SOCIO-ECONOMIC PROFILE

OF COMMUNITIES AROUND THE MONDULKIRI PROTECTED FOREST

Srepok Wilderness Area Project
Technical Paper Series - No. 5

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List of Acronyms

ADB	Asian Development Bank
ICC	International Cooperation for Cambodia
CBNRM	Community-based Natural Resource Management
CDHS	Cambodia Demographic and Health Survey
CUZ	Community Use Zone
FGD	Focused Group Discussion
IKSP	ndigenous Knowledge Systems and Practices
IMR	Infant Mortality Rate
IP	Indigenous Peoples
LMDFE	Lower Mekong Dry Forest Ecoregion
MAFF	Ministry of Agriculture, Forestry and Fisheries
MIST	Management Information System
MOE	Ministry of Environment
MOMS	Management Orientated Monitoring System
MPF	Mondulkiri Protected Forest
NGO	Non Government Organizations
NRM	Natural Resource Management
NTFP	Non-Timber Forest Products
OPD	Out-Patient Department
PLUP	Participatory Land Use Planning
PPWS	Phnom Prich Wildlife Sanctuary
RUZ	Regulated Use Zone
SPZ	Strict Protection Zone
SWAP	Srepok Wilderness Area Project
WCS	Wildlife Conservation Society
WWF	World Wide Fund for Nature

Executive SUMMARY

The SWAP was set up by WWF to:

i) Improve natural resource usage management through increased community participation in decision-making and to improve access to and sharing of the associated economic benefits.

ii) Initiate wildlife ecotourism activities within the Srepok Wilderness Area and provide a model fo r the development of sustainable ecotourism activities elsewhere in Cambodia.

iii) Establish community-based monitoring of species in order to track the progress of wildlife restoration and to document natural resource management efforts.

The methodology is to leverage win-wins for wildlife populations, communities, government, conservation NGOs, and the private sector through:

1. Low-impact, high-value ecotourism.

2. Protected area management and forest protection.

3. Community-based natural resource management (CBNRM).

Primarily, there exists a need to better understand the socio-economic situation of the communities adjacent to the MPF and their level of dependence on its natural resources as an entry point for community development. In 2006 WWF through the SWAP conducted a rapid baseline survey in the three clusters of communities around the MPF. The study, which included focus group discussions in 14 villages, interviews among key informants from the villages, and individual interviews in 568 households representing 43% of the total households in sampled villages, assessed the socio-economic profile of the communities in relation to the resources inside the MPF. This paper details the study.

The following information will be used to provide background and baseline information to underpin all SWAP activities. It will be particularly relevant in guiding community engagement activities and in assessing ecotourism potential to help identify project sites and partners and to design future research.

The main findings from this study were:

Socio-demographic status

- Economic in-migration was increasing. This trend was well established and primarily due to the search for economic opportunities perceived by migrants to be available through agriculture on available land. Research indicates that fifty percent of these migrants originated in Kampong Cham Province and the other fifty percent from the Prey Veng Province. These migrants were mostly distributed in Bu Chri, O Boun Leu, Srae Sangkom and Sre Huy communes.

- The population density surrounding the MPF was increasing with evidence that the MPF was becoming a focal point for population growth. The area showed a density of 24 persons/km2 compared with 2 persons/km2 for the province as a whole.

- All villages studied had health centers and primary schools. The main issues identified in the study related to these centres were generally poor service delivery and irregular availability of health workers/staff and teachers.

- Potable water access was low. One pump well serviced an average of 28 houses.

Economic Status

- Agricultural subsistence production was the main economic activity for households in the study. Households with size of 6.2 persons had farm plots that were often not large enough to ensure food security. The population therefore supplemented subsistence agriculture with the collection of forest products.

- Farm size was important for food security. The average size of cultivated land for a household with insufficient rice was 2.3 hectares compared with households cultivating 3 hectares, which produced sufficient rice. Households with 3.5 hectares or more had tradable quantities. A total of

53% of the households claimed having insufficient rice production; 40% had sufficient and the rest had more than sufficient production.

