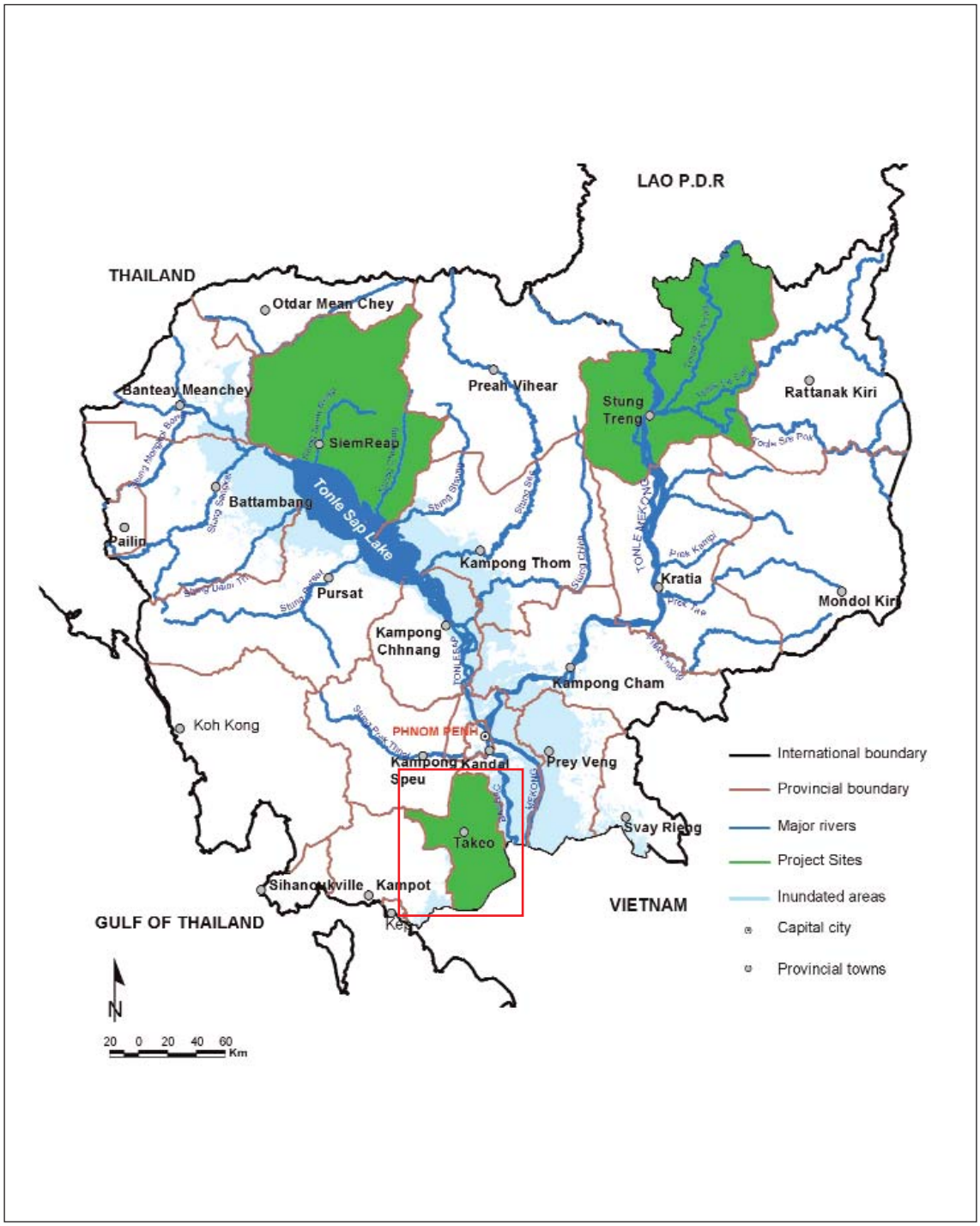

Figure 1: Map of Cambodia and the provincial sites of the Mekong Valuation Project highlighting Takeo province






Village Resources

Kdol Chrum, Bourei Cholsar and Sangkum Mean Chey

Kdol Chrum

Physical Capital

Kdol Chrum is bordered by Kampong Krasaing village in the north, Sangkum Mean Chey village in the south, Vietnam in the east, and Koh Angdaet district in the west (Figure 4). The estimated land area of the village is 1 600 hectares. The commune office for the Kampong Krasaing commune is located in this village. It has a primary school, two military outposts, four police posts, one health center and eleven stores. It has two roads with a total length of about 3.8 kilometers that connect it to other villages. All the roads are flooded during the wet season, making transportation possible only by boat during that time.

There are 244 boats in the village, of which 56 (23 percent) are motorized and 188 (77 percent) are non-motorized. The boats are used for fishing and transportation of people and goods during both the dry and wet seasons. There are two tractors, four hand-tractors and a number of water buffalos used for tilling of land. The village has ten machines used for separating the rice seed from the plant during the harvesting of rice. It also has 27 irrigation pumps used for pumping water from the canals and other water bodies into the rice fields.

Sources of power in the village include four privately owned generators that provide electricity to 24 households. Another main source of lighting is kerosene lamps. For cooking, villagers use wood gathered from the nearby flooded forests. The main sources of drinking water in the village are the canals and other smaller water bodies. Sediments are usually allowed to settle to the bottom of water containers before drinking. Generally, drinking water is boiled but not filtered. Some of the households own televisions and radios. The villagers have no cell phones or other telephone systems in the village.

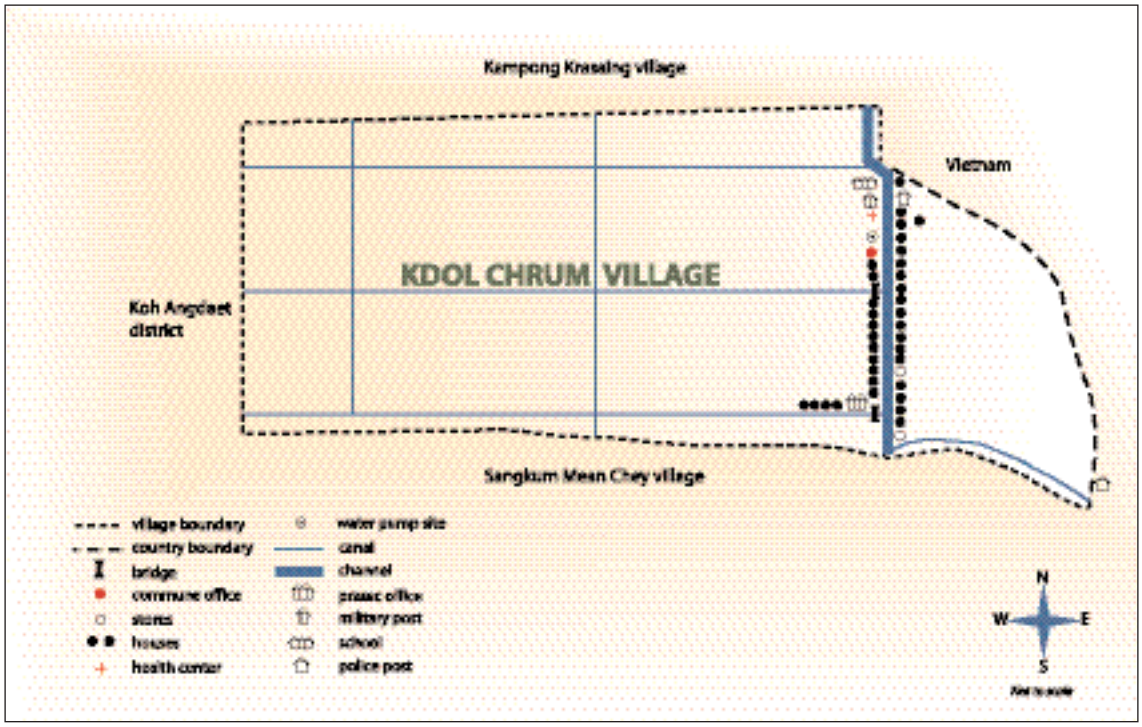

Figure 4: Physical map of Kdol Chrum village

The houses in Kdol Chrum are made of various materials. About 70 percent have roofs and walls made of palm leaves and a floor made of wood, 20 percent have roofs made of zinc and walls and floors made of wood, and 10 percent have roofs made of tile and walls and floors made of wood. Nearly all of the villagers do not have toilets and use the open fields and the river for the discharge of both human and household wastes. A few households have toilets that were made with the aid of non-governmental organizations who worked in the village previously.

Residential and agricultural land in the village is generally in private ownership. The government gave the land away at no cost when the people first settled in the area. About 70 percent of the households own cows and ducks. There is an irrigation system using motor pumps in the village to provide water for farming during the dry season.

Natural Capital

The village of Kdol Chrum has significant natural resources (Figure 5). Although it has a minimal forest area, the village has substantial freshwater bodies. During the wet season the whole village is flooded, the entire area of 1 600 hectares becomes a freshwater resource. During the dry season, freshwater resources of the village reduce to about 23 hectares, made up mostly of canals. Freshwater resources are available from the following canals: the Po Saroeun Canal, Canal No. 90, Canal No. 92, Kdol Chrum Channel and various other smaller water bodies. The village has an agricultural area of 1 240 hectares where rice is mostly planted during the dry season. The banks of canals and channels are also used by some households for rearing ducks. Vegetables as well as fruit trees are planted on some residential land during the dry season. Kdol Chrum has

