



A Publication of the Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme

Vulnerability Assessment of Climate Risks in Attapeu Province, Lao PDR



A JOINT UNDP - IUCN - MRC GEF-FUNDED PROGRAMME



January 2005

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1 INTRODUCTION

As a part of the GEF funded, Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme (MWBP)*, a joint programme of the four governments of Cambodia, Lao PDR, Thailand and Viet Nam, managed by the United Nations Development Programme (UNDP), the World Conservation Union (IUCN) and the Mekong River Commission (MRC), IUCN has participated in a dialogue focusing on water and climate change in the Lower Mekong Basin. The ongoing dialogue aims to infuse climate change concerns into the decisions made by water managers and policy makers, and to help local communities cope with and adapt to increasing climatic variability. Assessing vulnerability is a key component of this initiative.

The Lao PDR assessment is one of three case studies that aims to assess the potential consequences of climate change on wetlands communities and livelihoods. As in the other studies conducted in Cambodia and Thailand, initial attention is given to understanding vulnerability and adaptations to current climate variability.

2 BACKGROUND

Lao PDR, a landlocked country of five million people, is one of the Least Developed Countries (LDCs) in the world. Approximately 73 per cent of the population lives on less than \$US2 per day. It has an area of 236,800 km², with mountains covering two-thirds of the country (STEA, 2000). Much of the population engages in agricultural work, creating a high dependence on the climate. The country's per capita income is \$310 (World Bank, 2003). The Mekong River plays a large part in the life of the people as a major source of wetland resources, in addition to providing a link to other Southeast Asian countries through which the river flows. Lao PDR ratified the United Nations Framework Convention on Climate Change (UNFCCC) in January 1995. As an LDC, it has access to special programs and funds established by the UNFCCC and its member countries. These programs aim to build capacity for adapting to climate change by providing technical assistance, training, and other resources.

It is recognised that extreme climate events, including floods, are likely to become more frequent and/or severe with future climate change (IPCC, 2001). This would pose a great threat to poor communities living in southern Lao PDR. These communities are currently struggling with basic development needs in addition to dealing with the annual floods in the area. Poor households living beyond the reach of national programs are often forced to the edge of their coping capacity by losses incurred during the floods. Because the damages are not life threatening, families will often take a lax attitude towards preparing for these floods. The impacts they sustain are not dramatic, and yet, each year several families are kept in the grind of poverty—or fall into poverty—directly due to these losses. The potential of climate change to increase floods, and to pull a greater proportion of a community into poverty, would be a great burden. It may even grow from a low-grade stress on the community to a real threat to its survival.

This study seeks to understand how floods currently threaten communities, and how it specifically impacts various types of households. The coping mechanisms employed both by individual households and the community will provide insight to new ways to promote preparedness. An examination of external assistance will also inform government agencies and international organisations on how they can most effectively assist communities in reducing vulnerability. Indigenous coping mechanisms to current climate variability should provide direction for international and national efforts to support adaptation to climate change. Therefore, this study was commissioned to

provide an assessment of current household and community vulnerability to floods in Attapeu Province, Lao PDR. In particular, the objectives are:

- To document the frequency and intensity of floods and record perceived changes in these patterns
- To identify the impacts of floods on rural livelihoods
- To identify local coping strategies
- To consider the viability of current coping strategies under changing climate conditions

3 METHODOLOGY

Partners -The Asian Disaster Preparedness Center (ADPC) worked closely with the IUCN Asia Regional Office in Bangkok in developing the methodology for the study and for the implementation of activities. IUCN Lao PDR acted as the national partner to coordinate various activities throughout the study, including a planning visit in June 2003 to meet with several government agencies and share the study's objectives. The Living Aquatic Resources Research Center (LaRReC) is IUCN's government focal point for all wetlands-related work in Lao PDR. LaRReC and IUCN jointly coordinated activities at the provincial level. START/SEA in Bangkok also provided input for the conceptual development and methodology.

Site selection - Sanamxay District in Attapeu Province was chosen to complement IUCN's work in the Mekong Region and to draw upon knowledge gained in previous and ongoing projects. The initial selection criteria for choosing the two study sites were:

- 1) The villages are vulnerable to floods;
- 2) One village would have families that rely primarily upon rice for their livelihood, while the other village would have families that rely primarily upon fishing; and
- 3) The villages represent different levels of development.

Following this mission in June 2003, government officials and team members chose Sompoi village and Intee village in Sanamxay District.

Background information - This study draws on work carried out by IUCN, ADPC, and partners on poverty, climate change and variability, and vulnerability. IUCN previously conducted a number of complementary studies in Attapeu, such as the participatory poverty assessment (PPA), a nutritional assessment, an institutional assessment, and others, which have provided background information on wetland resources and other factors affecting rural livelihoods. Other inputs include national documents, interviews with government and IGO representatives, interviews with villagers, and reports on Lao PDR's climate and development.

Data collection - A multi-stakeholder process was utilised for the fieldwork, and national and provincial agencies provided staff for the study team (please see Annex A for team members). In each village, participants were divided into four focus groups of approximately ten people each. These groups were:

- Women from households that rely primarily on fishing for their livelihood
- Men from households that rely primarily on fishing for their livelihood
- Women from households that rely primarily on farming for their livelihood
- Men from households that rely primarily on farming for their livelihood

The field study had five main components:

- 1) Gather household background - Team members were paired with villagers for one-on-one interviews to gather information on household income, sources of income, wetland resources used, household members, etc. A questionnaire prepared by ADPC guided this process, and interviewers incorporated additional notes.
- 2) Identify wealth rankings - was carried out in Sompoi village and Intee village. An understanding of how flood losses can lead to movements between wealth rankings helps to identify thresholds of vulnerability. This understanding contributes to more effective targeting of programs to enhance community coping strategies. This component involved group discussions to identify various assets of households in four different levels of wealth: “Wealthy”, “Middle”, “Poor”, and “Very Poor”. ADPC provided focus group guidelines, and one or two team members facilitated discussions.
- 3) Identify household impacts of floods - ADPC developed a worksheet for the team members to use during one-on-one interviews with villagers. This component helps to identify the losses incurred during a flood, such as livestock, housing damage, equipment, and others. Villagers were also encouraged to list other losses they felt important to sustaining their livelihood.
- 4) Group discussion on flood vulnerability and coping strategies - This component involved group discussions on the losses identified in the previous exercise, strategies for coping with floods, and how floods affect household vulnerability and livelihoods. ADPC provided focus group guidelines, and one or two team members facilitated discussions.
- 5) Village mapping and context - This involved discussions with the village head, his deputy, and other key informants during which additional information on the village composition and context was gathered. These discussions also reviewed past interaction between the village and district or provincial government, details of external assistance, and past experiences with floods from the community level. Team members and villagers established the geographical context of the village and nearby wetlands through mapping.

