



STREAM



**A livelihoods study of farmers and fishers
in
Dang Tong Village
Kampong Chhnang Province**

Supported by STREAM Initiative
In cooperation with CFDO and SCALE

August 2002

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Acronyms

ACLEDA	Association of Cambodian Local Economic Development Agencies
ACR	Australian Catholic Relief
CFDO	Community Fisheries Development Office
DoF	Department of Fisheries
FLD	Farmer Livelihood Development
IPM	Integrated Pest Management
NGO	Non-governmental Organization
SCALE	Cambodian NGO (now FLD)
STREAM	Support to Regional Aquatic Resources Management

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The livelihoods study team included these provincial staff:

- Mr Uy Saophea, Fisheries Office
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- Mr Heng Da
- Ms Yi Chan Theary

Note: Inconsistencies in English spellings of place names may be attributed to transliteration from Khmer.

EXECUTIVE SUMMARY

This is the report of a livelihoods study team working together with villagers from Dang Tong Village in Kampong Chhnang Province, Cambodia. The study of the livelihoods of farmers and fishers is based on information provided by the villagers of Dang Tong, who shared their knowledge and raised real problems related to their livelihoods.

The study was undertaken from 5-10 August 2002. The team worked with 10-30 villagers who volunteered to participate in the discussions. The participants represent 85 families in Dang Tong Village.

Having considered differences in material ownership, means of production and standards of living, the villagers decided to divide themselves into three wealth ranking groups: medium, poor and very poor. The main resources in the village were divided into five groups: human, physical, natural, social and financial.

In general, villagers are skilled in farming and mat weaving, but some villagers also have individual skills such as carpentry, boat making, hairdressing and fixing machines. Although this village is in the Tonle Sap (Great Lake) area, which has the most plentiful supply of fresh fish in the country, the villagers are subsistence fishers.

The village always floods in the monsoon season so the road can be traversed only in the dry season. Over the years the river has eroded the road, and the bridge is old and decrepit. Although the village has large areas for planting, the natural resources of the village are being degraded, especially the fishing. The inundated forest is disappearing due to overuse of its wood for fuel and the expansion of dry season rice and lotus areas.

The villagers rely mainly on agricultural produce and on exploiting natural resources. As the population grows, they expand the planting area to improve production, in particular clearing the inundated forest to plant dry rice. Fish is especially important but the disappearance of the forest has led to a decrease in natural fish stocks. Villagers have no clean water or hygienic toilets, which increases the risk of disease. Additionally, villagers do not know how to use pesticides safely or effectively. The community fishery is newly established and inexperienced.

There were three main groups of people and institutions that had relationships with villagers: government, business and civil society.

The main problems identified by the villagers relate to a lack of irrigation systems, the problem of illegal fishing, and lack of technical know-how regarding the use of pesticides. Villagers are also worried about the

degradation of riverbanks and fish spawning areas. The identification of the most important problems resulted in an action plan designed to repair the dams and channels and to secure and improve rice production.

It was recommended that the irrigation system should be fixed, that villagers should receive advice on using pesticides, managing the community fisheries and managing the natural resources. Additionally, clean water for drinking and toilet facilities should be established.

1. INTRODUCTION

1.1 Location

Kampong Chhnang Province is located in the center of Cambodia and is one of the five provinces around the Tonle Sap (Great Lake) (Figure 1). The province borders Kampong Cham Province to the east, Kampong Speu and Kandal Provinces to the south, Pursat Province to the west and Kampong Thom Province to the north. The total area of the province is 552,100 ha, of which 136,000 ha is agricultural land.

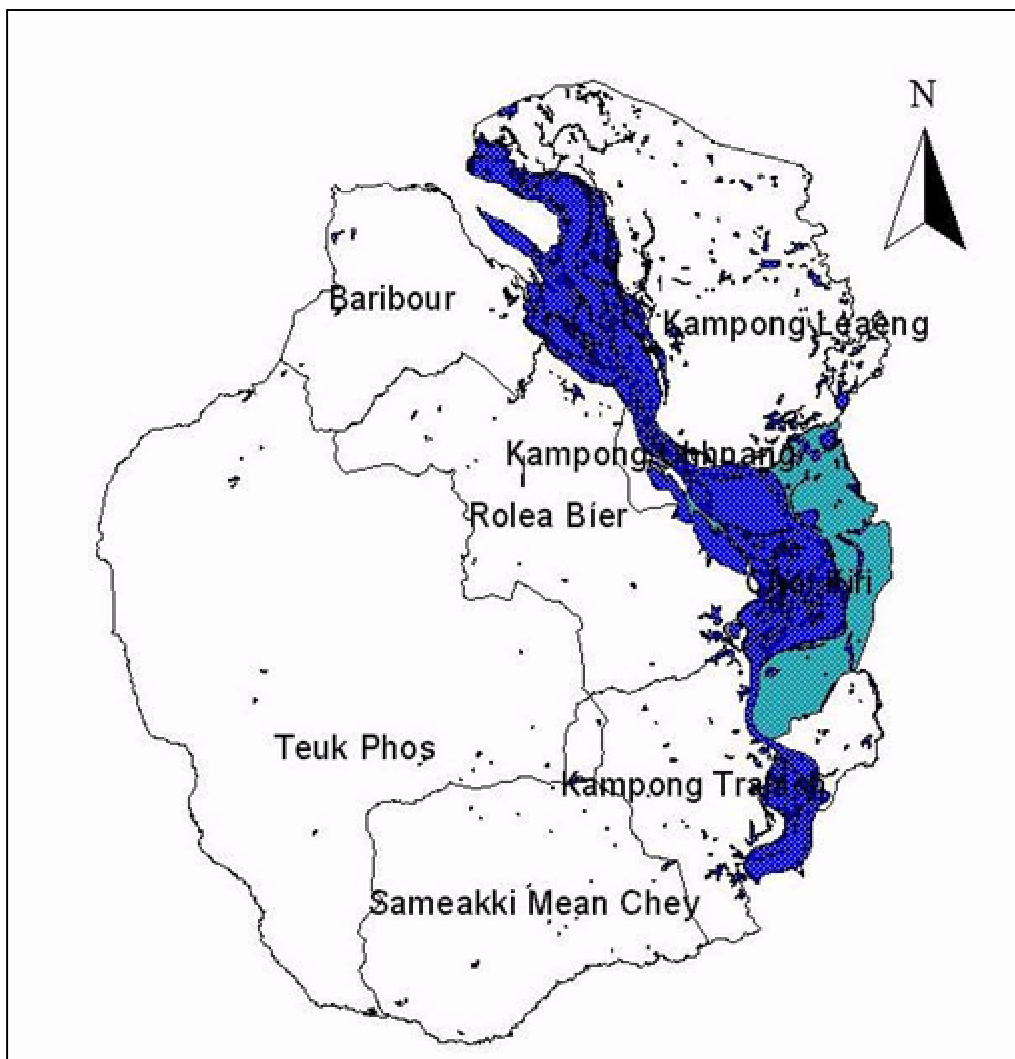


Figure 1 Map of Kampong Chhnang Province

This province can be reached by boat and road. It lies about 93 km from Phnom Penh if traveling via National Road 5 or about 73 km traveling by train. Alternatively, one can travel by boat along the Tonle Sap but at 110 km this way is longer than by road.

The province comprises eight districts, 69 communes and 546 villages. The total population of the province is 487,993 (National Census 1998). Of the eight districts, six have fishing lots in the Tonle Sap area, these being Kampong Tralarch, Chol Kiri, Rolea Phhear, Kampong Leang, Boribo and Kampong Chhnang. The province is also home to a famous attraction called Kang Rey Mountain, which is visited by national and international tourists. Moreover, Kampong Chhnang is the province known to have the most plentiful fresh water fish in the Tonle Sap.

The team selected Dang Tong Village in Kaoh Thkov Commune, Chol Kiri District for the livelihoods study. Dang Tong Village stretches along the river and usually floods in the monsoon season. The village borders Kampong Cham Province to the east, Ta Ches Village to the west, Sdey Bonlech to the south and Ta Mul Kraom to the north.

1.2 History of Dang Tong Village

A long time ago, Dang Tong Village was the farming area for people in Ta Ches Village. Three households from Ta Ches Village farmed in this area and in the dry season they stayed in a hut there to look after their crop. In 1958, six households decided to settle permanently in this village and started building houses (Table 1). At that time the village was under Sdey Ponlech Village administration in Ampil Teuk Commune, Kampong Tracach District. Throughout the civil war from 1970-75 people in this village were evacuated to other villages.

During the Pol Pot regime, this village was called Toul Trabek. There were about 40 households, 50% of which came from the neighboring villages. The remaining 50% were evacuated by Pol Pot from Phnom Penh and Kampong Chhnang. After 1979 the village name was changed from Toul Trabek to Dang Tong. Mr Doch Dom, now 70 years old and in one of the first groups to settle in this village, explained why it was called Dang Tong (Box 1).