- Production sufficiency also depends on family size. Generally, the families who experienced production shortages had more than 6 members. About 10% of households produced more rice than needed and hence had a balance available to trade. About 19% of households relied mainly on NTFP collection for livelihood support.

- Farming was mostly non-mechanized. Plows, harrows and a few hand tractors were used in land preparation. Of the 547 farming families, 49 reported using hand tractors. Of those, 20 households actually owned them, while 29 were renting. The respondents noted that hiring tractors to cultivate farm land was a costly input to farming; Costs to hire tractor services were around 150,000 Cambodian Reil (or 37.5 USD) for every hectare the hired person and their tractor cultivated.

- Fishing was practiced by 13% of households. They still used traditionl methods of hook and line fishing.

- One-third of respondents admitted to hunting.

- Most land was acquired without permission – mirroring the poor legal situation surrounding land registry. The only proof to ownership was a letter from the commune council. All respondents did not have a land title.

The key threats to the MPF identified were:

- Land issues driving forest clearance: migration, land speculation, weak tenure, and concessions on communal land. Land grabs, inequitable trades, fracturing communities all contributed to a reduction in the incentive for all people living near the MPF to recognize the benefits from conservation.

- Evidence that fishing catch was falling. Reasons included commercial fishing practice sand dam constructions.

Key ways forward for this SWA project in light of these findings:

- Democratic stakeholder engagement.

- Expansion of the existing Natural Resource Management (NRM) committee in each commune to include other concerned sectarian groups. The capacity of this committee can be further improved to accommodate the programs/projects/activities involved in biodiversity conservation inside the MPF. This also means institutionalizing the MPF agenda to the development plan of each commune and to encourage provision of financing or counterpart contribution to some management projects/activities.

- Federating or networking the different NRM based associations/committees in the eight communes around MPF will further synergize efforts towards sustainable resource management in their areas.

- Institutionalizing the management plan at the local authority level through issuance of local ordinances/orders. Making local authorities active partners in implementing and attaining the vision for MPF.

- To reduce the reliance on the forest and increase the efficiency of agricultural production, it is proposed that some form of agricultural extension is required. Additionally, there is a need for access to information on credit and information in general. WWF is not in a position to provide this directly, but is willing to motivate for help/aid from its partners.

- Information gathering and sharing to address land issues contributing to habitat loss. The project must aim to gather further information on land issues at a local level and look at ways of bridging information among relevant local stakeholders [such as communities and the authorities]. It will also monitor migration and try to better understand how people moving into the area can be assisted in finding land that does not infringe on the integrity of the SWA.

- Extensive monitoring and research to aid in decisions and plans on resource use. SWAP intends to find ways of monitoring through various available monitoring tools such as Management Oriented Monitoring System (MOMS) and Management Information System (MIST).

1 BACKGROUND

1.1 The Mondulkiri Protected Forest

The Mondulkiri Protected Forest (MPF) is one of the largest protected forests in the country covering 363,177 hectares. It is located in the northeastern part of Mondulkiri Province in the northeastern region of Cambodia, at latitude 12.8° north and longitude 106.5° east. It is bounded in the east in part by Yok Don National Park in Vietnam and in the north by the province of Ratanakiri and the Srepok River. It is politically situated within the two districts of Mondulkiri Province; Pech Chenda District in the southern part and Kaoh Nheaek District in the west and north. Of the 21 communes of Mondulkiri Province, eight are wholly or partially within the MPF and strategically clustered in the south, north and western part of the protected forest (Table 1.1 and Figure 1).

Table 1.1 List of Villages and Communes Bordering the MPF.