4 STUDY AREA

Attapeu Province, with a population of 93,000, is located 600km from Vientiane in southeastern Lao PDR. It shares borders with Cambodia and Vietnam, and is one of the poorest provinces in the country. There are five districts in Attapeu: Samakkisay, Phouvong, Saysetha, Sanamsay, and Sansay. The Annamite Mountains are to the east of Attapeu, while the

Figure 1: Study Area in Lao PDR



Phouvong Mountains are to the south. The total land area is 9,428 km², only 1.6 per cent of which is cultivated. The Xekong, Xekaman, Xetsou, Xepian and the Xekamlo are five main rivers in the study area. Attapeu has a large percentage of forest cover at 78 per cent of the land (compared to the entire southern region at 58 per cent, and the northern region at 36 per cent); however, deforestation is a growing concern since domestic energy is largely provided through fuelwood (STEA, 2000). According to national estimates, 53 per cent of the rural population is poor versus 24 per cent in urban areas. The situation is even more pronounced in the south with 66 per cent in poverty.

4.1 Sompoi

Sompoi village is located approximately 75km from the provincial capital of Attapeu Town. The village is adjacent to the Xekong, with one main path through the village running parallel to the river. Floods hit the area frequently, as it is located very close to the river and on relatively low ground. Figure 2 below shows the geography of Sompoi. The population of 454 lives in 82 households, comprising 89 families. There is no electricity, running water, or latrines in the village. However, the village has four hand pumps and a makeshift school.

The villagers sustain their families through a number of livelihoods, including rice farming, fishing, making handicrafts, and selling non-timber forest products (NTFPs). Most of the villagers in Sompoi are poor. Several villagers and the village head mentioned the need for a proper school. At the national level, almost one in six children do not attend school. Education is seen as a pathway to development and to improve their livelihoods. However, the remoteness of the village makes it unattractive for prospective teachers.

Table 1: Household Information

	Sompoi ¹	Intee ²
Annual income		2,982,974 kip
Paddy field area	1.3 ha	2.7 ha
Number in household	6.6	6.3
Annual education expenditure	250,438 kip ³	374,679 kip
Annual medical expenditure	908,225 kip	1,073,077 kip

4.2 Intee

Intee village is approximately 25km by road from Attapeu town. The village is only one hour from town and easily accessible by car. Floods hit the area, but its location near small mountains provides a safe retreat each year. Figure 3 below shows the geography of Intee. The population of 1434 lives in 218 households, comprising 233 families. There is no electricity or running water, although the village has latrines, 10 handpumps, a small school, and a clinic.

The Intee population is largely composed of the Oi ethnic minority group. The villagers sustain their families through a number of livelihoods, including rice farming, fishing, trading, making handicrafts, selling non-timber forest products (NTFPs).

¹ Sompoi assessment participants included 40 women and 40 men.

² Intee assessment participants included 39 women and 40 men.

³ 1 USD is approximately 10,300 kip (September 2003)

5 FLOOD HAZARDS

Few climate studies have been conducted in Attapeu, Lao PDR to date. Therefore, information in this section will be drawn from national studies, discussions with the Meteorological Service, and interviews in Attapeu. Lao PDR has a tropical climate that is strongly influenced by the southwest monsoon. The average temperature is 25-27°C in the plains around Attapeu. Over 70 per cent of rainfall occurs during the wet season from April to October, although there is great interannual variation. Annual rainfall is 1500-2000mm.

While floods can be positive for the wetlands, and indeed play an invigorating role in the Mekong ecology, floods of greater intensity or duration than expected often severely affect communities. Both of the study villages readily recounted their experiences during floods and the sometimes devastating impacts they can have on the family's ability to support their livelihoods. This is an issue throughout Lao PDR, which reported 16 floods from 1966-2002 that resulted in at least 10 deaths, 100 people affected, or an appeal for international assistance (CRED, 2003). Floods, as they occur in this region, do not often lead to deaths. However, they do cause a large amount of housing damage, loss of equipment, and other asset damage that can have longer-lasting impacts on household's well being. According to CRED, the average number of people affected in each major flood disaster was 226,332. This masks the number of people affected in the numerous smaller disasters that are not reported in the international database. It also does not include secondary impacts such as health and sanitation problems in the weeks after a flood.

Floods occur each year in the two villages, with most of them being "normal" floods. Normal floods occur during August, September, or October, and they last for approximately three days. The height of the flood is between 0.5-1 metre in the village, and up to 4.5 metres in the paddy fields. Discussions in both villages revealed that the most recent flood to cause serious damage occurred in November 1996. That year, the flood lasted 12 days in Sompoi and seven to ten days in Intee. The height of the flood was two metres in Sompoi. Older members of the village recalled a flood in 1968 that was even more severe than 1996.

Villagers reported that flood characteristics have not changed significantly in the last 10-15 years. However, they noted that damaging floods appear to have occurred with greater regularity in recent years. Losses of livestock and rice, and equipment damage were suffered each year from 1997-2002.

“...[villagers] had severely suffered long spells of droughts a decade ago. Since 1996 onward, they shared great concerns about the frequency of floods taking place in a large area more recently.” (Action Aid, 2003)

6 VULNERABILITY TO FLOODS

Floods are an annual occurrence in the Mekong region. They are looked upon as part of the natural landscape, and communities have lived with the yearly pulse of flooding for generations. Villagers recognize the benefits of flooding, such as the increased availability of fish and other aquatic species in wetlands. Even though they might lose the rice crop during a flood, the next year's rice production was likely to improve. People also said that plants and wildlife were plentiful in rivers and forests, so they had a great variety of foods.

While there are many factors that contribute to an individual’s resiliency following a flood, such as health, age, and gender, the question of livelihoods is ultimately played out at the household level. Family members rely strongly on each other to share income and labor, and it comes down to the families as a whole that are affected. Their combined assets before and after an event determine their vulnerability to floods. This local dialogue therefore focuses on the household impacts of floods and how this affects the capacity of the household to maintain its collective livelihood.

6.1 Household Impacts of Floods

6.1.1 Rice and Paddy Field Losses

The WFP (2001) states that, “Most of [Lao PDR’s] 5.36 million people live in rural areas dependent upon subsistence farming, and the economy is based almost entirely on agriculture with a single season rice crop dependent on the Southwest monsoon. Floods regularly destroy crops in the center and south.” Losing rice stocks and paddy fields were the single most cited problem for villagers from floods. Paddy field damage is devastating for some families and exacerbates an already precarious situation in terms of food security. During one focus group discussion in Intee, villagers estimated that 60-70 per cent of the paddy fields are destroyed. It is not uncommon for some families to completely lose their rice harvest for the year.