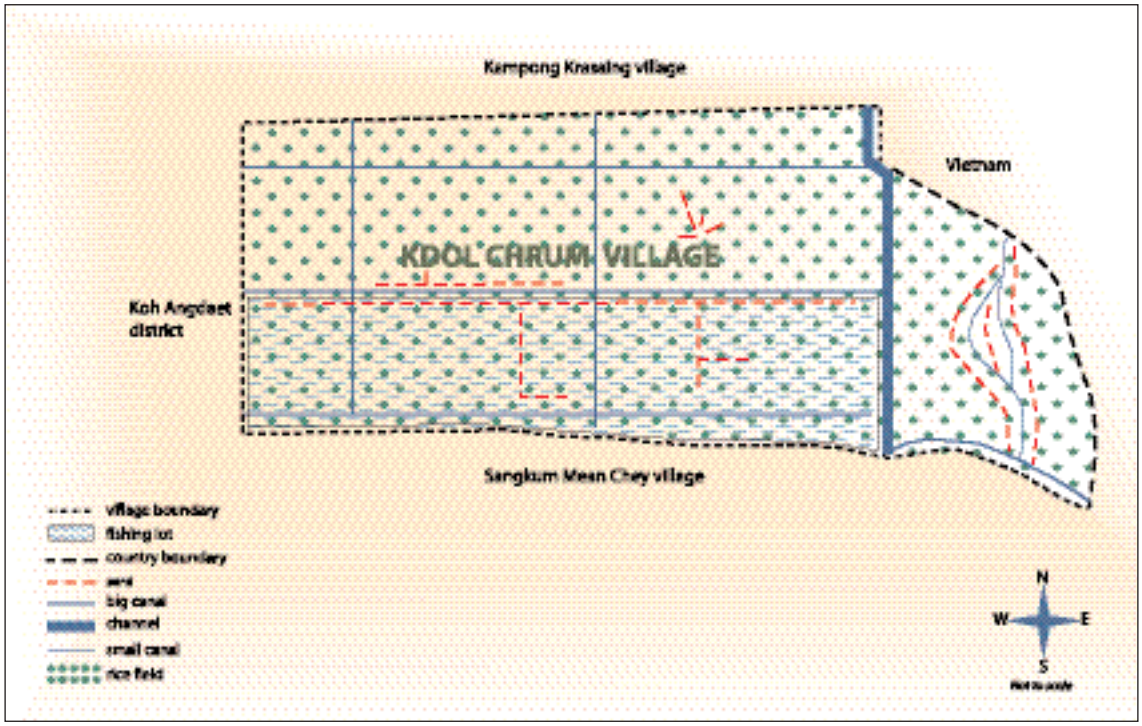

Figure 5: Natural resources map of Kdol Chrum village

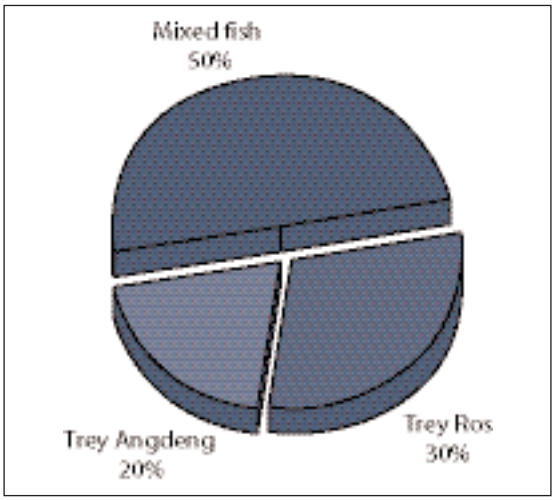

Figure 6: Main fish species caught in Kdol Chrum

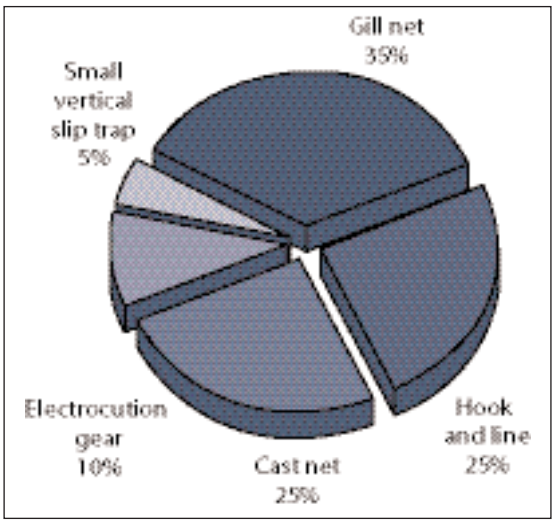

Figure 7: Type of gear used by households to catch fish in Kdol Chrum

two fishing lots - Fishing Lot No.1 and Fishing Lot No.2 - the first has been converted for public use while the second is only partly converted.

The villagers estimated that the fish species caught in Kdol Chrum are composed of trey ros (30 percent), trey angdeng (20 percent), and mixed species (50 percent) (Figure 6). The major fishing gear used is gill net (35 percent), hook and line (25 percent), cast net (25 percent), electrocution gear (10 percent) and small vertical slip trap (5 percent) (Figure 7). Fishing is split fifty percent for small-scale and fifty percent for medium scale and large scale. Boats in the village are usually purchased from Vietnam or in the provincial capital and not built by the villagers themselves. With regards to fishing activities, men usually make fishing gears, repair boats and go out to fish, while the women assist in the marketing and processing of fish and the maintenance of nets and gears. Children sometimes assist the women in their activities.

Human Capital

In 2004, Kdol Chrum village had a population of 1 145, of which 568 were men and 577 were women. The village had 219 households, with an average household size of 5.2 persons and a population density of 0.7 persons per hectare. The entire village is made up of a Khmer population, except for the one percent who are ethnic Vietnamese. All of the residents are Buddhist.

Only about 20 percent of the villagers can read and write in Khmer while no one can do so in English and about 60 percent of the villagers have no education at all. The primary school in the village has 4 buildings, 16 classrooms, 5 teachers and 361 students. Those few students who aspire to secondary education go to Koh Angdet district or the provincial capital; those who attend college go to the provincial capital of Takeo or Phnom Penh. The lack of money and the need to assist in household and farming chores have been identified as two overriding reasons why many students do not seek education beyond the primary level.

The incidence of sickness among villagers each year in Kdol Chrum is reported at about 20 percent for adults and about 15 percent for children. The most common diseases are flu, fever, cough and diarrhea. When villagers get sick, they simply take a rest from work, or continue doing their activities without medication. If they do get medication it is usually obtained from the health center for free or bought in the village or provincial capital stores; others produce traditional medicine at home. Some aquatic plants and animals are used for the production of traditional medicine. In particular, crab fat has been used to cure injuries. Both men and women have equal access to the different forms of medication for the sick in the village. Doctors seldom visit Kdol Chrum, even if they do come, most activities usually involve training in the medication of the sick, not in the

Table 1: Wealth ranking in Kdol Chrum village

Characteristics	Higher wealth households	Medium wealth households	Lower wealth households
Area of owned land	Rice land of 20 ha, house land of 0.30 ha	Rice land of 3 ha, house land of 0.20 ha	Rice land of 1 ha, house land of 0.10 ha
House type	6.5m x 9m Wall and floor made of wood, Roof made of tile	4m x 5m Wall and floor made of wood, Roof made of zinc	3m x 4m Wall and floor made of wood, Roof made of palm leaves
Occupation of household	Rice farmer, fishing lot owner	Rice farmer, fisher	Rice farmer, fisher, laborer
Other things owned	Rice tractor, rice mill, big motorboat, water pump, television	Motorboat, water buffalo, television, radio, cassette tape recorder	Small non-motorized boat, radio

actual curing of villagers from ailments. The delivery of babies is usually performed in the health center with the assistance of a midwife or at home with the help of a local elder experienced in delivery.

The villagers in Kdol Chrum provided their own criteria for ranking their households in terms of wealth (Table 1). Of all households in the village, 60 percent were categorized to be of lower wealth, 30 percent were of medium wealth and 10 percent were considered to be of higher wealth, according to their categorization. Overall, villagers ranked themselves as a lower wealth community in comparison to the other villages in the Kampong Krasaing commune. The wealth ranking by occupation indicates that the medium and lower wealth households are likely to depend more on aquatic resources as fishers compared to the higher wealth households.

Financial Capital

About 90 percent of the people in Kdol Chrum derive their income solely from occupational sources; the remainder received income from leased properties. Villagers do not receive income support from relatives and other sources outside of the community. About 20 percent of the villagers are reported to save money kept in their houses that is later used to purchase buffalos and other farm animals, or to buy television sets and other household goods. About 70 percent borrow money from lenders and neighbours for various reasons, such as in times of sickness or accident, to finance a wedding, or to buy food.

In some instances, borrowing in the village is in-kind and also paid in-kind, such as when rice is borrowed and paid for with labour service. From 1994 to 2003, a non-governmental organization used to lend money to villagers - at a 4 percent interest rate per rice growing season (approximately 6 months) to support their livelihood activities, however the NGO is no longer in operation. There are 12 money-lenders who live in the village and impose rates that are considered high by the villagers. Villagers also borrow from the money-lenders outside the village at similar rates offered by village lenders.

Collateral is usually not required among the villagers since borrowing agreements are done in good faith and trust. However, lenders also assess the paying capability of borrowers by looking into their income and property profiles. There are instances when people cannot pay back their borrowings, forcing lenders to take away property, such as farm animals, as payment. In most households, the women usually handle the family purse and take care of the family expenditure. Borrowing and lending of money is mutually decided between husband and wife.

Table 2: Celebrations and social activities in Kdol Chrum village

Month	Name of celebration	Description
January	Bon Phka	Collection of money from the people to repair the pagoda
	Victory Day	Victory against Pol Pot regime
February	Chol Chhnam Chinn/ Chol Chhnam Vietnam	Chinese/ Vietnamese New Year
February-March	Bon Meak Bochea	Commemoration of the spontaneous gathering of monks to listen to Buddha's preaching
April	Chol Chhnam Khmer	Celebration of Khmer New Year
	Bon Da Lean	Celebration of rice harvest
May	Bon Pisaak Bochea	Commemoration of the birth of Buddha
July	Chol Vosa	Celebration of the start of the wet season
September-October	Bon Phchum Ben	Offering of food for the dead
October-November	Chenh Vosa	Celebration of the end of the wet season
	Bon Kathen Tean	Contribution of money for the construction or repair of the pagoda
November	Bon Om Tuk	Water Festival

Social Capital

Kdol Chrum is a socially integrated village where trust and goodwill among villagers generally exists. The village celebrates the social activities as listed in Table 2. The committee of elders that runs the pagoda, the village head and the Village Development Committee usually takes the lead in activities with the support of the more active villagers. Women, youth and children participate in most of these village activities. In general, villagers have good relationships with each other; however misunderstandings that are unavoidable are often resolved by neighbours and village elders. Crime seldom happens in the village.

Village Administration

The village chief is in charge of managing Kdol Chrum, he is assisted by two vice-chiefs (Figure 8). The village chief implements the rules and regulations made by the commune council, resolves village conflicts, and undertakes other responsibilities pertaining to the position. The vice-chiefs take charge in the absence of the chief or if he is indisposed and performs other assignments as assigned by the chief.

The Village Development Committee is also headed by the village chief (Figure 9). This committee undertakes the planning and development of projects for the village. It has a vice-chief, a secretary, a cashier and a member. The village also has a Community Fisheries Committee whose members are elected by the villagers (Figure 10). The committee is in charge of the management of and planning for the fisheries and aquatic resources of the village.