District/Cluster	Communes	Village
Northern Cluster Kaoh Nheaek District	Nang Khi Loek commune	• Peam Chi Miet • Nang Buo • Kaoh Moueleu • Kaoh Mouel Krom
Western Cluster Kaoh Nheaek District	Ou Buon Leu	• Ou Boun • Tol • Antreh
	Roya	• Roya • Memom • Kdaoy • Roveak
	Sokh Sant	• Klang Le • Ou Agnor • Sre Thom • Chi Klab
	Srae Huy	• Srae Huy • Chol
	Srae Sangkom	• Serei Rot • MeanCHei • Serei Meanrit • Mongkol • Chamreun • Kbal Chroy • Kbal Koh • Ou Yeh • Rumdaoh
Southern Cluster Pech Chenda District	Krangteh	• Krangteh • Romiat • Tram Katch • Pou Rapet
	Pu Chrey	• Bebai, • Putang • Puchrayang • Pucheichongchang

The MPF was created under Sub-decree No: 75 ANK-BK of The Royal Government of Cambodia on 30 July 2002 for "Genetic Resources of Plants and Wildlife." It is characterized by a dry forest ecosystem having habitat mosaics dominated by deciduous dipterocarp forest, low elevation, strong monsoonal climate, and a high frequency of fire regime (MPF Management Plan, 2007). It is one of the few remaining true savanna forests in Southeast Asia, forming part of the largest remaining tract of dry forest in the Eastern Plains Dry Forest Landscape. It remains an important habitat for globally threatened and endangered species including gaur, banteng, tiger, wild Asian elephant, leopards, and various species of deer and birds.

In addition to the diverse fauna, this ecosystem also harbors a variety of resources which are economically and socially important to the local communities living around it; including timber and bamboo for shelter, food for daily subsistence (i.e. wild animals, wild fruits and wild vegetables), fuel wood to cook food, resin for light and additional cash income.

The MPF is also a catchment basin for various tributaries that drain to the Mekong River system. Arguably the most important river in this basin is the Srepok River, which is a major tributary of the Mekong flowing from Vietnam through the MPF. Together, with its tributaries, the Srepok River is an important fishing area for adjacent communities. Several deep pools feature along the entire stretch of river serving as an important dry-season refuge for fish stocks thus, contributing to the fishing industry of Cambodia (Hortle, et al, 2004).

For management purposes, the MPF is divided into four zones:

Strict Protection Zone (SPZ): Primarily for conservation of wildlife populations including river species within the dry forest mosaic. Hunting, logging, wildlife collection, and fishing in the Srepok River are prohibited. All forms of agriculture and cattle grazing are prohibited and dogs are not permitted to enter. Permanent structures may not be built. Registered tree owners may harvest wet resin, but this practice will be phased out within three years as specified in the MPF management plan.

Regulated Use Zone (RUZ): Provides additional area for conservation and a buffer between the SPZ and the CUZ. This zone also provides a corridor for the movement of wildlife to and from adjacent protected areas. Restrictions are the same as for the SPZ other than all legal NTFPs may be harvested by permit-holders and fishing, using legal methods, is permitted in the Srepok River and its tributaries.

Resin Collection area in Bu Chi. Resin is a source of income for communities around MPF

Community Use Zone (CUZ): Provides land for established communities to graze cattle, conduct subsistence agriculture and harvest NTFPs on a sustainable basis. Commercial plantation agriculture is not permitted and expansion of settlements is permitted only with the approval of the Forestry Administration.

Ecotourism Zone (EZ): Areas for tourism infrastructure development and intensive ecotourism use. Uses in this zone shall be detailed in the Ecotourism Management Plan, which is currently being drafted.

The MPF is part of the Eastern Plains Dry Forest Landscape within the Lower Mekong Dry Forest Ecoregion (LMDFE) which is identified by the Worldwide Fund for Nature (WWF) as one of the world's 200 most biologically important eco regions (Schweithelm, MPF Management Plan, 2007).

Along with the Phnom Prich Wildlife Sanctuary (PPWS) and Lumphat Wildlife Sanctuary, these major protected areas comprise 85% of the relatively intact block of dry forest in the region (WWF Brochure, 2006); and as such are considered a critical element of the LMDFE that stretches from Thailand, Laos, Cambodia and Vietnam.

1.2. The Srepok Wilderness Area Project (SWAP) of WWF

Threats to the MPF

Like any other ecosystem, the MPF is beset with numerous ecological stresses brought about by both direct and indirect contributors to biodiversity loss. Primarily, these contributors are socio-political and economic drivers such as poverty, increasing population, inadequate policy, weak political will, lax enforcement of existing laws, effects of markets, and low recognition of conservation values among local communities and government.