Of those families who were categorized as “wealthy”, or “having enough”, the average land area for paddy fields was 2.6 hectares⁴. Some wealthy families in the assessment produce four to five tonnes of rice per hectare annually. They may have some rice stocks to continue feeding the family in case of losses. Those families in the “poor” category did not fare as well. They owned an average of 1.8 hectares, while at the same time having one additional member per household to feed than the wealthy families. After losing the rice crop following a flood, previously landed families take one to two years to find new land. Villagers said that severe floods occur around every three years, and each time up to 50 per cent of the households must find new land to farm. They also said that, in addition to being located far away, the new land may be less fertile, leading to decreased rice production from already low quantities. Finally, additional help is required to clear the new land.

If only one indicator is used to assess vulnerability from the perspective of villagers, it would be whether a family has a sufficient amount of rice throughout the year. Villagers in both Sompoi and Intee consistently

Table 2: Rice Sufficiency by Wealth Ranking

Sompoi	Intee	
Enough to eat all year	<i>Wealthy</i>	Enough to sell (5-10 tons)
Short 6 months	<i>Middle</i>	Enough to eat all year
Short 8-10 months	<i>Poor</i>	Short 6 months
No rice	<i>Very Poor</i>	Short 8-10 months

used this to measure their food security and well-being. It is interesting to note the variations in each category between the two villages, as shown in Table 3. As with most of the other factors of vulnerability that are detailed below, Sompoi is more vulnerable than Intee as a community.

6.1.2 Livestock Losses

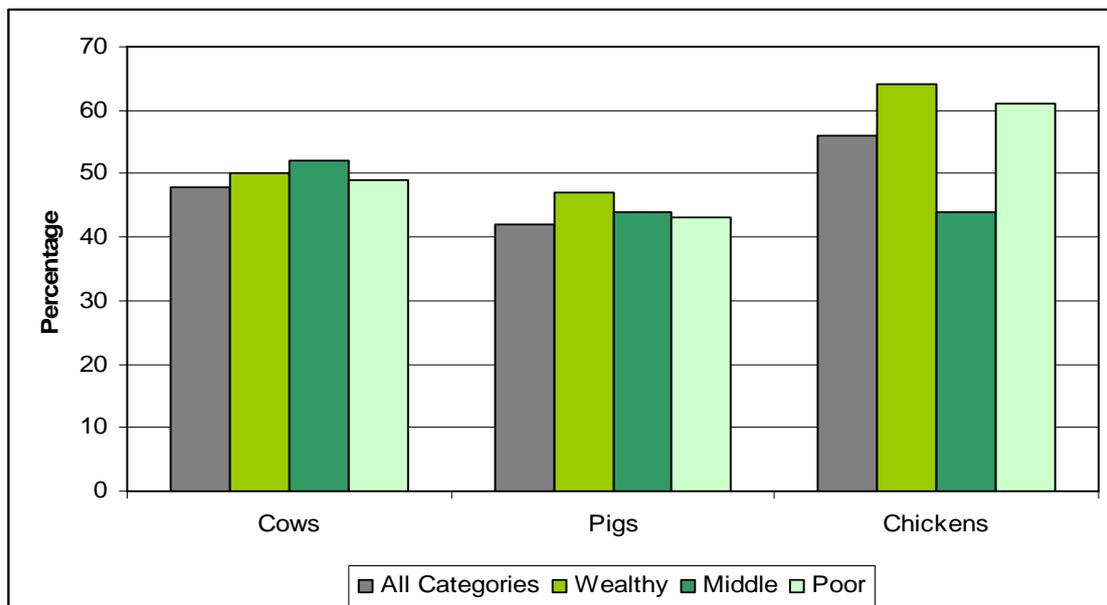
⁴ Please see Annex A for a listing of common assets held by families in four wealth rankings: Wealthy, Middle, Poor, and Very Poor.

Although rice losses and paddy field damage is a common and immediate impact on the household, most villagers agreed that losing livestock was the most serious blow to long-term livelihood and family security. In Lao PDR, as in many other developing countries, the family's buffalos and cows are used as a savings mechanism. When a disaster strikes or there is a medical emergency, families rely on the sale of livestock for large expenditures. They act as a safety net and are often the most valuable asset in the household. Across all wealth categories, the average family lost half of its cows and/or buffalos in the 1996 flood. Considering that in rural Lao PDR, one buffalo can buy enough rice to feed four or five people for an entire year (WFP, 2001), this is a terrible setback in the family's savings. Cows and buffalo also play a key role in livelihood as draught animals in the paddy fields.

These losses may also be exacerbated due to the traditional livestock management practices, particularly in Sompoi. During focus group discussions, villagers explained that rather than rounding up cows and buffalos each night to keep them near the house, they normally let them roam about to graze. When a flood occurs, many livestock die or are lost when owners cannot track them down due to flooded pathways and otherwise hampered transport. People explained that it is difficult to take animals to higher ground ahead of time, even if there is a warning, because they are left to wander a wide area.

Villagers also raise pigs, chickens, and ducks, which are kept in greater numbers by lower income families for sale. Losses of pigs during the flood were an average of 42 per cent, and losses of chickens were 56 per cent. However, this varied considerably between wealth categories. After the 1996 flood, wealthy families still had roughly twice as many cattle, pigs, and chickens than the poor families. Figure 4 below shows the average livestock losses per household following the 1996 flood.

Figure 4: Livestock Losses by Wealth Ranking



Families undoubtedly become more vulnerable as their livestock safety net diminishes, and they experience greater hardship when emergencies come up. Families that were previously quite wealthy may suddenly find themselves in precarious positions. Their sense of security also drops since the number of livestock in a household is one of the key determinants of wealth. In the discussion on wealth ranking, livestock was

invariably one of the first assets mentioned in both villages. Because of flooding, between one-half to three-fourths of families fall into the wealthy ranking. About 25 per cent of the families in the study lost almost their entire livestock holdings in 1996, keeping only a few chickens, if any. Commenting on her sudden drop in wealth, one woman in Intee said, "With the big flood, a rich family may not have enough food anymore. They can stay as a "middle" family for two or three years. If another flood comes again, maybe they would become poor."

6.1.3 Disease

Following a flood, sanitation is a major concern in the village. People reported a number of gastrointestinal diseases that would persist for weeks after a flood. This reduces the family's ability to recover from flood losses and to maintain income. This is particularly a problem when key labourers in the family become ill. For example, fishing is primarily a male occupation, so this livelihood activity is closed off when men in the family are sick.