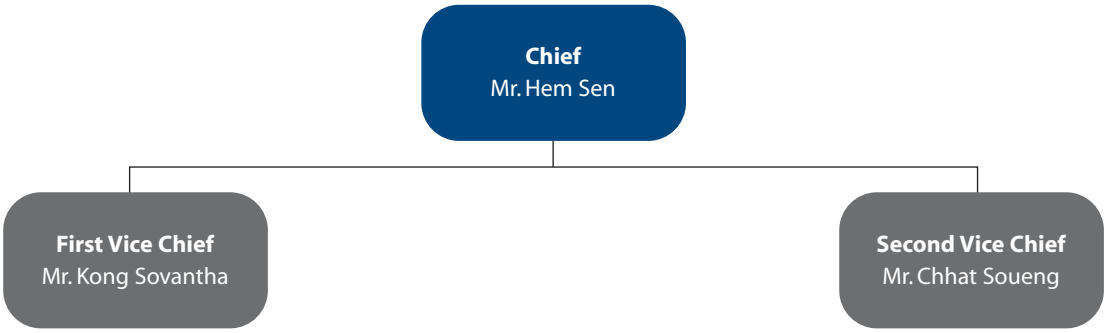

Figure 8: Kdol Chrum village organizational chart

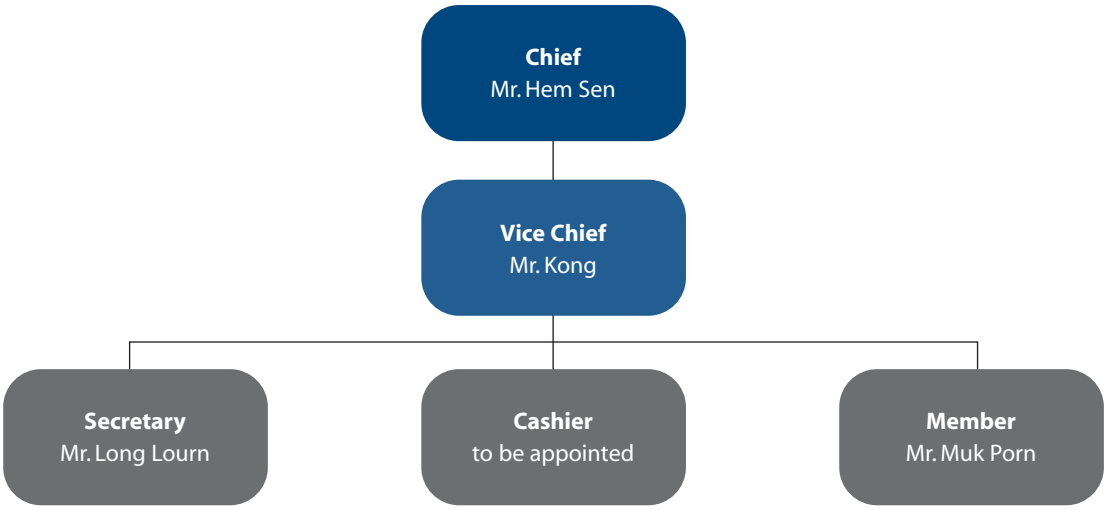

Figure 9: Kdol Chrum village development committee chart

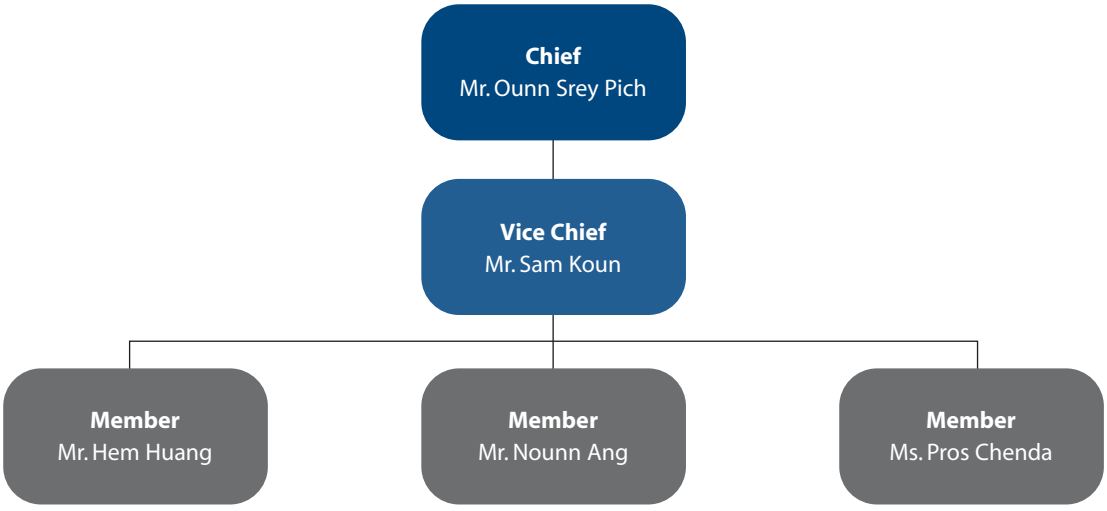

Figure 10: Kdol Chrum community fisheries committee chart

Bourei Cholsar

Physical Capital

The Prek Ksak village borders Bourei Cholsar village to the north, Kampong Krasaing village to the south, Vietnam to the east, and Koh Angdaet district lies in the west (Figure 11). The village has a land area of 800 hectares. It has two police posts and three stores. It only has about 3 kilometers of internal roads which are not connected to other villages. All the roads are flooded during the wet season; hence, transportation is possible only by boat.

Sources of power and lighting in the village include three privately owned generators and kerosene lamps. For cooking, villagers use wood gathered from flooded forests and gas contained in small bottles brought from Vietnam. Trees that grow along the banks of waterways are not harvested for any household activity. The main sources of drinking water in Bourei Cholsar are small rivers and streams. Sediments are usually allowed to settle to the bottom of the containers before drinking. Generally, drinking water is boiled but not filtered. Some of the households in the village own television sets and radios. There are some villagers who have their own cell phones for communication.

About 70 percent of the houses in Bourei Cholsar have roofs made of palm leaves and walls made of leaves or wood while 30 percent have roofs made of zinc or tile. Only a few villagers have toilets while the vast majority use fields and the river for excreting human wastes.

The residential and agricultural lands in the village are generally in private ownership. The government gave away land for free when people first settled in the area. Only four percent of the households own agricultural machinery, like tractors and harvesting equipment while 95 percent own cows, ducks and other farm animals. Water used for irrigation in the village comes from the canal. Villagers hire motor pumps that are privately owned to extract water for irrigation.

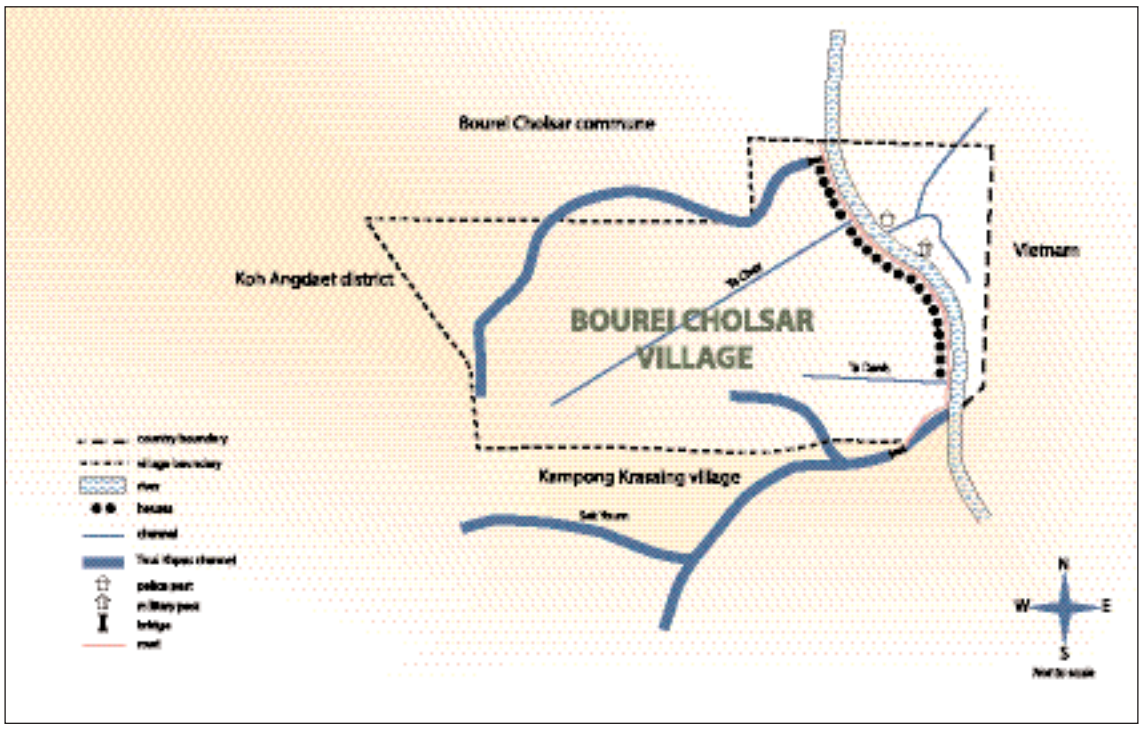

Figure 11: Physical map of Bourei Cholsar village

Natural Capital

Bourei Cholsar has ten hectares of flooded forests (Figure 12). This area becomes an entire freshwater resource during the wet season when the whole village is flooded. During the dry season, the freshwater resources of the village include the Stung Takeo Stream and some small ponds. The village has an agricultural area of 601 hectares, planted with irrigated rice in the dry season. The banks of canals and channels are also used by some households for rearing ducks. Some of the residential land is also planted with vegetables and fruit trees during the dry season. The village has three fishing lots: Fishing Lot No. 1, No. 3 and No. 5. The first two have been fully converted for public use while the remaining one is still a private fishing lot.

The villagers estimated that the major fish species caught in Bourei Cholsar are composed of trey linh and trey riel (80 percent), trey ros (10 percent) trey angdeng (5 percent), and mixed species (5 percent) (Figure 13). The major fishing gears are gill net (40 percent), hook and long line (40 percent), and traps (20 percent). Fishing is seventy percent small-scale and thirty percent medium and large scale (Figure 14).

Human Capital

In 2004, Bourei Cholsar had a population of 470, of which 239 were men and 231 were women. There are 80 households in the village with an average household size of 5.9 persons. The population density is 0.6 persons per hectare. The villagers are all Buddhist of Khmer origin.