Direct threats to biodiversity loss in the MPF include:

i. Unmonitored exploitation of resources (timber poaching, fuel wood and charcoal production, wildlife hunting and trading).
ii. Habitat change as forest land is converted for agriculture and settlement.
iii. Economic development which places very little consideration on environmental impacts.

Examples of these development projects that may threat en the integrity of the MPF are:

a. Mining: including ongoing gold mining exploration phase) activity inside the MPF.
b. Infrastructure: including talks of plans to improve roads from Mondulkiri to Vietnam, which will cut through the northern portion of the MPF.
c. Energy generation: several hydro power projects situated on the Vietnamese section of the Srepok River that are either in operation, under construction or in the planning stage will, in all likelihood, impact the hydrological cycle of Srepok River. According to the environmental impact assessment conducted for these hydropower projects, "the dams, and any dry stretches, break the ecological continuum of the river and prevent fish (and other water-associated animals) from reaching their spawning grounds and feeding grounds " because of their dependence on predictable water flow regimes. In addition, it was noted that these changes in hydrology often result in increased soil erosion resulting in siltation and sedimentation - especially in deep pools particularly impacting aquatic animals that arepools-dependent (SWECO Groner, 2006).

The SWAP project:

WWF embarked on a series of research, strategic planning and program development to save this remaining unique dry forest ecosystem in the country and keep the various globally threatened and important species found therein from extinction. WWF's work in the MPF started in 2004 with funding from WWF Netherlands. The funding covered the preliminary and initial assessment activities such as defining the appropriate management intervention. Here, wildlife-based ecotourism was identified as a viable strategy in conserving this remaining frontier of the country. Subsequently, the Srepok Wilderness Area Project (SWAP) was developed with the goal of restoring the once abundant population of large mammal species to the MPF. This is to be achieved through community -based natural resource management coupled with wildlife ecotourism to provide sustainable financing for both management of the park and supporting sustainable livelihoods for neighboring communities. The SWAP has benefited from

further funding from Habitat Impresarial Group (Spain) and the Darwin Initiative (UK) to operationalize this vision. This project is supported by the Royal Government of Cambodia through a Memorandum of Understanding between WWF and the Ministry of Agriculture, Forestry and Fisheries (MAFF) which specifically aims to:

i) Improve natural resource management through increased community participaion in natural resource use management and improve access to and sharing of the associated economic benefits.
ii) Initiate wildlife ecotourism activities in the Srepok Wilderness Area that will provide a model for the development of sustainable ecotourism activities elsewhere in Cambodia.
iii) Establish community-based monitoring of species in order to track the progress of wildlife restoration and to document natural resource management efforts.

The project has three major components:

Low-impact, high-value ecotourism.
The vision is to establish a high-end eco lodge within the MPF situated on the Srepok River that will become a recognized and desired destination for high-value tourists. This lodge will be a pivotal element that will catalyse a mosaic of tourism enterprises in and around the MPF. It is expected that tourism income will be generated for park management in the form of concessions and via conservation/entrance fees paid by visitors. Communities are a key element of the tourism and conservation strategies. They are expected to benefit directly from employment in the tourism industry and through sales of such things as community handicrafts and supplies to tourism establishments (e.g. fish, rice, fruits and vegetables). These sources of income for communities will also be supplemented indirectly through a community -use fund that will be used to upgrade basic services.

Protected area management and forest protection.
The first four years of the project focused on intensive patrolling and enforcement activities inside the protected forest, especially within the strict and regulated use zones to allow species population to start increasing. This also included the development of a zoning plan and formulation of a detailed five-year protected forest development plan.

Community-based natural resource management (CBNRM).
Noting that regulatory measures will only be successful with meaningful cooperation from the local communities, the above strategies will be coupled with extensive education in surrounding communities who are the primary users of the resources in the MPF. Various capacity building programs will be implemented to ensure community resource management is sustainable. It is expected that increased capacity will result in a rise in volunteerism and active participation in resource management.