In a "normal" year, families in Intee would spend an average of 32.4 per cent of their income on medical costs. The costs can drain the family's savings when there is an emergency. Due to bouts of malaria and dengue, three of the families had medical expenses as high as five to 25 times their stated annual income. People will often suffer with chronic illnesses rather than seek treatment, which in turn affects their capacity to maintain a steady livelihood. The situation is grimmer in Sompoi, since serious illnesses require treatment hours away in Attapeu where the only hospital in the entire province is located. The boat and road transportation is a substantial outlay of time and money. The boat trip alone costs around 40,000 kip, which is almost a week's worth of income. When savings are reduced through livestock losses, the question of whether to seek medical attention is often put off until it is too late.

In addition to human health impacts, diseases also struck many of the animals that did not go missing or die directly in a flood. This was the case in Intee and Sompoi, which led to similar rates of livestock losses in both communities. Villagers said that district and provincial agriculture officials recommended them to vaccinate animals against disease, but the vaccines are not available regularly, and "only rich families can afford it." Poor families would sometimes borrow money for the vaccines. Another problem is the level of understanding among villagers on the correct usage of vaccines. District Livestock and Fisheries officials said people sometimes request vaccinations only after the animal has gotten sick.

6.1.4 Equipment

Since most of the houses are built on stilts, the area below the house often becomes the place for storing fishing equipment, bicycles, firewood, and other household items. The most important items that people lost during the floods included fishing equipment of all types. Long wooden boats were cited by several villagers, which also could have provided the family with a means of transport. Boats are a key asset at any time, but during the flood, they are especially vital. They enable the family to recover goods, search for cattle, etc. in the immediate aftermath of floods. Losing a boat severely limits the opportunities for maintaining income from fishing, particularly for reaching desirable fishing grounds. They are also used to travel to neighbouring villages or to Attapeu for supplies of rice and other necessities.

Many household articles can be difficult to replace since many of them are not manufactured locally, but must be bought from Attapeu and transported to the village. Other equipment losses mentioned by the villagers included:

- Fishing rods
- Fishing nets
- Bamboo fish traps
- Pots
- Bowls
- Blankets
- Knives
- Clothing

The area around Intee is very well forested and villagers often earn a living cutting down firewood for sale. Piles of firewood are also stacked below houses for domestic use (see Figure 5 left). People noted that they lost significant amounts of firewood that were swept away, sometimes up to 60-70 pieces.

Figure 5: Firewood Stacked Below Houses in Intee



6.1.5 Housing Damage

Most of the houses are built high on stilts, and the area beneath the house is used for storage. Nevertheless, 10 of the 79 villagers in the assessment reported housing damage ranging from slight to total loss. In some areas, wooden floors were damaged where the water reached the second floor. Several families suffered the complete loss of their houses in 1996, with only the tin roof or the stilts remaining. Others did not have family homes damaged, but instead lost their small huts located near their paddy fields. The huts are necessary since, as mentioned above, the fields are sometimes located kilometres away from the village. Farmers will often go to live at the field for weeks at a time. These small huts are sometimes destroyed during floods. A farmer in Intee said he felt that damage to his hut was the greatest impact during the 1996 flood, aside from the destroyed rice.

While it is not a common problem within the community, this loss greatly impacts a few villagers very significantly. They may also be the ones who are poorer and must farm

land farther away than wealthier villagers. The loss of housing at the paddy field takes considerable resources in time and effort to rebuild the shelters. It is a cost that takes away from other recovery efforts in farming or supporting the family.

6.2 Other Elements of Vulnerability

It is important to note some of the additional constraints to maintaining a livelihood in the two villages. When floods occur, the following factors can exacerbate the losses or make the process of recovery more arduous. Elements of vulnerability to floods may be categorised into three levels:

- 1) physical/material,
- 2) social and institutional, and
- 3) motivational and attitudinal (Calow and Nicol, 2001).

Most of the household impacts from floods discussed above would fall into the first category, which includes climate-related disasters and the resulting physical losses of household assets. They are all capital assets that are used in the production of food or the labour for earning a livelihood. This section describes how social and attitudinal factors can affect household vulnerability.

Many of the villagers felt that floods occur naturally every year and are therefore a part of the natural cycle. They felt that their parents, grandparents, and countless generations of ancestors have lived with the same conditions; therefore, they are not motivated to change their behaviours. Floods do not bring about the wholesale destruction of physical assets and livelihoods, so people feel they can accept the level of damage that occurs from normal floods, and even the odd severe flood as in 1996. This attitude has led to the community acceptance of flood impacts, with little motivation to prepare or take steps to mitigate damage.

In any case, many families are dealing with such harsh conditions to survive on a day-to-day basis that they feel they do not have the resources to undertake additional measures to guard against disasters. They said they require assistance, either from the government or other organisations. Although disaster preparedness is an important component of sustainable development, the community's priorities are to improve their daily lives, health, and livelihood opportunities. Villagers requested irrigation canals to alleviate some of the effects of drought during the dry season, road access, latrines, and building a school. Families in Sompoi said that even if they could produce excess rice, the lack of transportation or access to a market makes it economically unfeasible. Family planning was also requested to ease some of the population pressures. The women noted that this is the most difficult problem in general. In categorising wealth, a large number of children indicated poor households. People also requested better education services for their villages—for example, there are currently only five teachers for 200 children in Intee.

The key elements that reduce vulnerability for families in Intee are their physical assets. Most striking are the positive effects of being located close to the market in Attapeu. WFP (2001) uses proximity to a road as an indicator of vulnerability, and a comparison of the two villages shows that can significantly increase livelihood opportunities. A much greater number of traders are active in Intee compared to Sompoi, in medicines, groceries, and handicrafts. The second physical element is the location of the village. Intee is on higher land, and does not experience the severity of floods that Sompoi does (see Figures 2 and 3).

Finally, team members noted that the Oi ethnic minority traditionally farms in more than one place concurrently. This may reduce their exposure to flood hazards somewhat, so that if one field is damaged, the other one may still be suitable for

growing crops. Team members also felt that Intee has a stronger line of communication between the headman and village members. This facilitates cooperation during emergencies and the dissemination of information that comes from outside the village.

7 COPING STRATEGIES FOR FLOODS

The extent and variety of impacts that confront households during floods is sometimes overwhelming. However, communities and households have dealt with this phenomenon for hundreds of years. They have developed a number of ways to survive in this environment, if not thrive, by drawing on the plentiful resources of the wetlands around the community, and on the hardiness of individuals. A range of coping mechanisms employed by households affected by floods is described below. Not all of them are particularly effective in helping to maintain or improve livelihoods, but they do allow families to meet their most basic, immediate needs. Households generally use a combination of these strategies at once. This section also includes coping strategies the communities would like to adopt and information on external assistance from the government and international organisations.