Table 1 Historical record of events in Dang Tong Village

1958-60	Three households lived and settled in Kampong Ta Ches Village to farm in the dry season. There were no houses so they lived in huts. This village was under the administration of Sdey Ponlech Village, Ampil Teuk Commune in Kampong Tralach District.
1970-75	No people lived in the village and no farming took place. The villagers moved to Toul Trabek Village to escape the fighting.
1976-79	The villagers returned to the village. Twenty households were old villagers and twenty were people from Phnom Penh and Kampong Chhnang town. At that time there was no individual property; villagers had to work together and serve food together in one place.
1979	The village name changed from Toul Trabek to Dang Tong. There were 55 households living in the village.
1980	On 28 March, the provincial governor decided to establish two more districts: Chol Kiri and Sammakhy Meanchey. Dang Tong Village was put under the administration of Kaoh Thkov Commune and Chol Kiri District.

Box 1

How Dong Tong Village was named

During the war between Cambodia and Vietnam, a soldier named Nimul put the Cambodian flag in the lake near the village as a signal that he had taken over the area from Vietnam. Dang Tong means 'flag post'. So the people called the lake Beung Dang Tong which is now is the name of village.

2. RESULTS

2.1 Wealth ranking

Dang Tong Village is located in a low-lying area. The village always floods in the monsoon season and villagers have to build their houses raised above the ground to protect them from flooding. There are 77 households in the village and 85 families, with some households accommodating two families. Roof type is an indicator of the quality of the house and the houses have been classified by their roof type to indicate relative wealth: the best quality roof is tile, then corrugated iron and the poorest quality is leaf. Fifty houses in the village have leaf roofs, 12 have iron roofs and 14 have tile roofs. One house is made from concrete while all the other houses in this village are made from timber.

The livelihoods study team worked with nine people in the village – older men, Buddhist elders and the village leader – to ‘wealth rank’ the villagers (Table 2) into three groups: very poor, poor and medium.

- The very poor group was made up of 21 families, 25% of the total number of families.
- The poor group was made up 30 families, 35% of the total.
- The medium group was made up 34 families, 40% of the total.

Very poor

This group is made up of 21 families, which comprises 25% of the total number of families in the village. Most of these families are young and married. Eight families live in the same house as their aged parents; ten have a small hut and three live in poor quality houses with leaf roofs. The main crop for this village is dry season rice and lotus, but some families in this group have no rice fields and some have only a small area, from 0.07-0.20 ha. They have no land to plant lotus or other secondary crops, which are the cash crops of this village.

The villagers in this group have no draft animals or small tractors to plough their fields, although they have small tools such as hoes, knives and axes. They have no fishing gear besides nets. In general, each family has a net of about 200-300 m and a small boat.

Table 2 Wealth ranking criteria

Criteria	Very poor families	Poor families	Medium families
House and roof type	Hut with leaf roof	House with leaf, iron and tile roof	House with iron and tile roof and concrete house
Dry season rice area	0-0.20 ha	0.20-0.50 ha	0.30-4 ha
Lotus area	No	0.20-0.30 ha	0.30-1 ha
Secondary crop area	0.04 ha	0.04-0.12 ha	0.12 ha
Agricultural equipment	Hoes, knife, axe	Plough, harrow	Small tractor, threshing machine
Fishing gear	Net 100-300 m	Net 300-500 m	Net 500-1,000 m
Livestock ownership	Chicken	Chicken, pig, water buffaloes	Chicken, pig, water buffaloes
Means of transport	Boat	Motorboat and bicycle	Motorboat and motorbike
Family size	4-8	6-10	6-13
Family laborers	1-2	1-3	3-5
Income per day	500-1,000 riel	1,000-2,000 riel	2,000-3,000 riel
Expenditure per day	500-700 riel	700-1,000 riel	1,000-1,500 riel

On average there are 4-8 members in each of these families but most have small children. There are 1-2 laborers in each family. The estimated average income for these families is 500-1,000 riel¹ per day and the daily expenditure is 500-700 riel.

Poor

This group is made up of 30 families, which comprises 35% of the total families in the village. They mainly live in houses with leaf or corrugated iron roofs, but some have tile roofs. All the families in this group have agricultural land; on average they have 0.20-0.50 ha of dry season rice area, 0.20-0.30 ha of lotus area and 0.04-0.12 ha of secondary crop area. To farm, they have equipment such as ploughs and harrows, which are enough for them to cultivate dry season rice areas. They own a few livestock such as pigs and chickens, and water buffalo which can be used for draft purposes.

This group uses the same fishing gear as the very poor group but they are able to buy longer nets, each family having a net from 300-500 m and they also have motorboats to go fishing in. The average family size of this group is 6-10 and the number of laborers in the family is 1-3. The estimated average income of these families is 1,000-2,000 riel per day and the daily expenditure is 700-1,000 riel.

¹ The riel is the Cambodian currency unit. There are about 4,000 riel/USD.

Medium

This group is made up of 34 families, which comprises 40% of the total families in the village. They live in houses with iron or tile roofs and one family has a concrete house. The families in this group have at least 0.30 ha of dry season rice area and some have up to 4 ha. Additionally, they have between 0.30 and 1 ha of lotus area and 0.12 ha of secondary crop area.

Most families in this group have between two and five water buffaloes, which are used for draft purposes. Moreover, some families have a small tractor to plough their own land and for other villagers to hire. Besides farming, they have various livestock such as chickens and pigs. In general, a motorboat is the most suitable means of transport for this village. Most families in this group have a motorboat, except two families who have a motorbike and bicycle.

The family sizes of this group range from 6-13 members of which 3-5 are laborers. The estimated average income of these families varies from 2,000-3,000 riel per day and daily expenditure from 1,000-1,500 riel.

Figure 2 indicates the locations of the various types of houses in Dang Tong Village.

2.2 Resources

2.2.1 Human resources

In general, villagers are skilled in farming dry season rice, lotus, secondary crops and fishing. They are also skilled in mat weaving.

The village is led and organized by village leaders, Buddhist elders and more recently the provincial fisheries office. By cooperating with the district governor, villagers have established a Community Fisheries committee to help them manage and preserve the village's natural fish stock. The village has several key people such as teachers, Buddhist elders and monks who play the main role in educating children and villagers. Moreover, some villagers have individual skills such as carpentry, boat making, hairdressing and machine fixing.