About 10 percent of the people in Bourei Cholsar can read and write in Khmer; no one knows English. Seventy percent of the villagers have no education at all. The village has no primary school of its own, so most children have to go to school in other villages. The lack of money and the need to assist in household and farming chores are

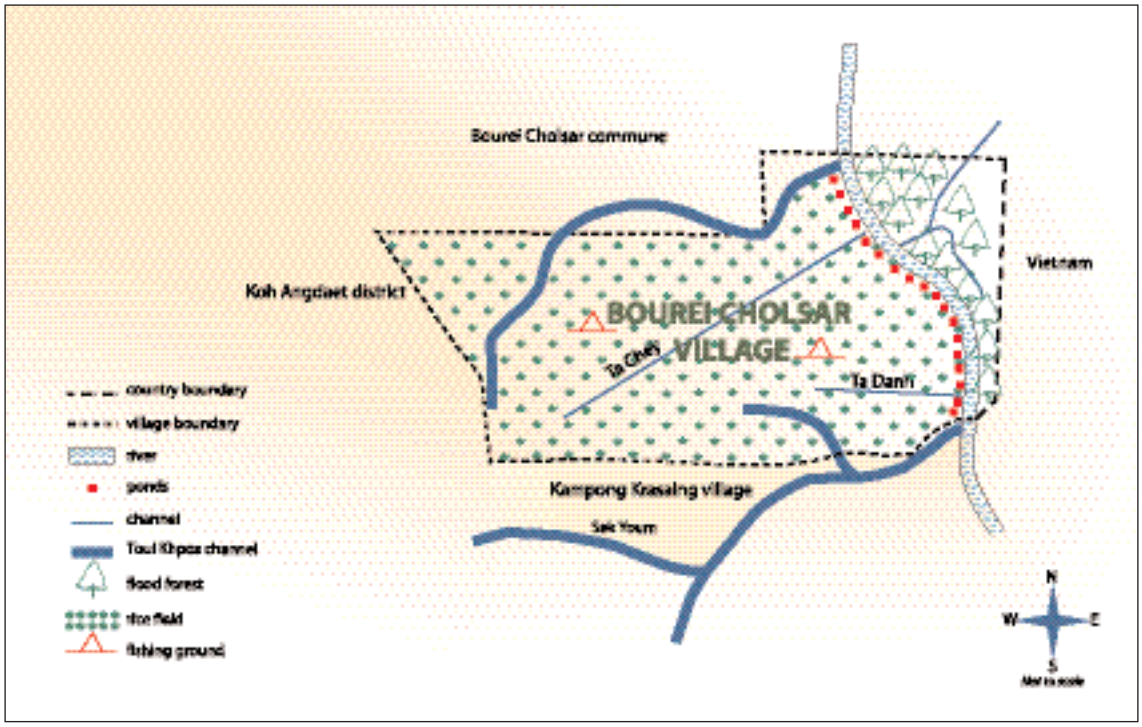

Figure 12: Natural resources map of Bourei Cholsar village

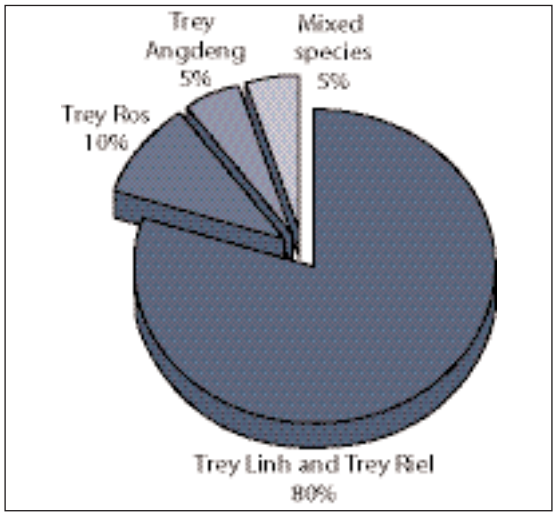

Figure 13: Main fish species caught in Bourei Cholsar

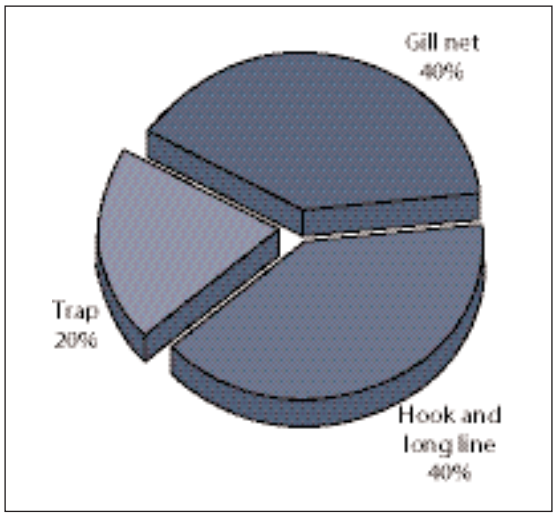

Figure 14: Type of gear used by households to catch fish in Bourei Cholsar

overriding reasons why many young people do not seek education beyond the primary level. For education, there is no bias against girls beyond the age of 12 to 16 years as compared to boys of the same ages.

The incidence of sickness among the villagers each year in Bourei Cholsar is about 10 percent for adults and 20 percent for children. The most common diseases are flu, fever, cough and diarrhea. If they fall sick, villagers normally take a day of rest or try to continue their work without medication. They can receive free medication from the health center, buy medicine from the village stores or purchase it from Vietnam. Other villagers produce traditional medicine at home. Some aquatic plants and animals are used for the production of traditional medicine. In particular, crab fat has been used as a traditional remedy to cure injuries while some forest trees and grass species are used for medication. Aquatic plants, such as snao and sleak sroleem, mixed with alcohol are used as traditional medicine as well. Both men and women have equal access to the different forms of medication for the sick in the village. Doctors seldom visit the village and if so, the activities usually involve training in the medication of the sick, and not in actually curing villager ailments. There is one midwife in the commune who assists pregnant women in delivery. However in most instances, the elder women in the village who have experience provide the needed assistance in childbirth.

The villagers in Bourei Cholsar provided their own criteria for the ranking of households in their village in terms of wealth (Table 3). The villagers ranked themselves as 60 percent being of lower wealth, 25 percent of medium wealth and 15 percent of higher wealth households. Compared to other villages in the commune, the village is ranked as a lower wealth village by the villagers. The wealth ranking by occupation indicates that although households of all classes are likely to be fishers, medium and lower wealth households are likely to be more dependent on aquatic resources, having fewer alternative occupations than higher wealth households who have other options such as leasing out their tractors.

Financial Capital

About 95 percent of the people in Bourei Cholsar derive their income from occupational sources while nearly 5 percent received income from leased properties, such as by the leasing of tractors for hire. No one receives income support from relatives or sources outside the village. About 5 percent of the villagers were reported to have kept money at their homes to use later to purchase buffalos and other farm animals, or to buy television sets and other household goods. At least 95 percent of the villagers borrow money from lenders and neighbours for various purposes that range from times of sickness or accidents to finance a wedding, or to buy food. There are two money lenders in

Table 3: Wealth ranking in Bourei Cholsar village

Characteristics	Higher wealth households	Medium wealth households	Lower wealth households
Area of Owned Land	10 ha of rice land 999 m^2 of house land	4 ha of rice land 999m^2 of house land	0.5 ha of rice land 999m^2 of house land
House Type	7m x 5m area Wall and floor made of wood Roof made of tile or zinc	4m x 4m area Wall and floor made of wood Roof made of zinc	3m x 4m area Wall and floor made of wood or bamboo Roof made of palm leaves
Occupation of Household	Rice farmer, fisher, fish culturist, tractor owner	Rice farmer, fisher	Rice farmer, fisher, laborer
Other Things Owned	Color television, video, motorized boat, water pump, generator	Black and white television, video, motorized boat, water pump	Radio, non-motorized boat

the village, both charging considerably high interest rates by the villagers' standards. An NGO used to lend money in the village but it is not active anymore.

Collateral is usually not required between villagers since borrowing agreements are done in good faith and on trust. However, lenders do assess the paying capability of borrowers by looking into their income and property profiles. There are instances when people cannot pay back the money borrowed, forcing lenders to take away the properties of borrowers, like farm animals, as payment. In some instances rice fields are temporarily seized from borrowers who default in payment and leased to other rice growers until the borrowed money is recouped. In most households, the women usually handle the family purse and make the family expenditures. Borrowing and lending money are mutually decided between husband and wife.

Social Capital

The people of Bourei Cholsar consider their village a socially integrated one where people cooperate with each other. The celebrations and social activities celebrated by the village are the same as those in Kdol Chrum (refer to Table 2).

Village Administration

Bourei Cholsar is administered by a village head and assisted by a vice-head (Figure 15). It has a Village Development Committee (Figure 16) and a Community Fisheries Committee (Figure 17).