7.1 Household Coping Mechanisms

7.1.1 Finding Alternative Food Sources

Most of the villagers said that they switch their livelihood activities from farming to fishing when the flood season arrives, similar to other areas where communities are heavily natural resource-dependent. Switching to fishing is a means of both subsistence and income. Families tend to eat the smaller fish they have caught, while they try to sell the larger fish. The prices are much lower in the village than in town, but it is not worth it for them to take it to market due to transportation costs. Both of the villages have access to rich wetlands, and aquatic resources are found in the rivers, ponds, and paddy fields. Many farmers in Intee often dig small fishponds in the fields. The number of fishponds in paddy fields is used as an indicator of wealth in this village.

Many people mentioned gardening as a source of income, and they grow a variety of vegetables and herbs, such as potatoes, taro, longbeans, soybeans, cabbage, mustard greens, cucumbers, coriander, basil, and chilli. They also rely on the variety of wildlife in forests and wetlands, including crabs, fish, frogs, toads, lizards, snails, and squirrels. Wildlife is a seasonal resource of food, as were most of the other sources. In focus group discussions, it seemed that practically everyone in the village had to rely on forests and wetlands following floods to some extent. However, the people who must hunt for food year round are considered in the lowest wealth category.

This is actually quite a beneficial coping mechanism by diversifying people's diets from being predominantly rice-based. A nutritional assessment found that villagers in Attapeu used almost 200 species of aquatic plants and animals throughout the year (Meusch and Yhoung-aree, 2003). Since glutinous rice provides the majority of calories in villagers' diets, consuming a greater variety of plants and animals helps to increase the intake of vitamins and protein. The cultural preference for rice means that many vegetables are grown only where rice cannot be grown. For example, chickpeas are suitable for growing in Lao PDR, but there has been little success in introducing it because of the low demand. Even though there is an abundance of food sources in wetlands, people become very anxious when rice is in short supply. There is clearly a

need to enhance knowledge of nutrition and the relative value of a diversity of foods (Meusch and Yhoun-aree, 2003).

7.1.2 Turning to Family and Friends

The social structure in Sompoi and Intee, similar to other communities in Lao PDR, includes a solid tradition of communal sharing. One of the most common coping strategies is to rely on family and friends for assistance. A reciprocal system exists for rebuilding houses, sharing food, providing transportation, and so on. Rebuilding houses is one of the highest priorities after a flood so that families are homeless for only two to three nights, although these may be only temporary shelters. The reliance on family and friends is a type of insurance whereby one family receives assistance one year, and then they may give it the next. Increasing population trends are contributing to the strain on resources experienced by each household. For example, one woman noted that in addition to losing livestock during floods, her stock has diminished each year since she gave chickens to her children or neighbours in need. Other villagers said that meeting their household food requirements was sometimes difficult since they are compelled to share resources with friends and family. However, villagers noted that families are not obligated to repay food if they cannot afford it.

Nevertheless, this custom of sharing goods “beyond household necessities” could be a factor in the relatively small differences between the poorest and the wealthiest families, compared to the income disparity that exists in larger communities. It also promotes the overall resilience of the community, although it may increase the vulnerability of individual families. This is quite a successful strategy, which can contribute to cooperation for any future development efforts.

7.1.3 Selling Labour and Making Goods for Sale

Employment as a wage labourer is seen as an indication of lower income rankings. This was not mentioned as a possibility in Sompoi, but in Intee it included such jobs as cutting wood in the sawmill or in the forest. It can also mean working in someone else's rice paddy. The wages are quite low—approximately 10,000 kip (\$1) per day. Sometimes a team of people will work together to cut grass, and this can bring in 500,000 kip per month for the team of five to six people. Many of the women also reported making handicrafts, such as mats, tables, rice containers, etc. from bamboo, rattan, and pandan leaves. Men made fishing equipment and furniture, or tried to sell extra fish. Most of these items were taken to the market in Attapeu, although people would occasionally go to the village to buy the handicrafts or equipment. In one year, a villager reported income of 300,000kip from selling firewood.

There are few existing opportunities to find wage labor in Intee. Even for fishing, there is not much of a market to sell fish that has been caught. The government has been working towards increasing crop productivity and diversification (Hanephom, 2000). It also plans to expand value-added processing and introducing agribusiness activities, which should eventually lead to more off-farm wage labor jobs in Attapeu.

7.1.4 Selling Livelihood Assets

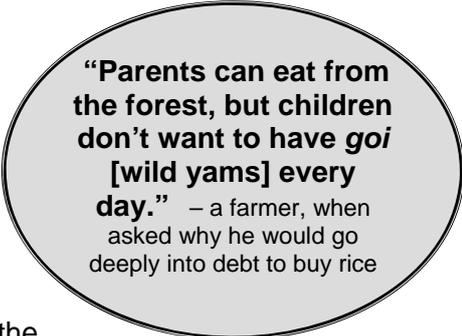
Selling off assets is one of the most common coping strategies. Cows and buffalo are the most highly prized household assets, which can buy a family of 4-5 enough rice for a year (WFP, 2001). Other people may be forced to sell their land, which greatly threatens the family's livelihood. While some items are not directly related to livelihood, there are valuable family possessions that can be sold during hard times. For example, people in Intee mentioned one type of instrument that resembles a gong.

This instrument seems to be a cherished possession that villagers no longer know how to make. In fact, they said they did not know where it came from, except that they are passed down from one generation to the next. The gongs are extremely valuable, and selling one can bring the family several million kip.

The effectiveness of this coping strategy depends on how much of a cushion it leaves the family following the sale, and if they are able to continue with some kind of livelihood activity. Some families said there was only a temporary setback in asset worth following a flood. They first sold chickens and pigs, and then the big-ticket items such as livestock or land. In some cases, the period between selling to regaining assets was only 2-3 years. For other families, however, floods led them to sell productive assets and it was very difficult to support their families. Their means of earning a livelihood were destroyed or sold off, and they had to work for years before gradually recovering some assets. Sometimes, families were able to live on the funds from sales for a short period, but they eventually ran out of money. They ended up having to work for a wage, falling into greater poverty and vulnerability. In one focus group discussion, people reported that they had still not recovered from the 1996 flood seven years after the event.