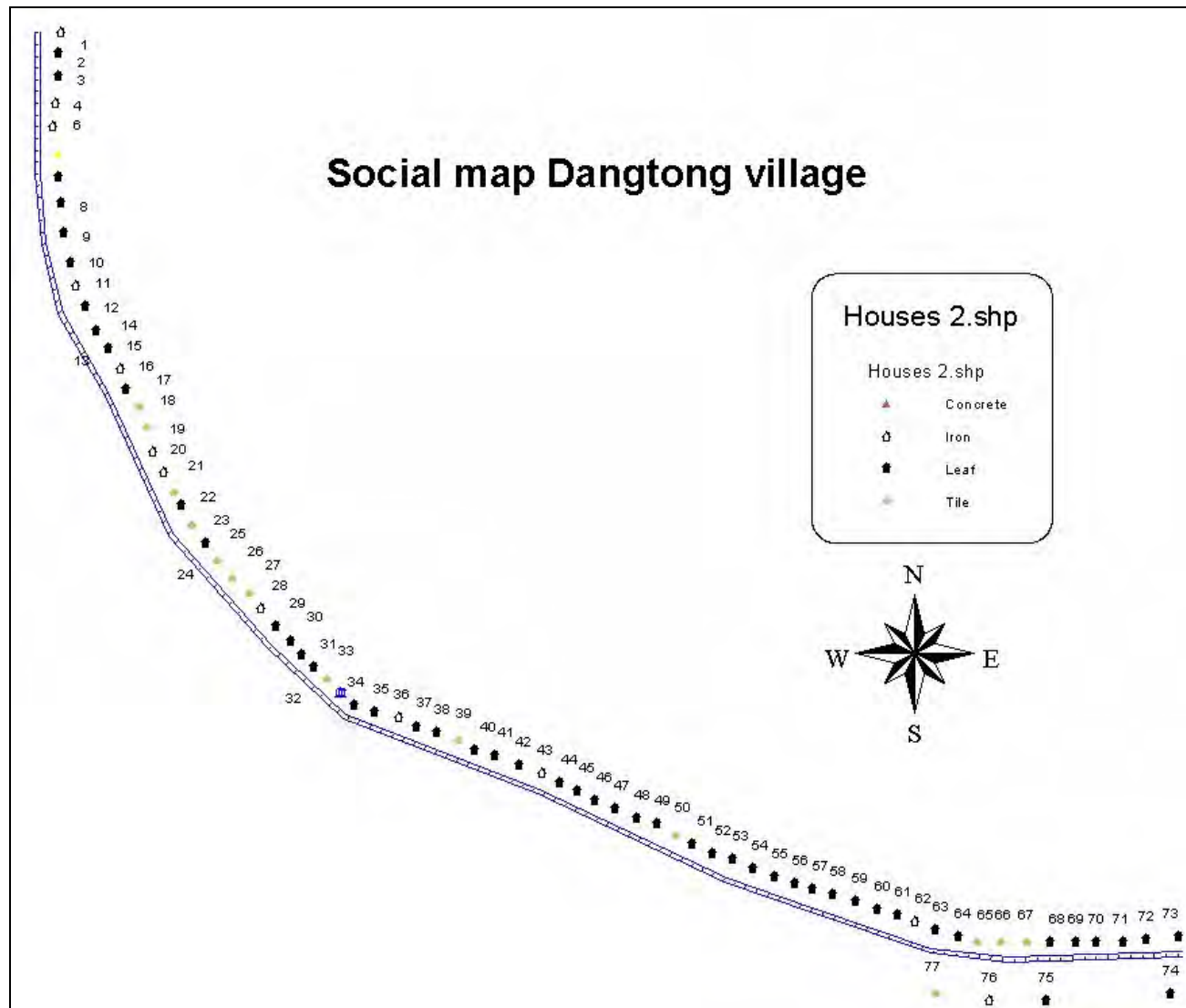


Figure 2 Social map of Dang Tong Village

2.2.2 Physical resources

Dang Tong Village is in the Tonle Sap lowland area. This village always floods in monsoon season so the road that connects it with the neighboring village can only be traveled in the dry season. Each year, the road has been eroded by river movement, making it difficult to travel along it other than by foot. There was an old bridge to the next village but it is in such disrepair that it is unusable.

For farming, the village has one dam and four channels. The dam and channels have gradually become shallower, so their capacity to hold water has decreased and this has led to a lack of water to irrigate dry season rice.

There is a meeting house in the middle of the village, for use in celebrations or for older village men to pray every Buddhist holy day.

2.2.3 Natural resources

Natural resources play an important role in maintaining the livelihoods of the villagers. The village has a large area for dry season rice and a lowland area for lotus. Villagers report that the total area for dry season rice is 74 ha, the area for planting lotus is 8 ha, and the secondary crop area is 7.2 ha. Besides crops, this village has several lakes and a river, both of which have plenty of fish. In addition, the river brings silt from the uplands to spread on agricultural land. Near the lake lies an inundated forest and villagers say that fish take refuge and spawn there. The forest is a source of fuel for villagers.

However, the natural resources of the village, especially the fish stocks, are being depleted. Poaching – using illegal fishing methods such as electric shock, undersized nets to catch small fish, big fishing gear and fishing in the closed season – is common. The inundated forest, which includes the fish refuge and fish spawning area, is likely to disappear due to overuse and the expansion of dry season rice and lotus areas.

The natural resources of the village can be seen in the diagram of the transect walk and the land use map (Figures 3 and 4).

2.2.4 Social resources

All the villagers are Buddhists. They have good relationships with each other and are willing to help each other on special occasions such as celebrations, building houses, new house entry ceremonies, weddings or in times of sickness and births. Villagers have formed a dam committee and community fishery and have organized security guards. Villagers also have connections with outside bodies such as commune leaders, the

district governor, the commune health centre, Integrated Pest Management (IPM), and the fisheries office.

To learn more about the relationships of the villagers with outside individuals and institutions, the team asked them to construct Venn diagrams. The men and women worked in separate groups to do this. The Venn diagrams were constructed using paper circles to represent people and institutions related to the villagers. The size of paper represents the role of the individual or institution. The largest size circle represents those who are considered the most important to their livelihoods. The distance from the center represents the relationship: the closer in proximity to the center, the more familiar the villagers are with the people indicated. Figure 5 shows the Venn diagram by the men's group and Figure 6 shows the Venn diagram by the women's group.

Most important people and institutions

The most important people and institutions in the village are the village leader, commune leader, school, community fishery, IPM, the market, teachers, midwife and monks.

- Village leader: the person who lives and works directly with villagers. Villagers rely on him or her when they want contact with outsiders and vice versa.
- Commune leaders: the person who is responsible for solving problems or conflicts that the village leader cannot help with, and who mediates between villagers and other stakeholders.
- School and teachers: school is the place for children to study and the teachers help to educate their children.
- Market: the place where they sell produce and buy materials.
- Community fishery: although the community fishery has only just been established, the villagers expect it will help them eliminate illegal fishing, preserve natural fish stocks and improve access to wider fishing areas.
- Midwife: helps when women give birth and also educates women on health care.
- Monks: represent the Buddhist religion, which the people respect, and help with funerals and other ceremonies and celebrations.