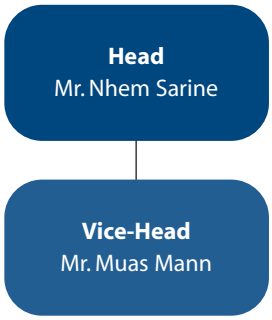

Figure 15: Bourei Cholsar village organizational chart

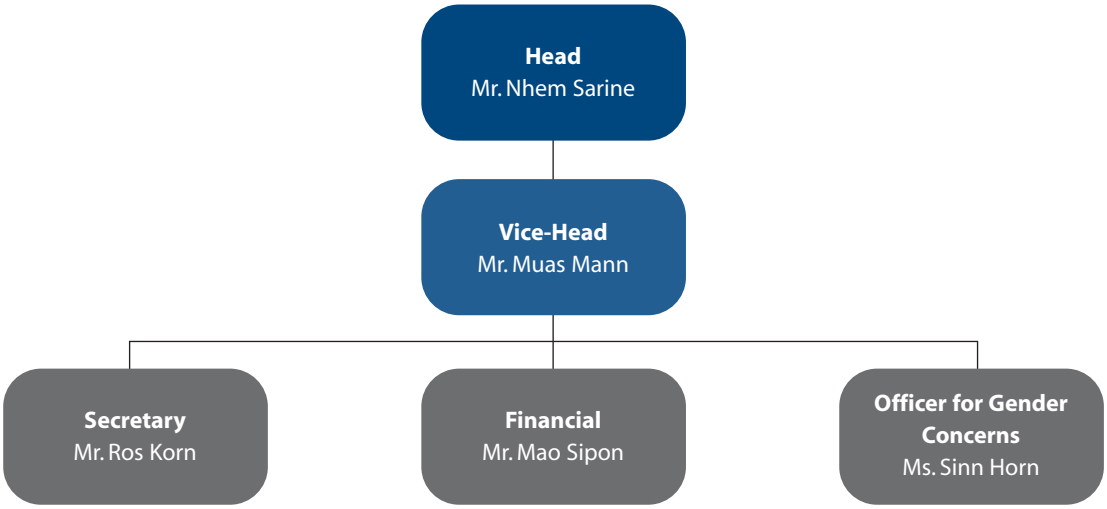

Figure 16: Bourei Cholsar village development committee

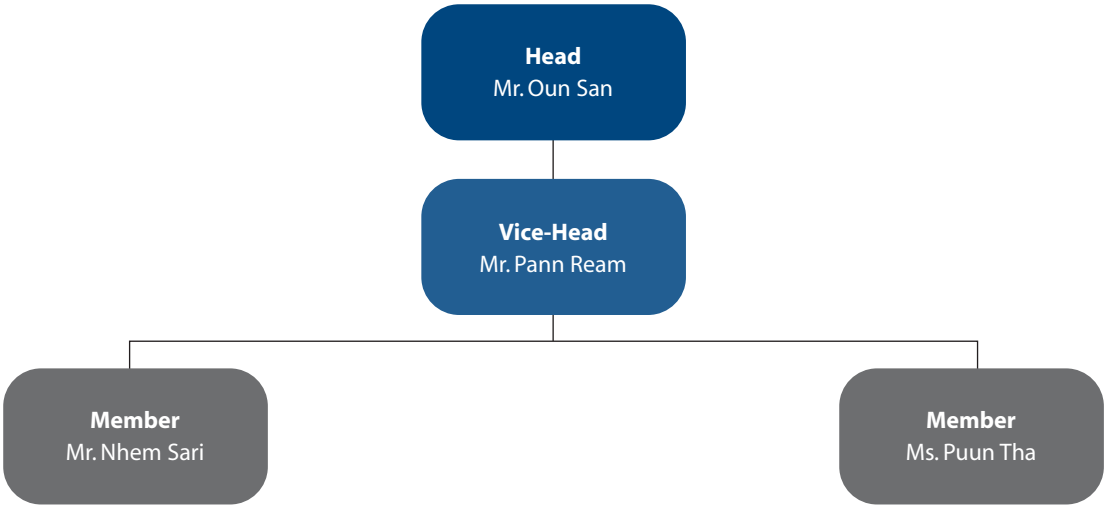

Figure 17: Bourei Cholsar community fisheries committee

Sangkum Mean Chey

Physical Capital

Sangkum Mean Chey is bordered by Kdol Chrum village in the north, Chey Chhuk commune in the south, Thmor Bey Dom village in the east, and Koh Angdaet district in the west (Figure 18). It has a land area of 2 400 hectares. The village has a pagoda, a primary school, and nine stores. It has 3.4 kilometers of road that connect the village to the other villages in the commune. All the roads are flooded during the wet season, making boat transportation the only possible means during that time of year. Boat transportation is used all year round, 35 percent are motorized and 65 percent are non-motorized.

The sources of lighting in the village are limited to kerosene lamps and torches. For cooking, villagers use wood gathered from the flooded forests. The trees that grow along the banks of the waterways are not used for any household activity. The main sources of drinking water in Sangkum Mean Chey are the lake, channels, canals and other water bodies. Sediments are usually allowed to settle to the bottom of containers before drinking. Generally, drinking water is boiled but not filtered. Some of the households in the village own radios. There are a few villagers who own cell phones.

About 30 percent of the houses in Sangkum Mean Chey have roofs made of palm leaves and walls made of leaves or wood; 70 percent have roofs made of zinc and walls made of wood. About 92 percent of the villagers do not have toilets and use the fields and the river for the discharge of human wastes. Only two percent have toilets that were made with the help of a non-governmental organization that previously worked in the area.

In Sangkum Mean Chey, residential and agricultural lands in the village are generally privately owned since the government originally gave the land away for free when they first settled in the area. About ten percent of the households own agricultural machinery, like tractors and harvesting machines while 85 percent own cows, ducks and other farm animals. Nearly 75 percent of the water for irrigation comes from the Prek Lapoav

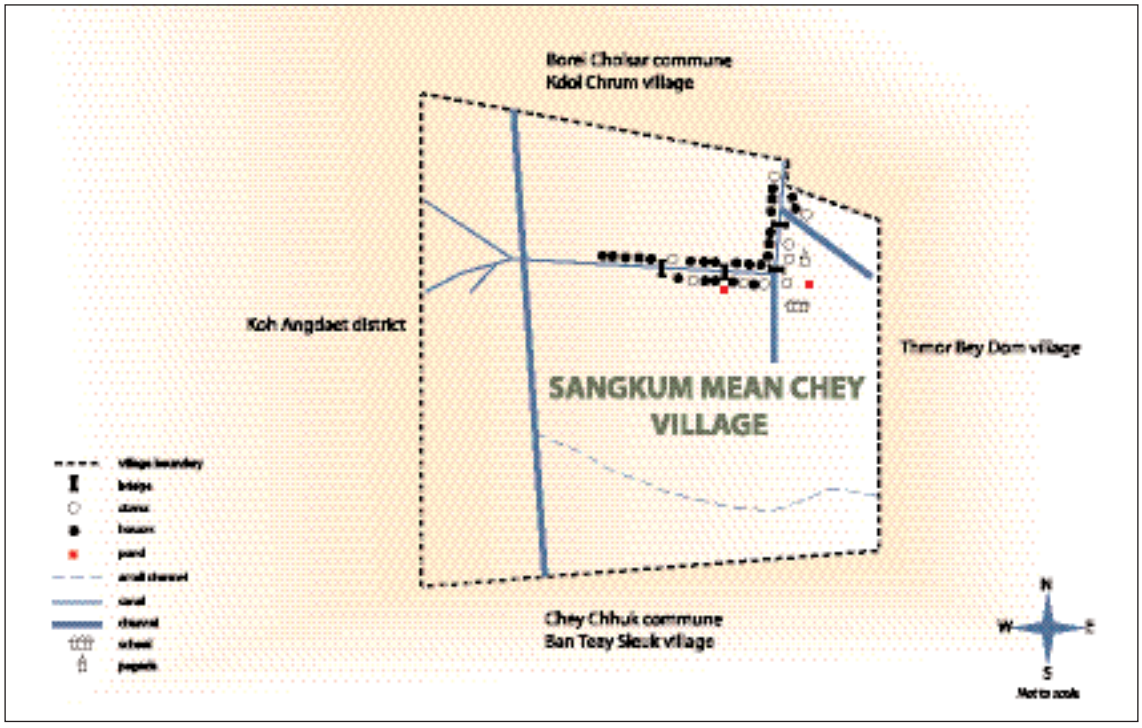

Figure 18: Physical map of Sangkum Mean Chey village

natural channel while the remaining 25 percent is generated from Canal No. 3. Villagers hire privately owned motor pumps to extract water for irrigation.

Natural Capital

Sangkum Mean Chey has a flooded forest area of 310 hectares (Figure 19). During the wet season the whole village is flooded, turning the entire area into a freshwater resource. During the dry season, the village relies on the freshwater resources of the Prek Lapoav Channel, Support Programme for Agriculture Sector in Cambodia (PRASAC) Canal No. 3, Brolay Keik Bey Canal and other smaller water bodies. The village has an agricultural area of 1 200 hectares where rice is mostly planted during the dry season. The banks of the canals and channels are also used by some households for raising ducks. Some of the residential lands are also planted with vegetables and fruit trees during the dry season. The village has a single fishing lot, Fishing Lot No. 1, which is partially open to public use.

The villagers estimated that the major fish species caught in Sangkum Mean Chey are composed of trey ros (30 percent), trey angdeng (15 percent), and mixed species (55 percent) (Figure 20). The major fishing gears are gill nets (30 percent), hook and line (25 percent), cast nets (25 percent), electrocution gear (15 percent) and small vertical slip traps (5 percent). Most fishing is done in the fishing lot at small and medium scales (Figure 21).

Human Capital

In 2004, Sangkum Mean Chey had a population of 1 086 of which 340 were men, 334 were women and 412 were children. There are 201 households in the village for an average household size of 5.4 persons. The population density is 0.5 persons per hectare. Nearly everyone is Khmer, except for one percent that is of ethnic Vietnamese; all are Buddhist.

Only about 30 percent of the people in Sangkum Mean Chey can read and write in Khmer but no one can do so in English. About 30 percent of the villagers have no education at all. The primary school in the village has 6 classrooms, 5 teachers and 260 students. The few students who aspire to secondary education go to Koh Angdaet district or Bourei Cholsar district. The lack of money and the need to assist in household and farming chores are the overriding reasons why many students do not seek education beyond the primary level.