7.1.5 *Going into Debt*

One of the more ineffective coping strategies, and a common one, was going into debt. Villagers told of how some families would buy rice after a production shortage or the total destruction of fields. The interest rate was incredibly high—the standard rate quoted was 500 per cent. For example, if a family borrowed 50 kg of rice, they would have to pay back 250 kg. They have one year to pay it back, and then after one year, the interest increases by another 60 per cent. In Intee, a company based in Attapeu lent rice to villagers. Interestingly, people said the interest rates are high all year round, and they do not increase during the flood. Oftentimes, families had to sell buffalo to pay back the debt. Villagers said that families from all income levels had borrowed rice in the past, except for those in the highest category. In Sompoi, very wealthy families could lend rice in this way. These families own large boats and can travel into town to buy rice, then come back to sell it. They will also buy rice from surrounding villages to sell at high rates. This causes some animosity within the community, and the poorer people feel powerless to obtain a fairer interest rate. Each year they go deeper and deeper into debt.



7.1.6 *Evacuation to Higher Ground*

Families in both Sompoi and Intee reported instances when they have evacuated the village for approximately 3-4 days. This is usually enough time for the waters to recede. They take clothes, rice for a few days, and small animals. Later, villagers will spend time boating around to look for other livestock such as cows and buffalo. Women in Intee said that their biggest concern during a flood is the safety of their children because they do not know how to swim. This is not a problem in Sompoi since the village is located near the river, and most of the children grow up learning to swim by playing in the river. Intee villagers evacuate to the mountains near the village each year when a flood occurs. They stay with relatives in a village in the highland. This is effective for short periods, but when a flood lasts longer than a few days, they begin to worry that they are imposing on relatives and friends in the village at higher ground.

The longer-term effectiveness of this strategy is questionable unless it is combined with greater preparedness efforts to gather household goods and livestock (see below). Evacuating to higher areas takes a significant effort, and if they are only able to save what they can carry or take in a small boat, it means that they will still lose a considerable amount of their livelihood assets.

Due to community bonds and attachment to ancestral homes, people are generally unwilling to move away to less flood-prone areas. Most of the members of Intee village had actually been transferred from a mountainous site in 1978 as part of a government relocation initiative. They say they now prefer to live in the lowland areas because it is easier to grow food and some irrigation has been installed.

7.1.7 Preparedness

When the district announces a flood, villagers said they prepare boats, rice, clothes, and other necessities to take to higher ground. Intee villagers said they take buffalo near the foot of the mountain because it is too difficult to take them all the way up to the site where villagers stay. Interestingly, they now have a tractor of great value, and wonder how to keep it undamaged during floods. Another preparedness measure is to harvest the rice early. Normally, they take 4-5 days' worth out of the rice stock; however, if the flood is bad, the rice stock might be waterlogged and damaged. Women mentioned that both men and women prepare the family belongings. One group said women are more attentive to the children, and several women complained that their husbands do not help prepare as much and do not watch over the children during dangerous flooding times.

In 2002, the government gave a flood warning and villagers successfully moved to an emergency shelter, which is about 3 km away. They also took livestock to the shelter with them. Flood warnings have not always been successful, however, and villagers tend to believe that they are inaccurate and given at the wrong time. Most of the people in discussions said that the district sometimes issues warnings, but the action taken upon them is very little. One of the difficulties in promoting preparedness is that people feel it is a significant effort to prepare by going to higher ground. This is largely due to the small size of boats and the repeated trips required to transport everything. Families must go back and forth with only small loads each time. This underscores the importance of improving forecasting accuracy and communication between the meteorological office and other governmental offices with access to the villages, such as PAFO and the Social Welfare and Labor Department. People must feel the warnings are credible enough to put in the effort to prepare for the potential floods.

7.2 External assistance

A common coping strategy is to receive external assistance from the government or other organizations. Villagers in Sompoi cited several agencies that had provided rice relief including the Department of Social Welfare and Labor, PAFO, Red Cross, Agricultural Development Denmark Asia (ADDA), and WFP. They also gave beans and other plant seeds. Rice relief from different agencies ranged from 5 kg per person as a one-off handout, to 200 kg per household. Other agencies gave seeds for one year's crop or supported flood mitigation efforts. For example, people in Sompoi reported that WFP provided assistance to build a dyke to protect the village. Unfortunately, the children found it to be an interesting new playground and it was destroyed.

Some programs implemented by the government in the past have failed, which then results in a loss of trust in external agencies, or a belief that the assistance is inadequate. One year, the district agriculture office distributed seeds after a flood, but they were given 14 days after the flood, which villagers felt was too late. In another case, a plan to dig a canal and pump water to prevent flooding in Sompoi a few years ago was completely unsuccessful. Each family contributed money to buy a pump from PAFO, but the pump was able to run for only 15 days before it ran out of fuel. When the villagers could not afford to continue buying fuel, the village was flooded. This incident has eroded the government's credibility within the village. The entire experience created some distrust towards PAFO, so they are wary of new schemes to reduce floods.

7.3 Community Suggestions on Coping Strategies

In discussions regarding strategies that they would like to implement, villagers had several ideas, some which had been tried before and failed. Nevertheless, villagers believe they would be beneficial if implemented properly.

- **Rice Bank**—A commonly suggested strategy was to establish a rice bank, with the added benefit of lessening the debt burdens placed on families that borrow rice at high interest rates. Each year, families would contribute to a village rice stock, from which they could borrow in times of need. Intee village had a rice bank a few years ago, but it has become defunct since some families borrowed rice, but have not yet repaid it. They optimistically predicted that the rice bank would be operational again within two years.
- **Village Fund**—A village fund for loans, agricultural insurance, livestock, seeds and other assets has been proposed. The government is trying to expand rural credit and savings facilities as part of its rural development plan (Hanephom, 2000). At the moment, none of the villagers participating in the local dialogue had access to a bank or state credit programs.
- **Livestock Enclosure**—Villagers in Sompoi are also trying to figure out some way to stop livestock losses. One suggestion put forward by the village head is to construct a barn or some kind of enclosure while simultaneously promoting awareness on the importance of keeping track of animals. He suggested that cows, buffalo, and pigs could be kept in the enclosure each night, which he hopes will help to reduce losses during floods. Most of the losses now occur at night when animals are lost in the fields and villagers cannot recover them.
- **Revolving Animal Bank**—Another suggestion is to establish a revolving animal bank. Under this program, the government or other organizations would give a one-time donation of livestock for village families to raise. A certain number of offspring from those animals would then be given to other families in the village.

8 NATIONAL DEVELOPMENT STRATEGIES

8.1 Lao PDR Development Strategies and Trends

Aside from physical elements of climate, economic and social changes in the next decades will also have an impact on communities' vulnerability to floods. The

development strategies implemented by the government and other organizations have the potential to enhance livelihood opportunities, which in turn reduce vulnerability. This section reviews several major development plans and trends that will affect communities in Attapeu Province.