Transect walk - Dang Tong village

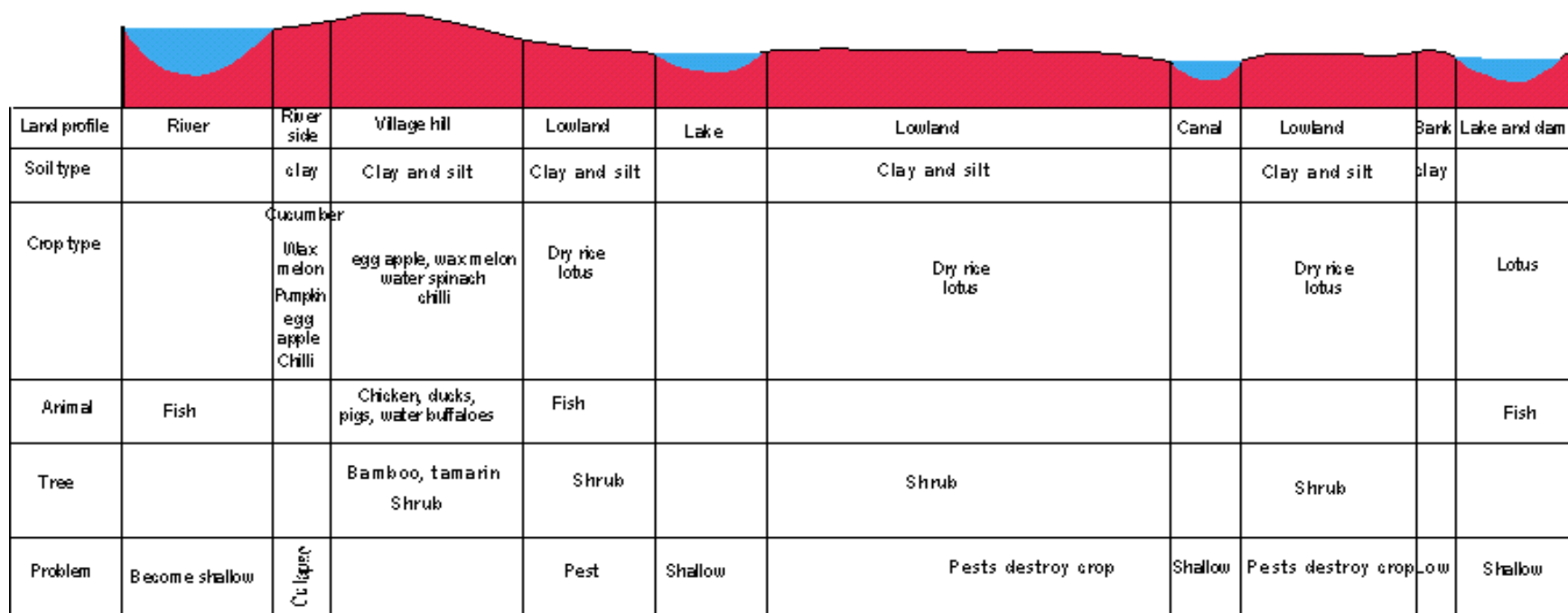


Figure 3 Topographical transect of Dang Tong Village

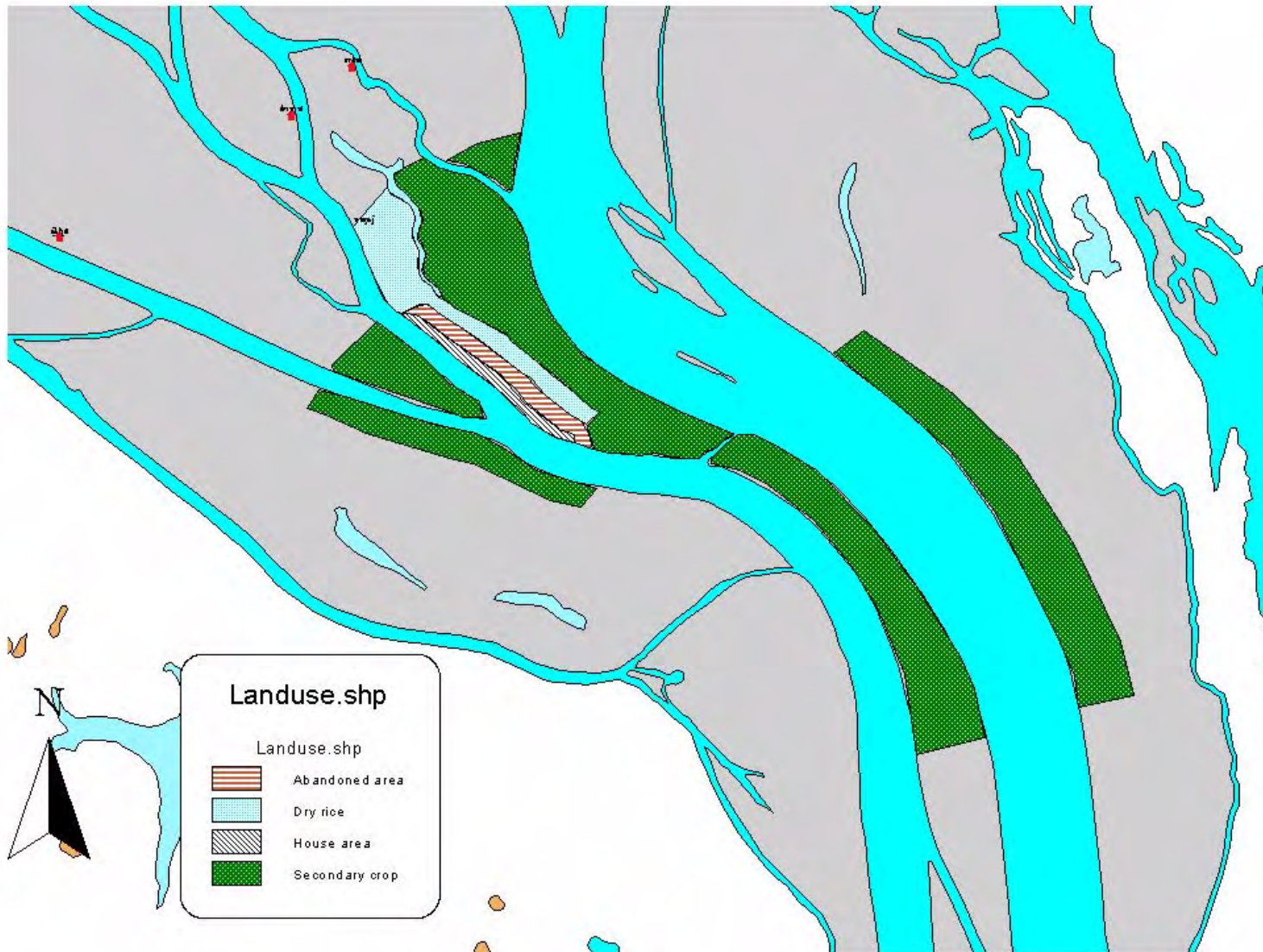


Figure 4 Land use map of Dang Tong Village

Medium important people and institutions

The medium important people and institutions include the provincial governor, district governor, Department of Agriculture, IPM, business people, the fisheries office and the hospital.

- Provincial governor: rarely visits this village.
- Hospital: a long way from the village and expensive.
- District governor: rarely visits this village.
- Department of Agriculture: used to provide rice seed to villagers but they do not monitor its use.
- IPM: once trained villagers on how to use pesticides.
- Business people: provide credit and buy any produce from the village but charge high interest rates for loans and buy the produce at low prices.
- Fisheries office: helps villagers to defend against illegal fishing and establish a community fishery, but the staff do not often come to the village.

2.2.5 Financial resources

In general, income generation relies on rice, lotus, fishing, secondary crops and livestock. Some households have individual skills or businesses such as rice milling, running a shop, carpentry and boat making. A few people in this village are garment factory workers or sell their labor.

2.2.6 Summary of village resources

Table 3 summarizes the main resources available in Dang Tong Village.

Table 3 Main resources available in Dang Tong Village

Resource	Details
Human	A village leader; traditional midwife; tractor driver; 20 garment factory workers; four carpenters; six teachers; mat weavers; monks; Buddhist elders; a hairdresser; machine repairers; boat maker. All villagers are skilled in farming and fishing.
Physical	Unmade road in the village; a bridge in the village; river; dam and channels; a school and a meeting house
Natural	River; lakes; dry season rice areas; lotus areas; secondary crop area; inundated forest
Social	Dam committee; fishery committee; security guard committee; Buddhist religion; teachers
Financial	Selling agricultural produce such as rice, lotus and secondary crops, livestock and fish; working in the garment factory; selling labor; milling rice