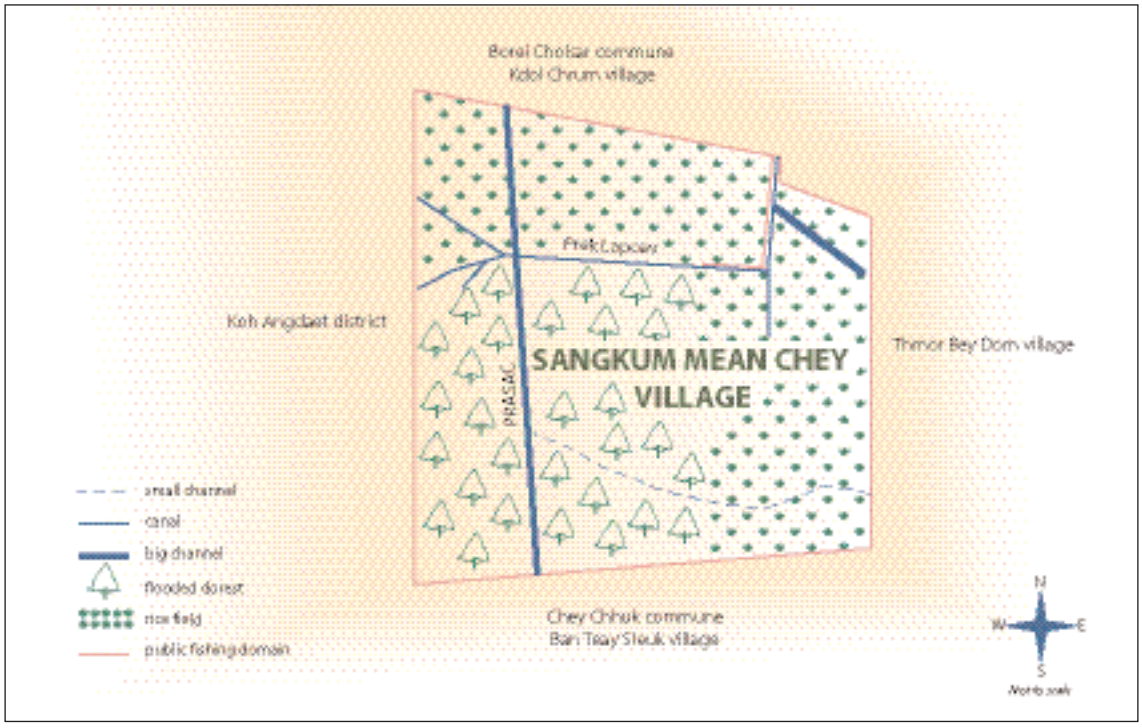

Figure 19: Natural resources map of Sangkum Mean Chey village

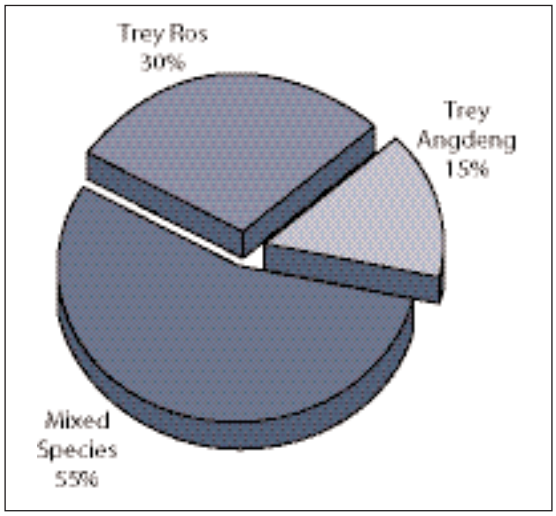

Figure 20: Main fish species caught in Sangkum Mean Chey

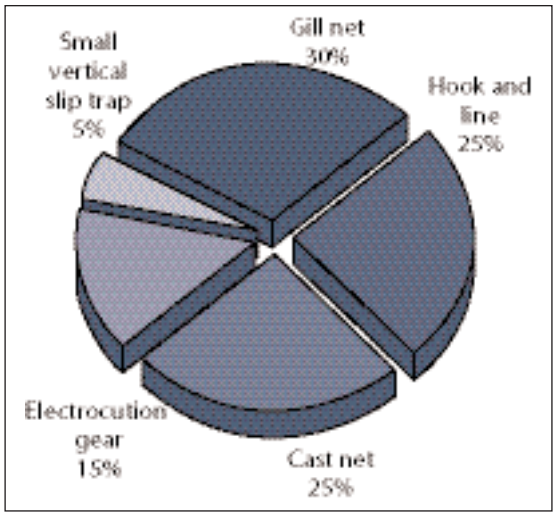

Figure 21: Type of gear used by households to catch fish in Sangkum Mean Chey

The incidence of sickness among the villagers that are reported each year is about 15 percent for adults and 20 percent for children. The most common diseases are flu, fever, cough and diarrhea. When they fall ill, villagers rest or try to continue their work without medication, get free medication from the health center, buy medicine from stores in the village or provincial capital, or produce traditional medicine at home. Some aquatic plants and animals are used for the production of traditional medicine. In particular, crab fat has been used as a remedy for injuries while some flooded forest tree species and grass are utilized for medication. Both men and women have equal access to the different forms of medication for the sick in the village. The village is seldom visited by doctors from outside, but if one does come the activities usually involve training in the medication of the sick, not in actually curing the sicknesses of the villagers. There is one midwife in the village that assists in the delivery of newborn babies.

The villagers provided their own criteria for the ranking of households in their village in terms of wealth (Table 4). Of the households in the village, 15 percent are characterized as lower wealth, 75 percent medium wealth and 10 percent higher wealth. Compared to other villages in the commune, Sangkum Mean Chey is considered to be a medium wealth village. The wealth ranking by occupation indicates that although households of all classes are likely to be fishers, medium and lower wealth households are likely to be more dependent on aquatic resources, having fewer alternative occupations than higher wealth households who have other options such as operation of tractor, rice mill or speedboat.

Financial Capital

About 95 percent of the people in Sangkum Mean Chey earn income from occupational sources while about five percent receive payments from leased properties. No one receives income support from relatives or other sources outside of the village. Nearly five percent of the villagers are reported to save money kept in their homes to use later to purchase buffalos and other farm animals, buy television sets and other household goods. A greater number of villagers, about 80 percent, borrow money from the PRASAC (an NGO operating in the village), neighbours, people in other villages and money lenders for various reasons, including in times of sickness or accident, to finance a wedding, or to buy food.

In some instances, borrowing is in-kind and also paid in-kind, such as when rice is borrowed and paid for with labour service. Interest rates imposed by other lenders are at about 10 percent per annum. Collateral is usually not required as borrowing agreements are done in good faith and on trust. However, lenders do assess the paying capability of borrowers by looking into their income and property profiles. There are instances when people cannot pay back their borrowings, forcing lenders to take their property away, like farm animals, as payment. There are also times when rice lands are temporarily seized from borrowers who cannot pay. This land is leased to other rice growers until the borrowed money is recouped. In the households,

Table 4: Wealth ranking in Sangkum Mean Chey village

Characteristics	Higher wealth households	Medium wealth households	Lower wealth households
Area of land owned	10-16 ha	3-5 ha	0.0-0.5 ha
House type	(4 x 6m) - (7 x 11m) Wall and floor made of wood Roof made of zinc	(3 x 5m) - (4 x 6m) Floor made of wood Wall made of leaves Roof made of zinc	(3 x 5m) Floor made of wood Wall made of leaves Roof made of leaves
Occupation of household	Rice farmer, fisher, tractor operator, speed boat operator, rice mill owner	Rice farmer, fisher, fish farmer	Rice farmer, fisher, laborer
Other things owned	Big motorized boat, tractor, big water pump motor, several livestock	Motorized boat, small water pump motor	Small non-motorized boat

the women usually handle the family purse and make the family expenditures, but borrowing and lending money are mutually decided between husband and wife.

Social Capital

As in Kdol Chrum and Bourei Cholsar, the people of Sangkum Mean Chey considered their village a socially integrated one where people cooperate with each other. The celebrations and social activities celebrated by the village are the same as those in other villages (refer to Table 2).

Village Administration

The village is administered by a chief and assisted by a vice-chief (Figure 22). It has a Village Development Committee (Figure 23). The village has no community fisheries committee at present.

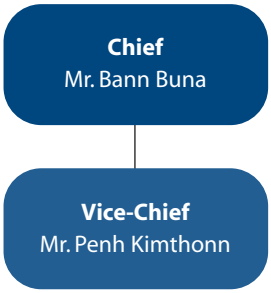

Figure 22: Sangkum Mean Chey village organizational chart

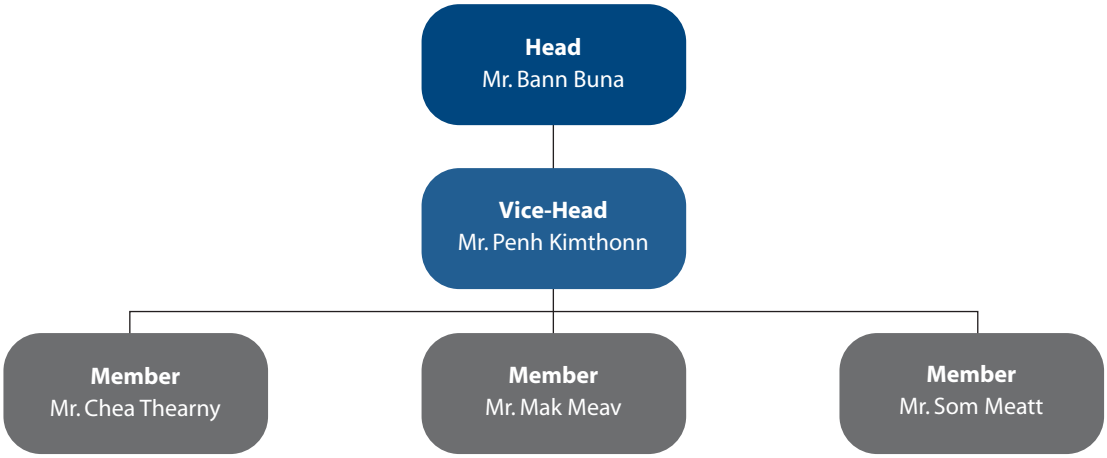

Figure 23: Sangkum Mean Chey village development committee






Village Profile

Livelihoods, Vulnerability, Stakeholders and Aquatic Resources Management

Livelihoods in the Villages

Rice farming is the primary livelihood whilst fishing is the secondary livelihood among households in the villages of Kdol Chrum, Bourei Cholsar and Sangkum Mean Chey (Figures 24 and 25). At least 90 percent of the households in the villages are involved in fishing (Table 5). Aside from fishing, other aquatic based livelihoods are fish processing, the collection of aquatic plants and animals and the collection of aquatic wood. Gathering of aquatic plants and animals and gathering aquatic wood are particularly important as almost all the households undertake this activity to supplement their daily household consumption. Some households also raise ducks by utilising water in canals and water channels.

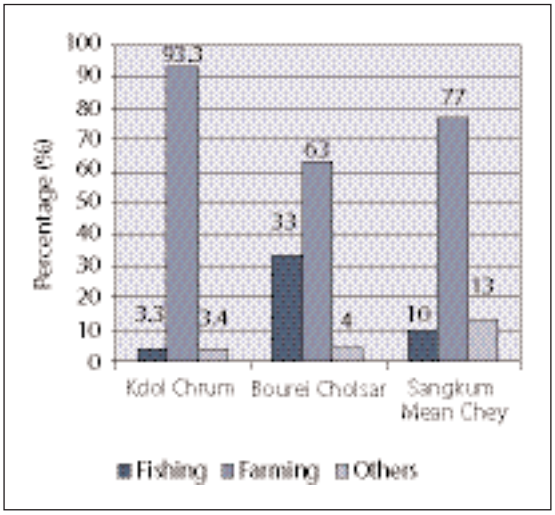

Figure 24: Primary occupation of household heads

Table 5: Aquatic resources-based livelihoods

Livelihoods	Percent of households		
	Kdol Chrum	Bourei Cholsar	Sangkum Mean Chey
Fishing	93.3	93.3	90.0
Fish processing	53.3	55.2	66.7
Gathering of aquatic plants and animals	100.0	100.0	96.7
Gathering of aquatic woods	100.0	93.3	100.0
Rice farming	93.3	86.2	83.3

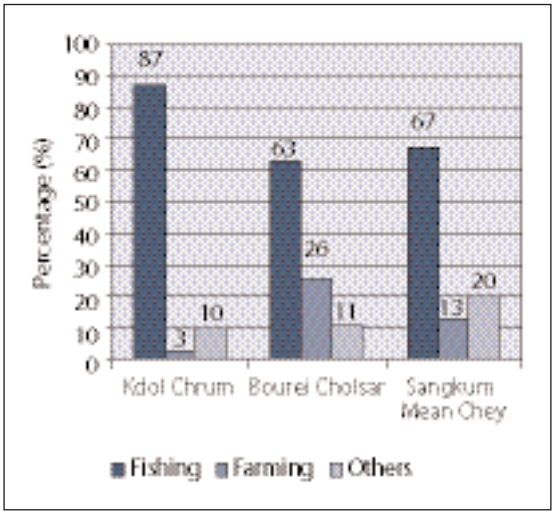

Figure 25: Secondary occupation of household heads

Vulnerability of the Villages

Trends

The villages of Kdol Chrum, Bourei Cholsar, and Sangkum Mean Chey and the commune they belong to were established in the 1980s. In the early days, with fewer people around, natural resources in the villages were abundant with no occurrence of resource over-exploitation. Fish were plentiful to villagers and catch per day was high. Fish catch declined in the 1990s as more people came and settled in the area and practised fishing. Presently, increase in population, together with the use of destructive illegal fishing techniques, have decreased the catch per day to its lowest levels.