In addition, NRM groups will be formed and assisted to forge user agreements with government departments. This component will be guided by the following mechanisms and processes to ensure maximum community participation and increase the sense of ownership:

- Baseline development: participatory assessments on development needs, NRM issues, and private enterprise potential.
- Capacity building: experiential learning (hands-on, "learning by doing") approach to facilitate understanding of ecotourism and other potential alternative livelihood activities.
- Decision-making and empowerment: democratic policy discussions and decision -making on key issues.
- Partnership: active partnership with key government and private sectors for community empowerment and development. This will include institutional linkages.

Currently, there is a need for an even greater understanding of the socio-economic situation of the communities living around the MPF and their level of dependence on its natural resources. Socio-economic issues constitute a direct and indirect cause to biodiversity loss and oftentimes, people living in the area are blamed for the destruction. It is therefore imperative to have a complete and comprehensive analysis of the social and economic factors before any development of a protected area management plan can begin. This will enable managers to determine the level of threat, if any, that these factors pose to the biodiversity in an area (Boquiren, 2005).

In 2006 WWF through the SWAP conducted a rapid baseline survey in the three clusters of communities around the MPF. The study, which included focus group discussions in 14 villages, the villages, and individual interviews in 568 households representing 43% of the total households in sampled villages, assessed the socio-economic profile of the communities in relation to the resources inside the MPF.This paper details this work.

The Srepok River

2 RESEARCH DESIGN

2.1 Purpose of the Study

The results of this study will be used widely. Firstly, the data will aid the WWF and the SWAP team by establishing a baseline, which will lead to a better understanding of the demographic trends and primary livelihood activities of the communities around the MPF. This will form the basis for developing an appropriate CBRM framework with accurate approaches and strategies.

Secondly, the study will be coupled with other data[1] gathered through a series of prioritization and selection processes and be used in identifying community project partners for the SWAP. The criteria in selecting the community partners are:

- Effect on population pressure (natural growth, migration rate);
- Extent of dependence on natural resources for livelihood, especially those found within the MPF;
- Extent of contribution to threats and resource use issues;
- Community readiness:
  - capacity
  - willingness to do NRM - openness to projects or interventions
  - governance - political will.
- Strategic location - near or adjacent to the MFP;
- Presence of other players providing other services to the community;
- Access to basic services; and
- Peace and order situation.

Thirdly, the research will be a general assessment of the situation in the area and the information will be used to identify further research opportunities.

Finally, the data will be used as a baseline and guide in the development of ecotourism and in the improvement of the socio-economic conditions of the communities that currently depend on resources within the MPF for their subsistence.

Local communities showing the different land uses in their area in one of the mapping consultations

2.2 Objectives of the Study

2.2.1 General Objective

The general objective of this study was to gather and compile current information about the socio-economic, cultural, and political characteristics of the surrounding communities of the MPF to aid WWF in selecting communities to work with and in developing approaches to work with these selected communities.

2.2.2 Specific Objectives

- To gather information on the socio-economic and cultural profile of the communities living around the MPF.
- To assess the level of awareness of the communities about natural resource management in general and the presence of indigenous or traditional environmental knowledge.
- To assess the level of awareness of relevant laws and regulations, with protected area management policy as a focus.
- To understand the level of dependence of these communities on the natural resources inside the protected forest by assessing their livelihood activities, important community issues and conflicts relevant to

[1] Data included gate registrations from different ranger outposts in the MPF to check the origins of people who frequently went inside MPF and gathered resources. Other data used were the results of the 3D map consultations to identify which communities had traditional claims inside MPF (i.e. there are areas inside MPF which used to be the old villages of Bunong communities).

Figure 1. Map of the MPF Showing the Villages Surveyed.