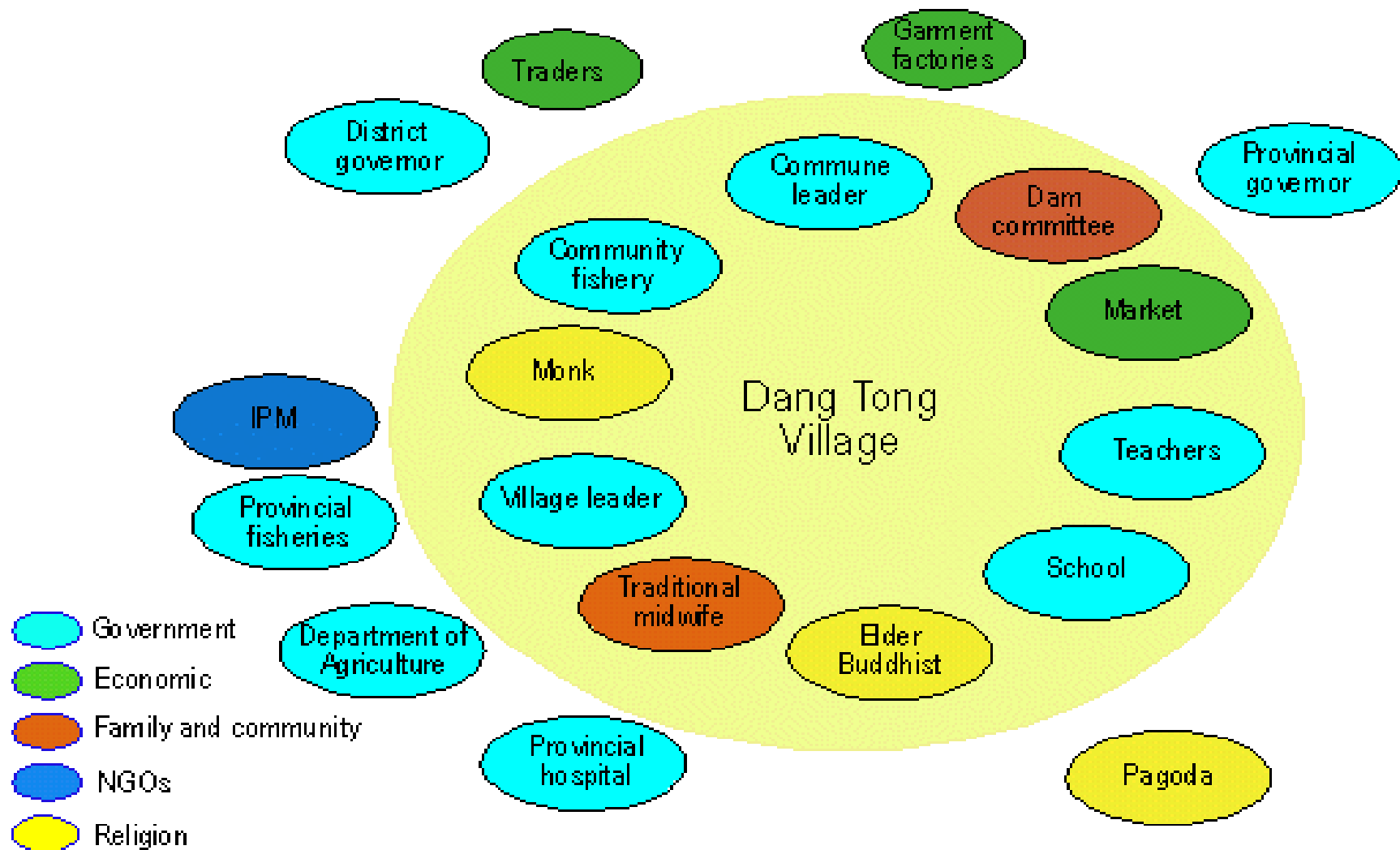


Figure 5 Men's Venn diagram

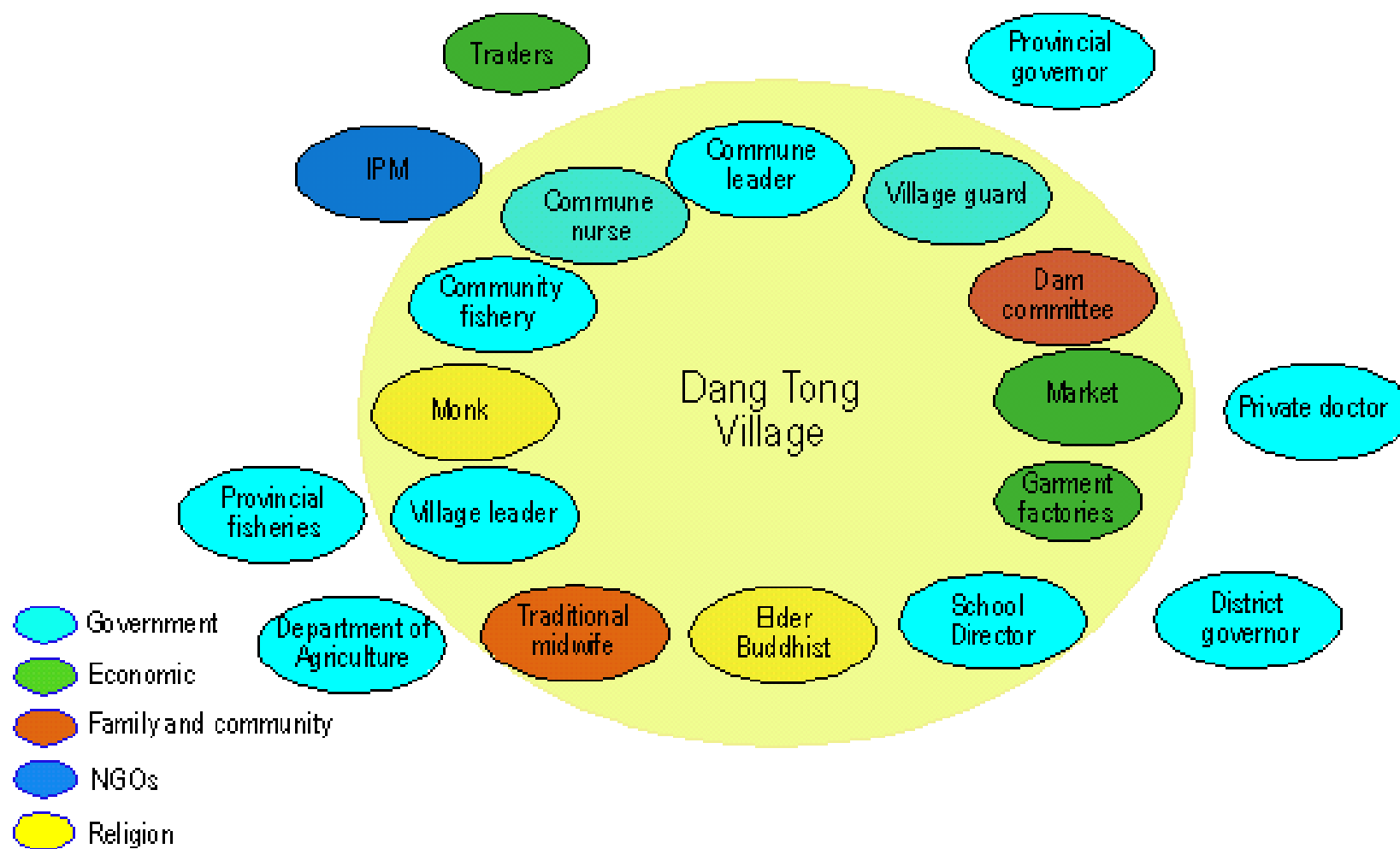


Figure 6 Women's Venn diagram

2.3 Vulnerabilities

2.3.1 Farming and seasonality

The people of Dang Tong Village plant three main crops in the village: dry season rice, lotus and secondary crops.

The most important crop for villagers is dry season rice, which is planted in inundated areas. Villagers plant the rice when the water levels in the river start to fall. Normally villagers begin to prepare the seedbed and broadcast rice seed in December, then in January they prepare the land for transplanting the rice seedlings. January is the busiest period for villagers, as the seedlings need to be transplanted in the time following the drop in water levels. In February the transplanting work needs to be finished and the villagers then carry on looking after the rice paddy by applying fertilizers, weeding and watering. This is a less busy time. Villagers harvest the rice in April and May, and then transport it to store at home. They plough the paddy in July before the area is flooded again.

The second crop is lotus, for which there are about 8 ha. Lotus is a cash crop which is planted to coincide with the dry season rice. Villagers start to plant lotus from January and February. Lotus fruits in April, so in late April it is partially harvested. The harvesting continues until May, sometimes June, depending on the weather. As with dry season rice, after harvesting the villagers clear the grass and plough the areas in July.

The third crop is secondary crops, for which there is a small area. The secondary crops include pumpkin, wax melon, cucumber, water spinach, eggplant and beans. Villagers start to prepare land for planting from late December and early January. Between March and April they are busy weeding and fertilizing. Sometimes they need to spray pesticides to protect against pests. The plants can be harvested from late April until July.

In addition to farming, villagers also fish. Most people in the village are subsistence fishers and fish from July to March. The fish are most plentiful, however, between January and February, so at this time villagers catch fish and process it into *prohok* and *phok* (condiments made from fermented fish).

Between November and December is the peak flooding season. When the flood is high it is also raining, so this is the most difficult period for villagers. Poor families are short of food, animals have no food and villagers have to travel by boat.

The seasonal calendars drawn up by the men's and women's groups can be seen in Figures 7 and 8.

2.3.2 Trend lines

Although this village is new, there are several trends worth noting relating to numbers of households in the village, ways of farming, the use of pesticides and chemical fertilizers, draft animals and natural resources. Figure 9 shows graphs of the trends described here.

Number of households in the village

Villagers know that the first settlement in this village was in 1960, when there were only three households. As more people settled in the village to farm and fish, the number of households increased gradually. Between 1970-73 the people in the village moved to other villages because of the fighting. They came back to the village again in 1975 at which time there were 55 households. Since that time the number of households in this village has gradually increased as some families have come from the neighboring village. Now there are 77 households, equivalent to 85 families.

Natural fish production

Villagers have noticed that natural fish production has been declining. They remember that in 1979, after the Pol Pot regime, they could catch up to 200 kg of fish per day, using small fishing gear like nets. The amount of fish catch per household per day has dropped steadily every year: in 1985 the daily catch was about 150 kg, in 1990 about 130 kg/day, and in 2002 the catch was only about 50 kg fish/day. The decline of natural fish stocks is a result of the increase in number of people catching fish and the growth in illegal fishing practices such as using electric shock, big fishing gear and fishing in the closed season. The other factor that has had an impact on fish numbers has been the disappearance of the inundated forest that was known to be a fish refuge and spawning area.

Rice yield

The rice yield varies according to the rice variety, fertilizers and pests. Villagers have planted dry season rice since 1979, at which time the soil was fertile. They did not use chemical fertilizers or pesticides and they planted the local variety of rice. The average rice production was about 3.5 tons per hectare. However, the soil quality has been deteriorating and villagers have been experiencing more problems with pest destruction. Despite this, the rice yield has increased because they have planted a new variety of rice and used more chemical fertilizer. Now the rice yield is 4 t/ha.

Month Activity	JAN/FEB	FEB/MAR	MAR/APR	APR/MAY	MAY/JUN	JUN/JUL	JUL/AUG	AUG/SEP	SEP/OCT	OCT/NOV	NOV/DEC	DEC/JAN
Dry season rice	☆☆☆ ☆☆ Transplant	☆☆☆ ☆☆ Transplant and water	☆☆ ☆☆ Transplant and water	☆☆☆ ☆☆ Harvest	☆☆☆ ☆☆ Harvest	☆☆ Plough	☆☆ Plough					☆☆☆ ☆☆ Plant seed
Lotus	☆☆☆ ☆☆ Plant	☆☆ ☆☆ Plant and look after	☆☆ ☆☆ Look after	☆☆ Partial harvest	☆☆ Partial harvest	☆☆ Final harvest						
Secondary crop: chili, egg apples, cucumber, pumpkin	☆☆☆ ☆☆ Plant	☆☆☆ ☆☆ Plant and look after	☆☆ ☆☆ Look after	☆ Partial harvest	☆☆☆ ☆☆ Partial harvest	☆☆ Final harvest						☆☆☆ ☆☆ Plant seed
Fishing	☆☆☆ ☆☆	☆☆☆ ☆☆	☆				☆☆	☆☆	☆☆	☆☆	☆☆	☆
Finding firewood						☆	☆					
Fixing boats and houses						☆☆	☆☆					

Figure 7 Seasonal calendar by men of Dang Tong Village
 (☆ represents one corn grain)

Month Activity	JAN/FEB	FEB/MAR	MAR/APR	APR/MAY	MAY/JUN	JUN/JUL	JUL/AUG	AUG/SEP	SEP/OCT	OCT/NOV	NOV/DEC	DEC/JAN
River level	★ ★ ★ Falls	★ ★ ★ Falls	★ Falls			★ Starts to rise	★ ★ Rises	★ ★ ★ Rises	★ ★ ★ Rises	★ ★ ★ Rises	★ Falls	★ ★
Animal disease	★	★	★ ★ ★ ★ ★ ★	★ ★ ★ ★ ★ ★ Chickens				★	★ ★ ★	★ ★ ★ ★ Water buffaloes		
Rain			★ Showers		★ ★ ★	★	★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★	★	
Shortfall of food								★ ★ ★	★ ★ ★			
Pests destroy crops	★ ★ ★ Pests	★ ★ ★ ★ Pests	★ ★ ★ ★ ★ Pests	★ Rats								
Ceremonies		★ ★ ★ Village celebration		★ ★ ★ ★ New Year		★ ★ ★ Making a rice mountain			★ ★ ★ ★ Pchum Ben		★ ★ ★ Water festival	