Before the 1980s, many forest areas in the village were flooded and forest resources were abundant. In the 1980s, with the arrival of more people, the forest resources started to diminish due to forest clearing for rice farming and the use of wood for constructing of houses and cooking. This trend continued into the 1990s as additional people came to live in the village.

In more recent years, following the release of fishing lots in Takeo, it has been reported that further clearing of flooded forests continued. Open access allowed these flooded forest areas to be cleared for wood and rice planting. Many of the villagers consulted were aware of the critical role of flooded forests as important breeding grounds for fish. They reported dwindling fish catch and expressed great concern at this negative trend.

As in many rural areas in Cambodia, poor health care and nutrition have been a constant problem in the villages. During the 1980s, many people often got sick from various illnesses. The establishment of a health center in Kdol Chrum in the 1990s helped to reduce the incidence of diseases but many health problems associated with poor nutrition remain. Doctors seldom visit the village and people do not have enough money to buy medicines when they get sick. Various illnesses continue to occur, especially those that are water borne.

The villagers believed that population growth, together with poor management, was a key factor in the over-exploitation of resources in their village. They also think that as a result of dwindling natural resources they have become poorer and, as a result, their ability to purchase food and medical services has been impaired.

Shocks

When floods occur in the villages, they do not have much effect on agricultural production because the villagers do not plant during the wet season. Floods, however, do cause villagers to move to higher ground or to raise the floor levels of their houses, resulting in additional costs. In 2000, for instance, a major flood affected the villages to such a degree that villagers had to relocate. In addition, when floods occur early, such as during harvest time, crops are affected resulting in lower production; this happened in 1990. Villagers estimated that, on average, above normal flooding occurs in their village at least once every three years.

The occurrence of droughts does not affect the agricultural production in the villages since it has an irrigation system. However, droughts can result in poor production of vegetables that in turn reduces food availability among households and the entire village. Villagers argued that both floods and droughts cause diseases and starvation, not only among themselves but also to their livestock, resulting in the deaths of some animals. There is also a lack of medicine to cure sick animals in the villages. There is little that villagers can do except to pre-empt the problem by killing sick animals, sometimes for food. In the case of bird flu, villagers recently reported that many of their ducks died, causing economic hardships for them since the dead birds could not be eaten. The villagers considered droughts and floods and the subsequent outbreaks of various diseases as highly critical negative factors affecting their lives and the condition of their village. They realized that not much could be done about droughts and floods since they are natural occurrences, but hoped that health concerns resulting from these events could be addressed.

Seasonality

The dry season in Takeo is from November to June while the wet season is from July to October. Rice production is done in the dry season to avoid

total flooding in the wet season. Rice production is irrigated with water supplied from the canals. Land preparation is carried out in October when the ground is still wet from flooding and rice seeds are sown in November and December. Crop growth is from January to March or April when harvesting occurs. Right after harvest, another round of rice seeds are sown. The second crop grows until harvested in July.

Villagers tend to be both rice farmers and fishers in the dry season and solely fishers during the wet season. Men usually prepare the land, plant seeds, and harvest the crop, while women help out with planting and harvesting, as well as processing and marketing rice. Women usually share in the work of vegetable planting and the rearing of ducks, in addition to their household chores. Children help out by feeding and maintaining ducks and other farm animals.

Fishing patterns in the villages also follow the seasons. The fishing season is closed from May to September. This is the beginning to middle of the wet season, hence fish catch is low. The open fish season is from October to January and catch is high. During the dry season when rice is in its growth stage, some villagers fish as an alternative livelihood. Fish catch in the dry months, however, is moderate due to the receding water level and the large number of people catching fish. Catch is increased in the peak of the dry season from February to April when the fishing season is still open but water levels subside.

During the wet season, the entire village is flooded and many villagers depend only on fishing as a livelihood. Catch during the early and middle part of the wet season is low because of the closed fishing season. The catch rises in the later part of the wet season when the fishing season is open and the area available for fishing expands with flood. Many species of fish are also brought into the village due to surging floodwaters that contribute to higher catch.

Average fish catch per household in the three villages is significantly higher in the dry season (641 kilograms) than in the wet season (316 kilograms). On an annual basis, average catch per household stands at 957 kilograms. The average gathering of aquatic plants per household in villages is higher in the wet season (457 kilograms) than in the dry season (411 kilograms), with an annual figure of 868 kilograms. The average gathering of aquatic animals per household is also higher in the wet season (597 kilograms) than in the dry season (496 kilograms), with an annual figure of 1 093 kilograms (Figure 26).

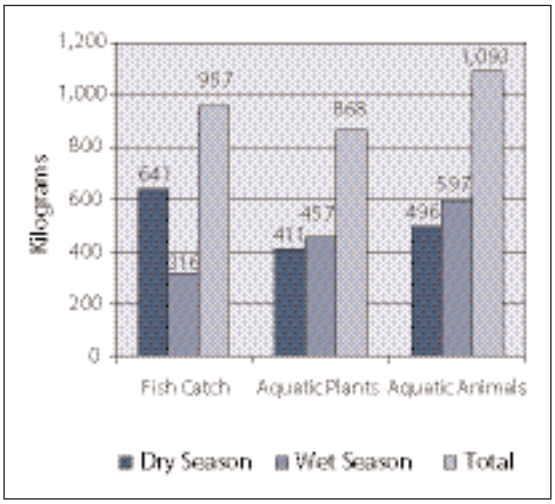

Figure 26: Seasonal and annual fish catch and aquatic plants and animals gathered

The prices of rice and fish in the villages are inversely related to the harvesting and fishing seasons in the villages. Thus, when rice and fish are plentiful, the market price is low and vice versa. The variability in the availability of rice and fish causes some hoarding of these commodities by villagers. Villagers usually process the fish catch into salted and other processed forms so that they will last well into the lean months when fish catch in the village is low.

The demand for labour in the villages is directly related to rice farming. During land preparation, planting, and harvesting times, the demand for farm labour is quite high, in contrast to the growing season when demand is low. As mentioned previously, some villagers use the off-period to go fishing when there is no farm work but many remain unemployed or underemployed. In the wet season, villagers who are willing to fish have ample opportunities but fish catch per unit of effort by the villagers has clearly gone down over the years.

Villagers believe that the lack of employment during the slack period of rice farming activities in their village is a major factor affecting their incomes and lives. They hoped that by creating some form of alternative income opportunities for the people, their situation would be improved. They also perceived that the changes in agricultural and fish prices could be significantly minimized through the development of better marketing and processing systems for their products.

Village Stakeholders

The primary stakeholders in the utilization and development of aquatic resources in the villages are the various households involved in fishing, fish processing, collection of aquatic plants, animals and wood, rice farming and duck rearing. Another important primary stakeholder group is the fishing lot owners, who live outside of the villages. Fishing lots create both negative and positive impacts. These lots limit villagers to certain areas for fishing and increase their costs because the rights to fish in these lots are paid for by fishers in the form of access fees. On the other hand, fishing lots help prevent the rapid destruction of flooded forests and fish habitats within their areas, which would otherwise be vulnerable in an open access environment (Figure 27).

Secondary stakeholders comprise of the government agencies and private entities involved in the villages and other stakeholders based outside the villages, but who have direct or indirect impacts on the utilization of aquatic resources in the villages. Government agencies include the national and provincial DoFs, district, commune and village administrative organizations, and the police and military units. Private entities include NGOs, fishers from outside (even Vietnam), who fish in villages (inclusive of Vietnam), the sellers of boats, fishing gears, and other fishing materials from outside and Vietnam, and money lenders.

Given their functions related to fisheries and aquatic resources, the provincial and national Department of Fisheries (DoF) play relevant roles in the management of aquatic resources in the village and in controlling illegal fishing. They play an important role in the organization and development of community fisheries management in the village. However, due to limited staff and financial resources they cannot effectively exercise their functions across the large number of villages in the province.

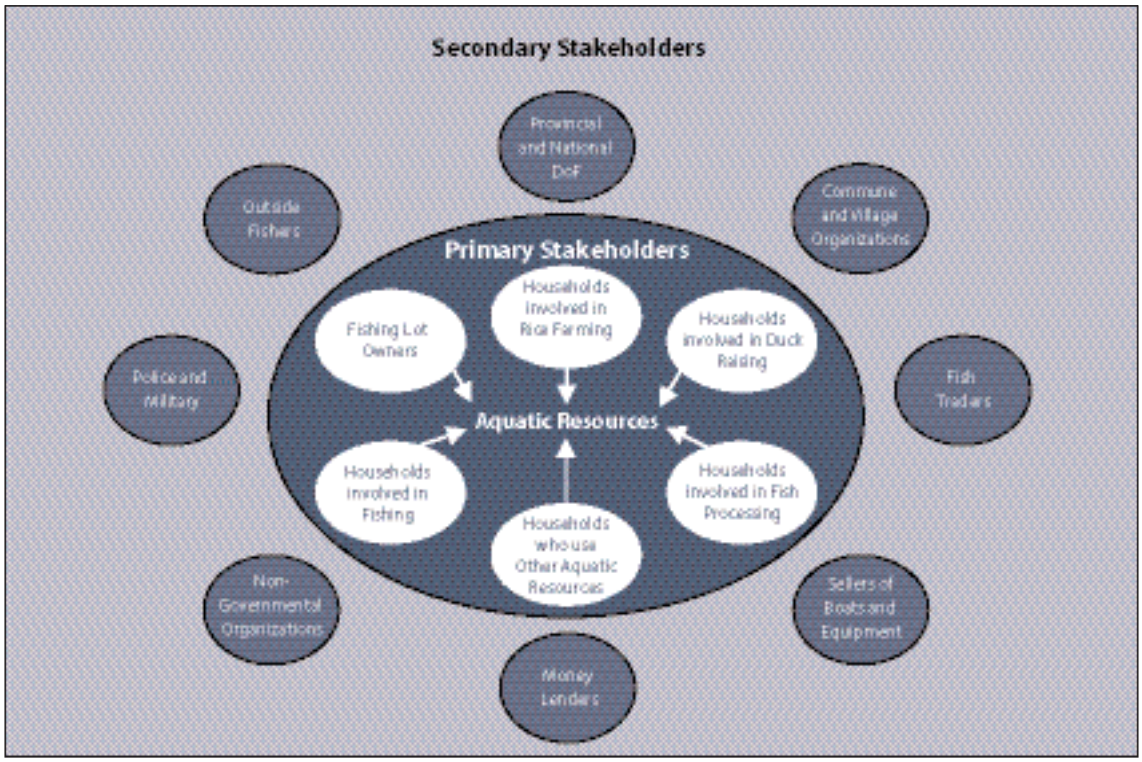

Figure 27: Stakeholders of aquatic resources

The district, commune and village administrative organizations and their officials also play a key role in the management of fisheries and aquatic resources in the village. As in the case of national and provincial administrative agencies, these agencies are also constrained by limited manpower and resources in the discharge of their functions. For instance, the budget for the Community Fisheries Committee is insufficient, leaving the committee to be partly operational at present.