The Lao PDR government aims to take the country out of LDC status by 2020. To guide all development efforts towards achieving this goal, the government has created “Eight National Priority Programmes” as follows:

1. Food production
2. Commodity production
3. Stabilization of shifting cultivation
4. Rural development
5. Infrastructure development
6. Expansion of external economic relations and cooperation
7. Human resource development
8. Services development

The overarching principles in implementing these priority programs are to enhance food security, preserve the natural resource base, and develop human resources. The Lao government’s policy of decentralization is promising as one of the main elements of the poverty alleviation strategy, whereby the government strives towards “building up provinces as strategic units, districts as planning and budgeting units and villages as implementing units” (CPC, 2001). This structure should more effectively tackle local development needs by addressing villages’ concerns and circumstances. The Interim Poverty Reduction Strategy Paper states that Lao PDR will focus on development of the following four pillars: Agriculture/forestry and Livestock, Education, Health, and Road Infrastructure. In fact, the Public Investment Plan allocates 18 per cent of the government’s budget for agriculture, 10 per cent for education, 7 per cent for health, and 32 per cent for transport.

The strong emphasis on agriculture and road infrastructure is in line with the needs voiced by villagers in discussions on how to improve their livelihoods. They place a very high priority on agriculture extension services, road access, and basic sanitation (particularly latrines in the villages). Improved agricultural extension services would help people to safeguard their primary livelihoods. As described above, some of the vulnerability-enhancing factors in the two study villages could be mitigated through increased training on livestock management practices. The Regional Development Cooperation (RDC) is a joint effort among six provinces in Southern Lao PDR to help enhance coordination on livestock management, promote fish breeding, and promote small-scale fisheries.

The Lao PDR government also aims to increase the area of irrigated land. In 1998, 8.3 per cent of all land planted with rice was irrigated, contributing to 12.7 per cent of rice production. The government’s objective in increasing irrigated farmland is to reduce vulnerability to droughts and floods and to minimize the variation in annual total production. In addition, different stress-tolerant rice varieties have traditionally been used throughout Lao PDR. These include *khao loy* (floating rice), *khao niaw loy* (floating sticky rice), *khao thon leng* (drought tolerant), *khao bo ngo nam* (drought tolerant). These varieties or high-yield varieties may be introduced to Attapeu. Ultimately, it should support the national goal of food security and maintaining rice self-sufficiency (Schiller *et al*, 2001).

Assessments to extend the road network through rural areas have been completed, but provincial officials doubt that a road will reach Sompoi within even the next 20

years. Questions also remain on how road access will impact the environment and the wetlands in the area. Nevertheless, the livelihood options and coping responses would broaden with greater access to markets. It would also increase communication between the remote villages and district and provincial headquarters, thereby strengthening institutional capacities to flood preparedness programs or general development efforts.

Threats to Mekong wetlands include increased population, deforestation, and watershed degradation. Wetlands and the aquatic life around Attapeu are facing great pressure from new fishing methods, including technologies such as refrigeration that encourage overfishing. One villager said, "Before, we only caught what we could sell that day. Now we can put fish into coolers and keep it to sell at the market." Other threats to wildlife include introduced species, pesticide use, overhunting, and habitat destruction. Some people noted that outsiders are increasingly using wetlands around the villages as hunting grounds.

8.2 Effectiveness of Coping Mechanisms under Climate Change

Looking at the picture of future climate in the region surrounding Attapeu and the development efforts and socio-economic trends, villagers' vulnerability to floods will be similar to what exists today. Although floods will likely increase, some of the factors causing vulnerability in the villages may have less impact on households in Sompoi and Intee. For example, the main cause of household food insecurity is the loss of paddy fields and rice stocks. This is so devastating for families because they normally produce only one crop of rice during the year, with relatively low yields. Future efforts to implement irrigation and introduce stress-tolerant and high-yield rice varieties may mitigate the severity of these impacts.

However, household vulnerability increase due to a worrying trend. The most common coping mechanism now utilized by villagers is to rely heavily on the plants and wildlife in wetlands. Based on current rates of deforestation and overfishing/overhunting, this coping mechanism may be severely threatened in the future. There is little understanding of how changes in the climate and hydrology in Attapeu will affect the ecology of the wetlands. These resources play a prominent role in the ability of households to get by during climate extremes of flood and drought. Any decline on these resources, which serve as a source of nutrition and livelihood, will directly reduce the coping range of villagers in the area.

Given the development strategies and trends highlighted, the coping mechanisms may be more successful in that there will be new options available to villagers, or more effective ways to implement them. For example, they may have access to new kinds of credit and savings, so that they will not have to fall into debt when rice shortages occur. This should also decrease the reliance on livestock as the chief saving mechanism, so losing cows and buffalo following floods will not destroy the family safety net. There may also be new trading opportunities available with increased access to markets, or if agro-processing industries develop in the area.

9 CONCLUSION

This local dialogue revealed that villagers in Sompoi and Intee are vulnerable to severe floods, although they are accustomed to the annual flood pulse that is characteristic of the Mekong Region. The main impacts from these extreme climate events are losing paddy fields, rice stocks, livestock, and equipment. Other impacts are disease following the floods and housing damage. A few notable factors combine

to enhance the impacts of these losses, mainly the livestock management practices and the lack of preparedness in both villages.

Families have used numerous coping strategies to deal with the impacts of floods, which hit hardest in the form of lost livelihoods and food shortages. They depend on the forests and wetlands surrounding the village for a variety of wildlife and plants. Since rice normally provides the majority of villagers' calories, wetland resources diversify the diet with needed vitamins and nutrients. People will also rely heavily on family and friends during and after a flood. Another mechanism is to work for a wage, although there are limited opportunities in the remote villages. This also hampers the success of selling goods made from wetland resources, as the market is not easily accessible. Several families sell productive assets such as livestock or land, with the proceeds sometimes going towards paying off earlier debts. Villagers in the assessment estimated that up to 75 per cent of families fall in wealth ranking due to losses incurred during floods. Finally, families coping with floods will evacuate the village for several days at a time. Unfortunately, it is difficult to take many of the household assets, so there are inevitably losses.

Climate change is likely to enhance the severity of floods in the future. A shorter, more intense rainy season will result in increased floods during the wet season and drought during the dry season. Development efforts, however, could go a long way towards enhancing the resilience of villagers by promoting expanded livelihood options and better preparedness against climate extremes.