Figure 8 Seasonal calendar by women of Dang Tong Village
 (★represents one corn grain)

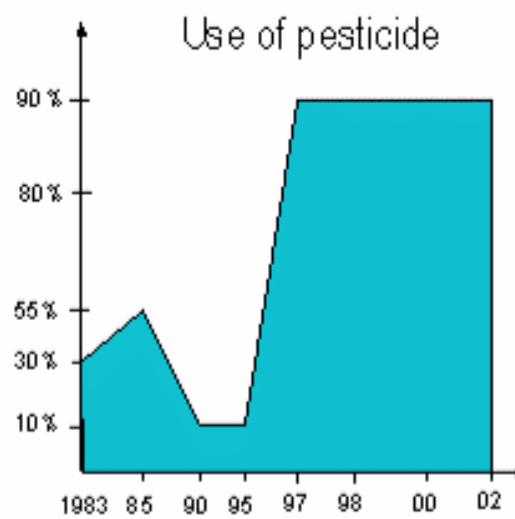
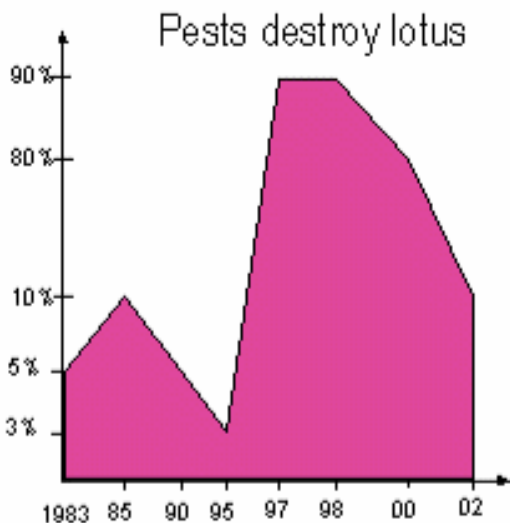
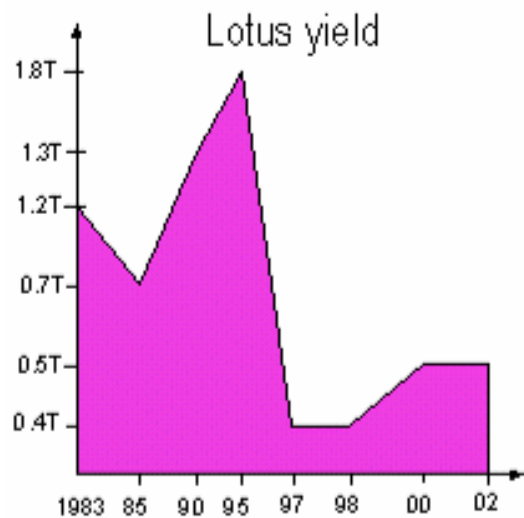
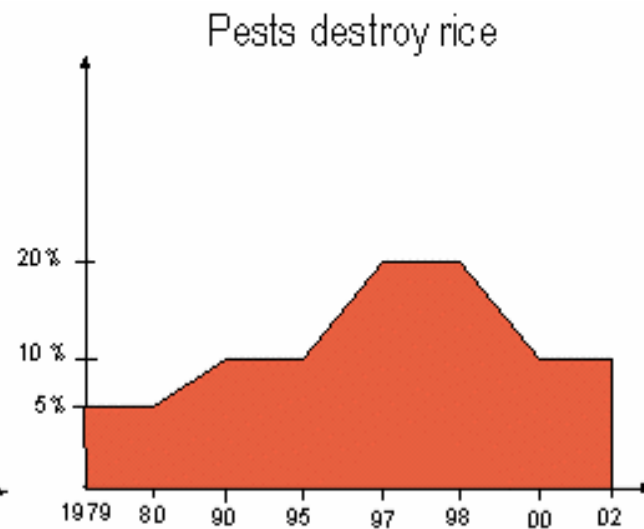
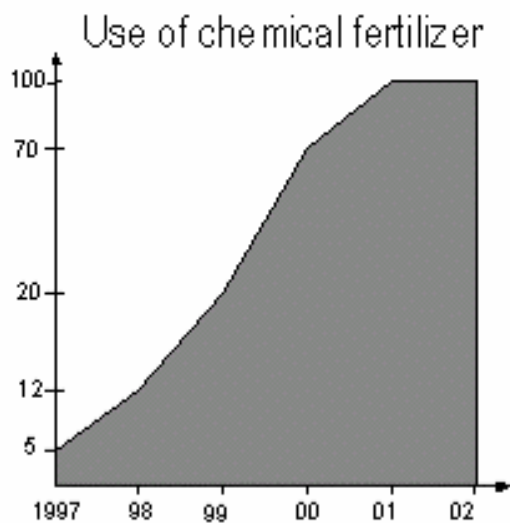
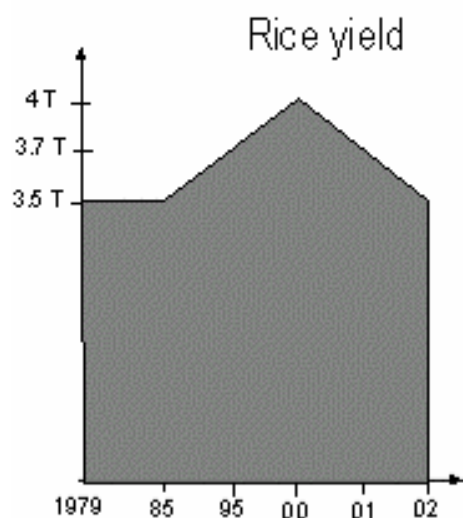


Figure 9 Trends in Dang Tong Village livelihoods

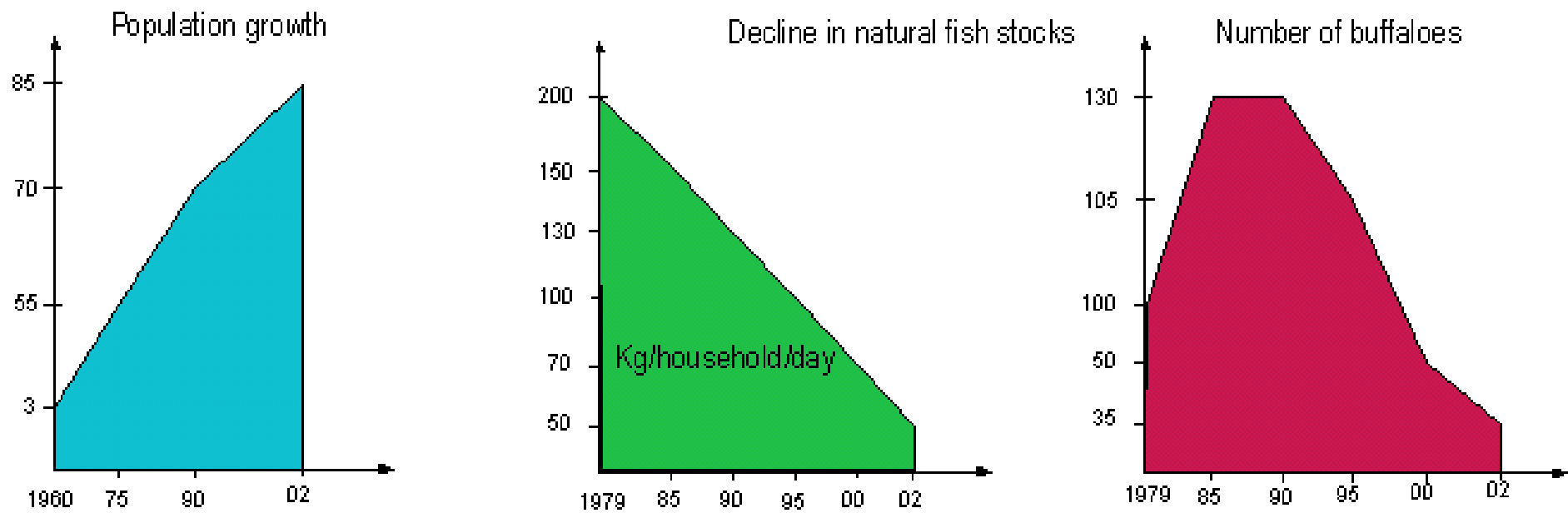


Figure 9 Trends in Dang Tong Village livelihoods (continued)

Use of chemical fertilizer

Every year the rice paddy fields in the village collect silt from the flooding river, but even this is not enough to sustain the soil quality and the needs of the community, so the villagers need to use chemical fertilizers to improve production. In 1997 a few families in the village started to use about 50 kg of chemical fertilizer per hectare in the rice paddy fields. The amount of chemical fertilizer and number of households using chemical fertilizer has increased gradually. Now all villagers use between 150-200 kg/ha of chemical fertilizer in their paddy fields.