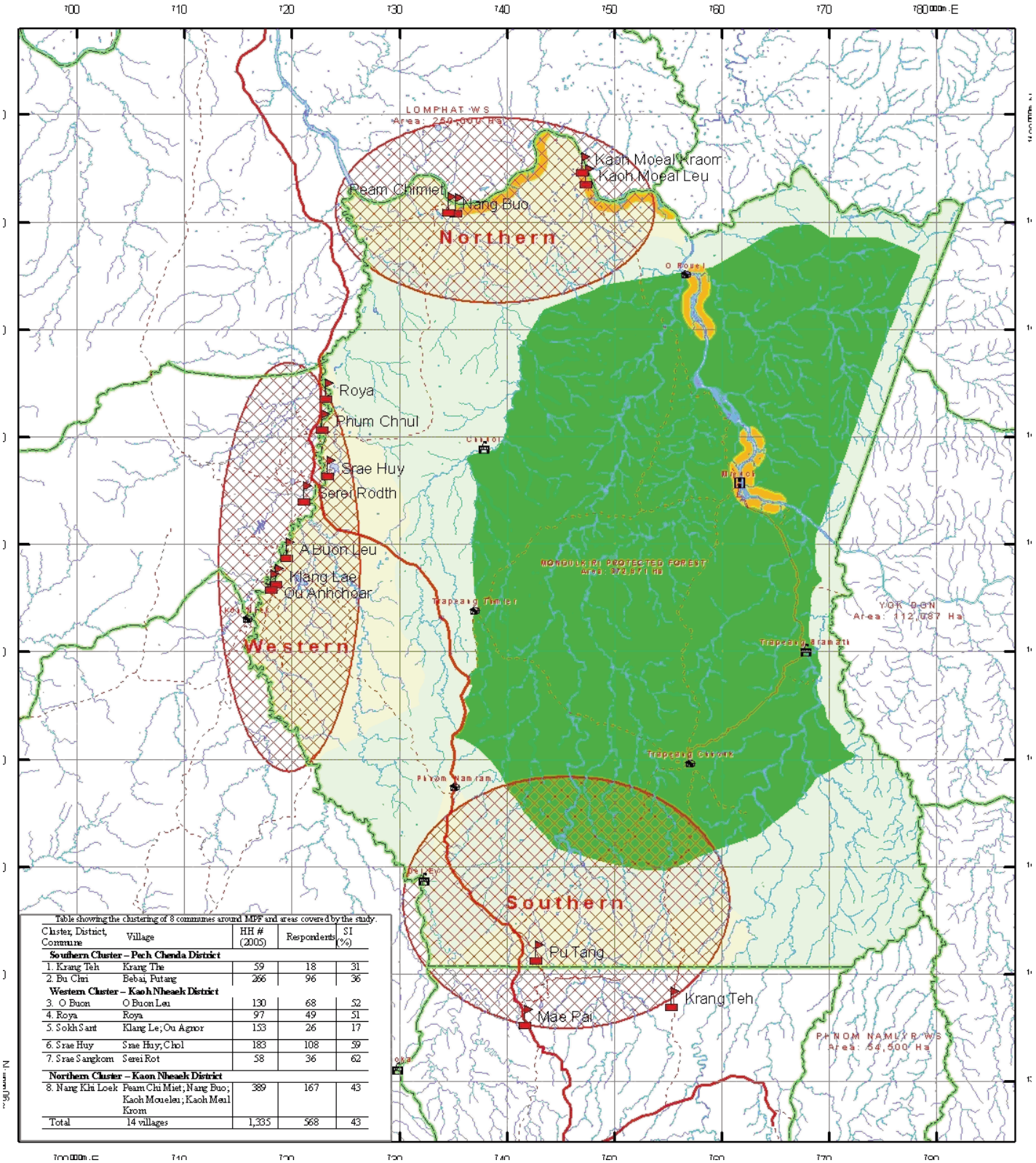


Table showing the clustering of 8 communes around MPF and areas covered by the study.