The police and military outposts operating in the villages have been credited as helping in the maintenance of peace and order in the village. However, there are reports that some personnel collect bribes or illegal fees for protecting illegal fishing operations in the village, inclusive of Vietnamese fishers.

The NGOs who used to provide loans to villagers helped because the interest rates they offered were generally lower than those provided by other money lenders. The loans would have helped households improve their economic conditions assuming the money borrowed has been used properly in income generating activities.

Fishers from other villages and Vietnam reduce the total catch of local village fishers, increase the total number of fishers, and add to the further exploitation of fisheries and aquatic resources. These outsiders may also care less about maintaining resources for long-term sustainability since they are non-residents and their main interest is to catch as much fish as they can.

Local fish traders and those from Vietnam who buy fish from the villages contribute in a positive way to the operations of village fishers because they provide an easy and convenient channel for the marketing of fish. However, in the absence of competition, fish traders can also control the buying price and set it to their advantage at the expense of village fishers. Fishers, however, did not indicate any problems associated with under-pricing of fish by local or Vietnamese traders.

Boat, fishing gear and other fishing material sellers from Vietnam also make positive contributions to the development of fishing villages. They help to bring in better equipment and new technology that leads to improvements in the total fish catch. Despite these positive aspects for fishers, the assistance of these stakeholders may intensify the exploitation of aquatic resources in the long run.

Money lenders in the village help by providing fishers with the capital needed to purchase equipment for fishing. However, these positive measures can be diminished if interest rates are set too high, making it difficult for poorer fishers to pay their loans. In general, though, the service provided by money lenders in terms of capital provision is beneficial for the village, as long as interest rates are kept reasonable and within the paying capabilities of borrowers.

Aquatic Resources Management

Access Issues

There are several aquatic resources related management issues that affect the villagers of Kdol Chrum, Bourei Cholsar and Sangkum Mean Chey. These issues are as follows:

- Illegal fishing by fishers, particularly the use of mosquito nets, is common.
- Overfishing caused by the increasing number of fishers from within the villages and those from outside the villages.
- Flooded forests are being cleared rapidly due to the illegal gathering of wood and for expansion of rice farming.
- Poor monitoring and enforcement by the authorites of the illegal activities in the villages.
- Villagers have limited knowledge about the rules and regulations related to the use of aquatic resources in their villages.
- The Community Fisheries Committee lacks funds and management capacity for aquatic resources management.
- There is a lack of alternative jobs for fishers that could wean them away from fishing.

In addition to these issues, other issues which directly affect the access of villagers to aquatic resources include the payment of access fees, the presence of fishing lots, the presence of fish sanctuaries and the imposition of closed seasons (Table 6). Overall there is a very high awareness among villages on all of these issues. The presence of fishing lots stands out as the key reason access to fisheries resources is restricted with 93 percent of the villagers in agreement. In relation to access fees, fish sanctuaries and closed seasons, the majority of villagers (64 percent and 79 percent) did not feel these management issues increased or decreased access to fish resources.

Illegal fishing

In general, the villagers viewed illegal fishing using mosquito nets, as the main issue in their villages.

Table 6: Aquatic resources related access issues in the villages

Access Issues	Percent of households
Payment of access fees	
Issue recognized by	99
Effect on households:	
Reduces access	19
Increases access	1
Remains the same	79
No opinion	1
Presence of fishing lots	
Issue recognized by	99
Effect on households:	
Reduces access	93
Increases access	2
Remains the same	4
No opinion	1
Presence of fishing sanctuaries	
Issue recognized by	99
Effect on households:	
Reduces access	21
Increases access	14
Remains the same	64
No opinion	1
Imposition of closed seasons	
Issue recognized by	94
Effect on households:	
Reduces access	19
Increases access	7
Remains the same	68
No opinion	6

The villagers analyzed its causes and effects and suggested various measures to address the problem. Using fine-mesh mosquito nets for fishing has several negative consequences. The loss of immature fish leads to a subsequent decrease in mature fish stocks. This in turn leads to a decrease in fish catch in the long term which eventually reduces the potential income of fishers and worsens poverty.

The villagers felt that poor monitoring and enforcement was the main cause contributing to mosquito net fishing; especially since no crackdowns have been conducted to curtail the activity. Poor knowledge among fishers on the negative effects of using mosquito nets adds to the problem. Furthermore, the authorities lack the resources needed for effective monitoring and enforcement against illegal users of mosquito nets.

Villagers made several suggestions for solutions to thwart the illegal use of mosquito nets:

- Provide strong monitoring and enforcement efforts.
- Impose stiff penalties for offenders.
- Provide credit provisions for alternative income activities, such as raising livestock and aquaculture.
- Provide training and extension services in alternative income opportunities.
- Strengthen the Community Fisheries Committee with material and capacity building support to better manage aquatic resources.
- Implement a participatory form of aquatic resource management in villages.

Village Projects

As part of the project, group discussions among villages were conducted to come up with specific projects to be undertaken at village level. The villages of Kdol Chrum, Bourei Cholsar and Sangkum Mean Chey identified small projects that could be carried out within the communities to improve aquatic resources management in their respective villages. These projects were intended to: a) create awareness amongst the villagers as well as outsiders on the importance of aquatic resources in their area; and b) encourage the participation and empowerment of communities in the management of aquatic resources.

As an initial project, the villagers chose to construct conservation posts, with funding provided from the Mekong Valuation Project. The main aim of the conservation posts was to create and increase awareness on the importance of protecting conservation areas within the village boundaries. These conservation areas are important for brood stock to take shelter in the dry season and spawn in the beginning of the wet season. The conservation posts serve as a reminder to deter villagers from damaging these areas. Six conservation posts were set up in Kdol Chrum, three in Bourei Cholsar and four in Sangkum Mean Chey. In addition, trees will be planted along the canal banks in Bourei Cholsar and Sangkum Mean Chey by the end of the wet season in 2005.

Villagers also proposed the following additional measures for the improvement of overall aquatic resource management in their villages such as:

- Replant flooded forests.
- Train villagers on forest protection measures.
- Rehabilitate old canals and construct new canals.
- Develop a company for marketing or implement better marketing systems for selling fish products.

Summary of Key Findings

This profile provides a comprehensive background of the three villages of Kdol Chrum, Bourei Cholsar, and Sangkum Mean Chey in Takeo province. On-the-ground findings give substantial insights into the utilization and management of aquatic resources in the villages. The following summarizes the findings:

Socioeconomics

- Villages have limited physical infrastructure and other physical resources. The villages are totally flooded in the wet season; therefore, villagers must rely on transportation by boat.
- Most village households derive their income from occupational sources including rice farming and fishing. Those in dire need borrow money at prohibitive rates of interest mainly from private lenders.
- Most households rely mainly on farming and fishing as either their primary or secondary occupation.
- Irrigated rice farming is extensively practiced in the dry season. No rice farming is done in the wet season due to flooding.
- Villagers are also dependent on other aquatic resources-based activities, including gathering of aquatic plants, animals and wood. Some households also rear ducks, which are dependent on water sources.

Natural Resources

- Some villages have flooded forests and fishing lots that are either fully or partially converted for public use. Flooded forests are sources of wood for villagers.
- The villages, which are entirely flooded in the wet season, are resources for fishing and other aquatic resources-based livelihoods for the villagers. In the dry season, the canals and other small bodies of water are used for fishing.

Social Aspects

- Health care services are limited in all villages; thus sickness affects the ability of villagers to generate income and obtain food.
- Many households have no toilets; hence, water bodies and open fields are used for discharging wastes.
- Many villagers are unable to read and write and have no education or a primary one at best. Educational services in the villages are limited to primary schools.

Organizations

- Villages have common existing administrative organizational structures that tend to management matters of the villages.
- Most villages have established community fisheries committees that are assigned with the function of managing fisheries and aquatic resources.
- Fisheries community committees in general lack financial and human resources capacity to effectively discharge its functions.

Management and Access Issues

- The villagers face some management issues related to the use of aquatic resources, the issue identified as most important is illegal fishing using mosquito nets.
- They also face direct access issues related to the use of aquatic resources. These include the payment of access fees, the presence of fishing lots, the presence of fish sanctuaries and the imposition of closed seasons.
- Of the access issues, the presence of fishing lots is considered by the majority of villagers as constraining their access to aquatic resources.

- For villagers, other management issues affecting aquatic resources include the clearance of flooded forests, poor monitoring and enforcement by the authorities, and other related issues.
- For the most part, villagers are aware of overall aquatic resource conditions in their villages and have proposed certain measures to improve their management.

In conclusion, the current trend and initiatives by the Department of Fisheries and local agencies to strengthen the development of community fisheries management in these villages provide an avenue for sustainable development and management of their aquatic resources. The data and information captured from and the discussions held with village communities represent a critical first step to identify and document stakeholder concerns and recommendations. These profiles set the foundation for future research initiatives and development activities towards effective management of aquatic resources and improving the livelihoods of the people in the province.

References

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APPENDIX - I

Additional Characteristics of Households of Kdol Chrum, Bourei Cholsar and Sangkum Mean Chey villages in Kampung Krasaing Commune, Takeo Province (2003-2004)

	Takeo	Kdol Chrum	Bourei Cholsar	Sangkum Mean Chey
Types of land owned by households (%)				
Residential land	83	93	57	100
Farm land	31	83	0	10
Household ownership of house (%)				
Self- owned	91	87	93	93
Rented	0	0	0	0
Status of house of household (%)				
Permanent	92	83	100	93
Temporary	7	13	0	7
Others	1	4	0	0
Sources of drinking water of households (%)				
River/ lake	100	100	100	100
Rain water	42	27	33	67
Treatment of drinking water by households (%)				
Boiled	89	87	93	87
Filter	12	20	7	10
No treatment	43	57	47	27
Means of disposing waste by household (%)				
River/lake	81	100	80	63
Field	77	100	73	57
Pit	3	0	3	7
Others	38	23	33	57
Sources of animals protein of households (%)				
Wet season				
Fish	76	70	78	80
Other aquatic animals	16	18	18	11
Other meat	8	12	4	9
Dry season				
Fish	71	68	72	72
Other aquatic animals	20	18	23	19
Other meat	10	14	5	10
Sources of vegetables of households (%)				
Wet season				
Aquatic vegetables	81	76	89	80
Non-aquatic vegetables	19	24	11	20
Dry season				
Aquatic vegetables	75	68	86	72
Non-aquatic vegetables	25	32	14	28
Sources of data: Household survey 2003				
*Note: A household survey was done on 30 households per village.				