Rice-destroying pests

Villagers reported that pests have always damaged their rice but usually the destruction has not been sufficient to harm the rice yield. They note that rice pests have been increasing. Between 1979-95 there was little destruction by pests and the destruction did not harm the rice yield. Pests caused serious destruction of the rice yield between 1997-98, leading to a reduction in rice production of about 20%. Between 2000-02 destruction by pests was reduced. This was thought to be related to the big flood that occurred during that period, when most pests died. However, the villagers also used more pesticides.

Lotus yield

Lotuses were planted in the reservoir and lakes, the total area of lotus being about 8 ha. Lotus yields vary according to the weather and pests: in 1983 there was no pest damage and the yield was 1.2 t/ha, and in 1985 the lotus yield was 0.7 t/ha because there was some pest damage. The lotus yield increased to 1.3-1.8 t/ha between 1990-95 when there were no pests and there was sufficient water. In 1998 and 2002 the lotus yield dropped to 0.5-0.4 t/ha because of pest damage and drought.

Use of pesticides

Villagers have used pesticides on their crops since 1985. Since that time they have used more or less pesticide depending on the damage by pests. Villagers note that they use many kinds of pesticides on their crop without instructions from the Ministry of Agriculture. They ask the vendors how to use them or follow advice given by their neighbors.

Use of draft animals

Normally villagers use water buffaloes as draft animals. In the last few years the number of draft animals in this village has decreased because villagers have started using small tractors to plough their farms instead of animals. Water buffaloes have been sold to buy tractors. Villagers find

that using a tractor to plough is faster than using a draft animal and more economically beneficial. Moreover, they do not have to spend time taking care of the animals. In 1979 the village had about 100 water buffaloes. The number of water buffaloes in the village increased gradually to 130 in 1995. From 1995 the number of water buffaloes started decreasing, and by 2000 there were only 50 water buffaloes in the village and now there are only 35.

2.3.3 Threats

Several factors make the people in Dang Tong Village vulnerable. In terms of farming activities, they lack an irrigation system while flooding sometimes destroys their rice, leading to a lack of rice seed. Villagers may also use a lot of pesticides without precautions or usage directions, and pests destroy crops. The population of the village is growing while the natural resources of the village are gradually declining. The villagers have no clean water to use and have no hygienic toilets, resulting in more human and animal disease. Furthermore, the backwash of motorboats traveling along the river collapses the riverbanks, disturbs the small fishing boats, and also disturbs the fish spawn along the riverbanks.

2.4 Institutions and Processes

2.4.1 Institutions

As the Venn diagrams (Figures 5 and 6) show, three main institutions have an impact on villagers' livelihoods: government, business and civil society (Table 4).

Table 4 Institutions related to the livelihoods of Dang Tong villagers

Government	Business	Civil society
Village leader Commune leader Commune health center Teachers District governors Community fishery Department of Agriculture	Midwife Garment factory Businessmen Private doctor ACLEDA bank	Village committee Dam committee Buddhist elders Australian Catholic Relief (ACR)

These three groups have different impacts on the livelihood of villagers.

Government

Villagers recognized that people from the government have the most useful relationships with them. The village leader helps to solve any

problems in the village, builds relationships with higher authorities and manages to keep discipline in the village. The district governor has a more distant relationship with villagers but can work through the village leader and commune leader to help them.

Business

A few traders come to the village and buy agricultural produce, livestock and fish. Villagers choose to sell their produce to them because they can buy goods for the same price as at the market while saving transportation costs. When villagers have minor health problems, they consult the private nurse in the village who can treat minor illnesses and will advise villagers to go to hospital in case they are more seriously ill. The traditional midwife helps the women give birth and educates pregnant women.

Civil society

At the moment, civil society plays an important role in organizing and managing the village. The older men encourage villagers to work together and preserve their traditional culture. The dam committee is responsible for collecting money to fix and look after the dam and manage the water supply for the villagers. The organization ACR (Australian Catholic Relief) has been collaborating with the fisheries office to establish the community fishery committee. This committee will work to preserve the natural resources of the village, specifically to sustain the natural fish stocks that have declined.

An analysis of the impact of these institutions in the lives of the people of Dang Tong can be seen in Table 5.

2.4.2 Processes

Recently the government has reformed some policies and the changes are having an impact on the livelihoods of poor people.

Generally, the villagers are aware that the local authority is taking serious measures to ban the felling of trees to make charcoal and timber. They are satisfied with the intervention because it helps preserve the remaining natural resources, but paradoxically they face problems of unemployment because of this. When they cannot fell trees to make charcoal and timber they have to return to planting rice and other farming activities, but they have no land or other equipment.

Table 5 Institutional analysis

Institutions		Positive	Neutral	Negative
Government	Village leader	✓		
	Commune leader		✓	
	Commune nurse	✓		
	Teachers	✓		
	District governor		✓	
	Community fishery	✓		
	Department of Agriculture	✓		
Business	Traditional midwife	✓		
	Garment factories	✓		
	Business people outside village			✓
	Business people in village	✓		
	Private doctors	✓		
	ACLEDA bank			✓
Civil society	Village committee	✓		
	Dam committee	✓		
	Guest house	✓		
	Buddhist elder	✓		
	ACR	✓		

The abolition of the fishing lots and the handing over of control of these to the communities for management and development is a positive sign for the villagers, however they have not been benefiting. The rich households in the village are able to dominate the resources by using big fishing gear which poorer households cannot afford.

2.5 Livelihoods strategies

2.5.1 Problem ranking

Although villagers have a wide range of resources and crops, production does not meet demand. The villagers face many problems in farming, natural resources management and health. In farming, they lack irrigation systems, seed and technical know-how on using pesticides. In fishing, the motorboats destroy the riverbanks and fish spawning areas, and illegal fishing takes place.

Villagers ranked the problems above to identify the most serious ones. Four problems were prioritized: lack of rice seed, lack of an irrigation system, lack of a water pump, and lack of clean water and hygienic toilets.

Lack of rice seed

Normally villagers keep rice seed from the May harvest time and plant this seed in December, within a six-month period. However, this period runs through the flood season so it is difficult for villagers to find the right place to store the rice seed because their houses flood. Since the seed quality decreases, sometimes the seed does not grow.

Lack of irrigation system

Dry season rice, the main crop of the village, depends on water from dams or lakes via the channel. The capacity of this irrigation system has decreased gradually: the lakes and channel have become shallower; the dams have deteriorated and thus hold less water. Villagers who use the irrigation system have formed a committee and shared money to fix it but there was not enough to sustain it.

Lack of water pump

The poor families who do not have enough money to buy a water pump have to hire one. When they spend money hiring a pump, they have to sell some of their rice production to pay for it, leading to a lack of food. Also, sometimes it is difficult to hire a pump because the owners need it to pump water for their own rice.

Lack of clean water and hygienic toilets

Usually villagers use water from the river, but in June or July when the water level of the river goes up, many rotten materials are washed into the river, which makes the water dirty. As there is no toilet, people usually defecate on the ground near the village. These two factors lead to human and animal sickness.

Although many problems were identified and explored through the problem ranking process, only the problem of lack of an irrigation system was chosen for analysis.

2.5.2 Problem analysis

The problem analysis (Figure 10) shows that the dam committee has no ability to fix the dam and the villagers have no money, but that the dam is central to rice-growing activities. Although the dam committee has been established, the dam is currently not working.