10 RECOMMENDATIONS

Preparedness and early warning—Improving climate information applications through work with the meteorological office, agricultural extension, water resource managers, and other users would be quite useful for enhancing flood preparedness. This would require improved forecasting ability at the provincial level, which is currently quite low in Lao PDR. Efforts to preserve indigenous methods of forecasting could also prove useful, although these have not been well-documented. However, one caveat exists regarding flood early warnings, which is that villagers need to have a *range of response strategies* to draw upon. The list of coping mechanisms above—although it is not exhaustive—indicates the rather limited options that are available for coping with floods. The families in both of the villages have few choices, and few cushions, at their disposal once a flood hits. This lack of response options may contribute to the villagers' seeming acceptance of flood impacts. In case they do have warning of a flood, the most they could save would be their livestock and a few household items. Furthermore, this is only possible if they can quickly locate livestock and if they have a safe place to keep them during the flood. Destruction to the paddy fields, however, is unavoidable without complementary measures for improved land management.

Livestock management—Discussions in the villages illustrated the importance of agricultural extension services and livestock management training. Livestock are often the most valuable asset in the household, aside from land. Due to their importance as the family's emergency fund and savings, the current rates of loss during floods as high as 50 per cent or more must be reduced. Villagers requested information and training on caring for animals to prevent diseases. In addition, simple measures such as an enclosure could reduce flood losses.

Rice production—Rice plays an important role in the villagers' life and it is a symbol of well-being. One measure to reduce vulnerability to floods (and droughts) involves

improving rice production in Attapeu. This would increase food security, utilizing a two-pronged approach: 1) to increase the number of crop cycles per year, and 2) to promote the use of stress-tolerant varieties. The Lao PDR government is also planning to expand irrigation to reduce water resource variability throughout the year. Careful investigation of the impacts of introducing these measures is required to ensure that irrigation schemes do not negatively alter the landscape, for example, by leading to increased salinization. Similarly, farmers would be wary to risk their single crop of rice on unfamiliar, untested varieties.

Sustain wetland resources—Major developments are on the horizon that will have great impacts on Attapeu's wetland. Roads, hydropower plants, large irrigation schemes, etc. will all affect the complex processes in the environment and the communities that depend on them. Although southern Lao PDR has one of the lowest population densities in Asia (as low as 2people/km²), habitat destruction is still a problem, in addition to overfishing and overhunting. Measures should be put into place to conserve the wetlands and the resources they provide.

Enhance livelihood options—In the future, less dependence on natural resources would help reduce vulnerability to severe flooding and droughts. However, Attapeu will remain an agrarian economy for several decades to come. In the meantime, some value-added economic activities could be introduced. Agro-processing, eco- or agro-tourism, promoting traditional handicrafts, and other measures could help to diversify livelihood options. Another needed measure to support sustainable livelihoods is the availability of savings and credit mechanisms for village communities.

Capacity building for assessing climate risks and vulnerability—Finally, in conducting this local dialogue in the two villages, it is clear that building up knowledge and human resources for assessing climate risks is needed. During a post-field visit discussion, team members stressed the importance of thorough training for local staff. Some of the concepts for dealing with climate change and vulnerability were unfamiliar to them. They also believe the methodology is useful for future local dialogues in Lao PDR. Detailed consultations with local staff and pilot tests will enhance the effectiveness of eliciting information on climate vulnerability and coping mechanisms.

At its core, disaster preparedness is concerned with sustainable development. As each successive disaster occurs, it gradually wears away the family's assets and their ability to maintain and enhance their livelihoods. The recommendations above are primarily targeted at the villagers' very urgent development needs. In implementing measures to support these goals, government and international organizations can help to enhance villagers' resilience to floods in Attapeu.

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ANNEX A: STUDY TEAM MEMBERS

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ANNEX B: WEALTH RANKING

Intee

Wealthy	Middle	Poor	Very Poor
4 ha paddy 2 kids 6 cows 3 buffalo gong tractor motorcycle house: 2 floors- concrete bottom with wooden top and tin roof 2 bicycles paddle boat plow 6 normal jars (for liquor) 15 fish ponds 5 pigs 20 chickens but kept somewhere else car watch battery charger rice enough to sell	3 ha paddy 4 cows 4 buffalo 8 kids house (same as wealthy) enough rice to eat 3 bikes 2 jars, bigger than rich 7-8 fishponds 10 pigs 7-8 kids	Jars 2.8 ha paddy 1 bicycle rice short 6 months 10 kids 0 animals 10 chickens 0 pigs thatch hut 3 fishponds **Intee villagers noted that Poor and V.Poor families will have more chickens, it's a poorer thing to have and they sell to Rich	0.4-0.5 ha paddy 5 kids, no school rice short 8-10 months thatch hut no animals 2-3 fishponds forage for food work in a sawmill for 10,000kip/day cutting grass for wages

Sompoi

Wealthy	Middle	Poor	Very Poor
6 cows 10 buffalo 5 ha paddy 8 pigs 1 truck wooden house with tin roof 1 boat 1 tractor 1 mill enough rice fishing tools gold chain	6-8 buffalo 5 cows wood and tin house 1 ha paddy 2 pigs rice for six months fishing tools 1 boat with a motor	No animals Thatch house Rice shortage 0.8 ha paddy lots of kids 4-5 1 kid/year 1 paddy boat 2 pigs	No paddy (rent) Rent house/no No animals Survive on NTFPs No labor in the family Widow



Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme

The Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme (MWBP) is a joint programme of the four riparian governments of the Lower Mekong Basin – Cambodia, Lao PDR, Thailand and Viet Nam – managed by the United Nations Development Programme (UNDP), the World Conservation Union (IUCN) and the Mekong River Commission (MRC), in collaboration with other key stakeholders. With funding from the Global Environment Facility (GEF), UNDP, the Royal Netherlands Government, MRCS, the Water and Nature Initiative (WANI) and other donors, the programme addresses the most critical issues for the conservation and sustainable use of natural resources in the Mekong wetlands. MWBP aims to strengthen the capacity of organisations and people to develop sustainable livelihoods and manage wetland biodiversity resources wisely. It is a five-year (2004-2009) intervention at three levels – regional, national and local – with demonstration wetland areas in each of the four countries: in the Songkhram river basin, Thailand; in Attapeu province in southern Lao PDR; in Stung Treng, Cambodia; and in the Plain of Reeds in the Mekong Delta, Viet Nam. The programme aims to:

- Improve coordination for wetland planning from regional to local levels
- Strengthen policy and economic environments for wetland conservation
- Generate and share information
- Train and build capacity for the wise use of wetlands
- Create alternative options for sustainable natural resource use and improve livelihoods

MWBP is a partnership between governments, aid agencies and NGOs, and provides a framework for complementary work for wetland conservation and sustainable livelihoods in the Lower Mekong Basin.

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CAMBODIA



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THAILAND



VIET NAM



IUCN
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