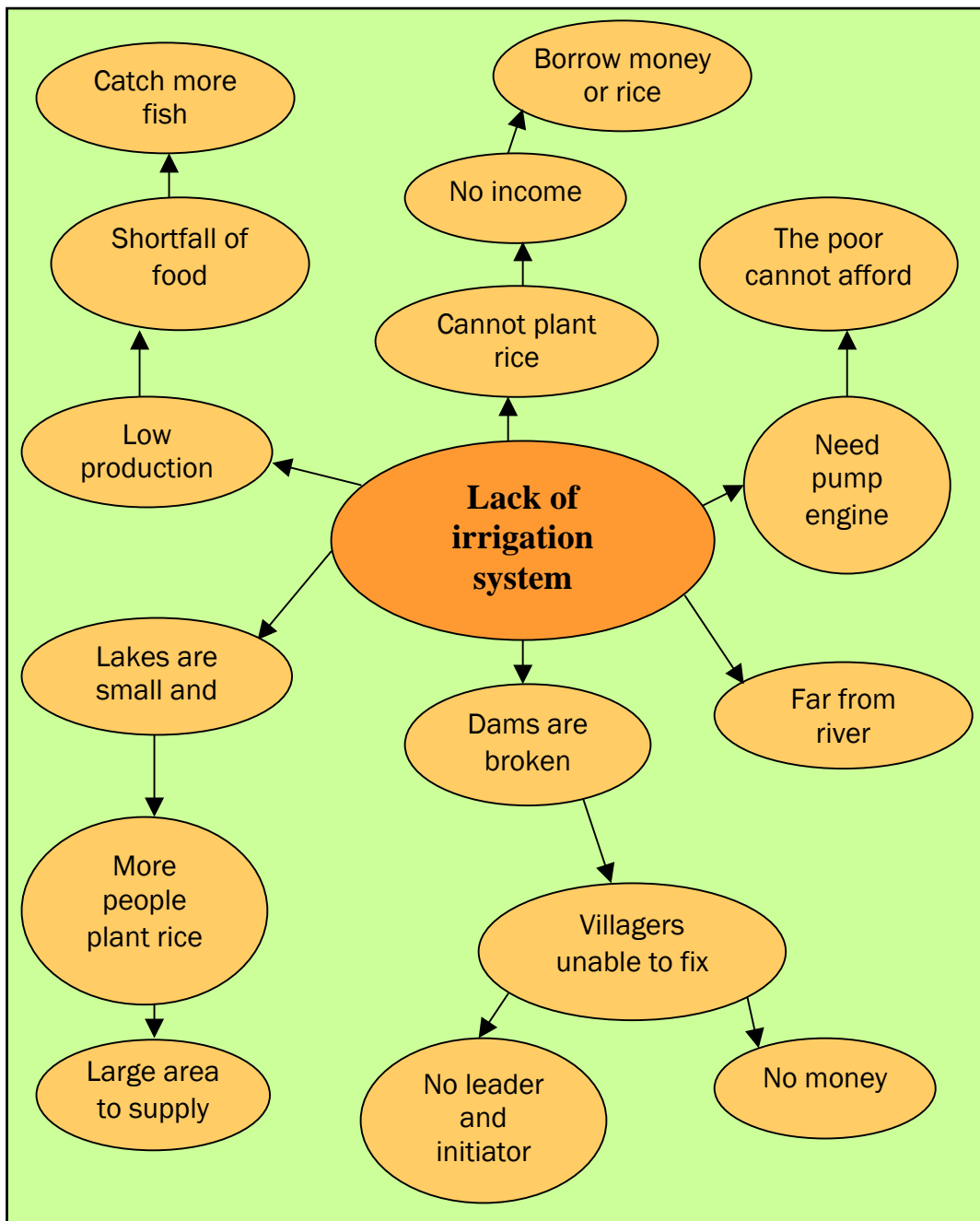


Figure 10 Problem tree analysis for lack of irrigation system

2.5.3 Action plan

The first step of the action plan (Table 6) is for villagers to talk with the committee to empower and encourage them to manage the work. The committee could inform all villagers who use the dams and channels, and divide them into small groups depending on the dam or channel they are using. Each group should work out the estimated cost and time needed to fix the dam and channel. Then they can start to collect money from the families that cannot contribute labor to do the work. The work can start after the harvest time from June to July. Villagers worry that it may rain or the river may start to go up and flood the area.

Table 6 Action plan to fix dam

Step	Initiative	Participants	Materials	Problems	Time
Empower and encourage the committee	Villagers	Village leader and villagers			November 2002
Inform villagers and form the group	Dam committee, villager leader	Village leader, villagers			November 2002
Estimate the cost	Committee, village leader	Committee, village leader, villagers	Pens and paper		December 2002
Collect money	Committee	Villagers		Poor families have no money	April 2003
Start work	Committee	Villagers	Hoes and baskets	May rain or flood	June-July 2003

2.6 Livelihoods Analysis Framework

As a result of the livelihoods study, the team were able to construct a framework showing the outcomes of the livelihoods analysis (Figure 11).

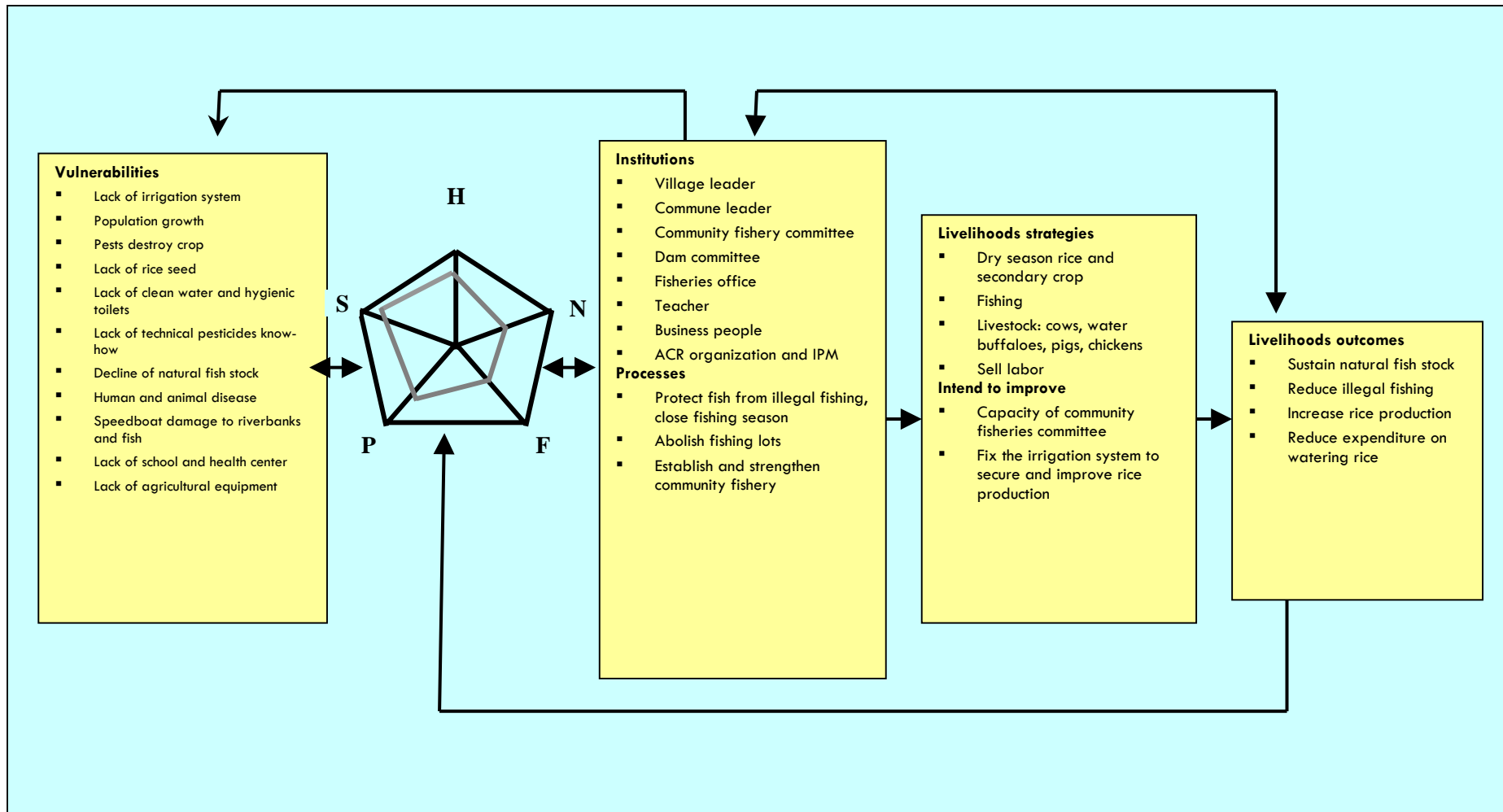


Figure 11 Livelihoods analysis framework

3. CONCLUSIONS AND RECOMMENDATIONS

3.1 Conclusions

Through the study in Dang Tong Village, the team found that, in general, villagers face many problems in their livelihoods because most of them are poor:

- Their livelihoods rely mainly on agricultural production and on exploiting natural resources, especially fish. The produce varies depending on nature.
- Due to population growth, the villagers need to improve production and develop more from the natural resources. When villagers expand planting area to improve production, it effects the natural resources, particularly in the case of clearing the inundated forest to plant dry season rice.
- Villagers have no clean water or hygienic toilets, resulting in disease.
- Inundated forest, known as a fish refuge and spawning area, is disappearing. The disappearance of this forest has led to a decrease in natural fish stocks.
- Villagers are not aware of usage directions for pesticides, so many have suffered after-effects.
- The community fishery that has been established is new, has no experience in managing natural resources and does not know how to develop policies to control the use of illegal fishing gear.

3.2 Recommendations

- Irrigation systems such as channels and dams should be fixed.
- Villagers should have assistance to improve their knowledge of using pesticides to preserve their health, the environment and save the cost spent on pesticides.
- The fisheries office and ACR should help the community fisheries that have been established to formulate and implement their policies.
- Relevant stakeholders should help to develop human resources in the village by training people to manage natural resources.
- There should be clean water for drinking, and toilets.