Cluster, District, Commune	Village	HH # (2005)	Respondents	SI (%)
Southern Cluster – Pech Chenda District				
1. Krang Teh	Krang The	59	18	31
2. Bu Chri	Bebai, Putang	266	96	36
Western Cluster – Kaoh Nheaek District				
3. O Buon	O Buon Leu	130	68	52
4. Roya	Roya	97	49	51
5. Sokh Sant	Klang Le; Ou Agnor	153	26	17
6. Srae Huy	Srae Huy; Chol	183	108	59
7. Srae Sangkom	Serei Rot	58	36	62
Northern Cluster – Kaon Nheaek District				
8. Nang Khi Loek	Peam Chi Miet; Nang Buo; Kaoh Mouleu; Kaoh Meul Krom	389	167	43
Total	14 villages	1,335	568	43

resource use.
- To identify other development players and resource stakeholders in the area as a basis in identifying areas for cooperation.
- To make recommendations for CBNRM/ livelihood improvement in the MPF

was based on information gathered from village leaders and commune council members. Target respondents were adult household representatives who were present at the time of the interview

Table 2.1. Profile of Respondents by Village.

Cluster, District, Commune	Villages Studied	Household Nos. (2005)	Respondent Households	% over total households
Northern Cluster - Kaoh Nheaek District				
Nang Khi Loek	Peam Chi Miet; Nang Buo; Kaoh Moueleu; Kaoh Mouel Krom	389	167	42.9
Western Cluster - Kaoh Nheaek District				
Ou Buon Leu	Ou Buon	130	68	52.3
Roya	Roya	97	49	50.5
Sokh Sant	Klang Le; Ou Agnor	153	26	17.0
Srae Huy	Srae Huy; Chol	183	108	59.0
Srae Sangkom	Serei Rot	58	36	62.1
Southern Cluster - Pech Chenda District				
Krangteh	Krangteh	59	18	30.5
Bu Chri	Bebai, Putang	266	96	36.1
Total	**14 villages**	**1,335**	**568**	**42.6**

Source: The data on household numbers was based on information gathered from village leaders and commune council members.

2.3 Methodology

2.3.1 Sampling

2.3.1.1 Survey Area Selection

Prior to identifying the areas to be included in the study, the team conducted a pilot survey of the eight communes situated around the MPF. WWF clustered these communes according to their location relevant to the MPF for ease of reference. These are the southern, western and northern community clusters, which will be referred to as such throughout the report analysis.

Part of this initial field visit was also to present WWF's plan to conduct a socio-economic survey in their area and to obtain their prior approval.

2.3.1.2 Household Sample.

The team interviewed 568 randomly selected households representing 43% of the total households in the study area.[2] The data on household numbers because of the unpredictable availability of the heads of households during the study period.

2.3.2 Data Collection

Combining the results of the ocular visits and information from the GIS maps, the team selected 14 villages to be part of the study. These villages were selected according to their proximity to the MPF. Three villages (Roya, Serei Rot, and Chri Group in Nang Bou) situated outside or further away from the MPF were also included. This was done to test the hypothesis that only the nearest communities were accessing the resources inside the protected forest.

2.3.2.1 Process and Instruments Used

Field work was conducted during February–June 2006, and encoded in Microsoft Access database during July–August 2006. The purpose for storing the individual survey results was to allow future studies to use these as a baseline and to make

[2]Household here refers to families (can be more than 1 family) living together in one roof and sharing food and economic activities. The study will use this as the unit in discussion of the findings unless otherwise stated.

Tit Chan, one of the research team members during interview with a police officer in Koh Nheak

updating these results with future survey results easier.

Specifically, the team employed the following methods in data collection:

- Secondary data were obtained from previous studies conducted by WWF and other organizations working in the area. The provincial database prepared under theSIELA program was also used extensively in this report - particularly on population figures.
- Primary data gathering used a combination of tools and methodologies:
    - Field visits – direct observations and descriptions of the situations in the villages, the different ecosystems an critical habitats in the study area, recording the geographical coordinate using Global Position System (GPS) readings whenever necessary.
    - 39 key informant interviews using a semi-structured schedule (Appendix 1). Key informants interviewed were: commune leaders, the District Governor of Kaoh Nheaek, district police in Kaoh Nheaek, teachers in the village schools, district and village health workers, and district provincial agriculture staff.
    - Semi-structured family survey using a pre-tested questionnaire (Appendix 2). The questionnaire was pre-tested with 15 respondents from one village.
    - Focused group discussions (FGD) using pre–designed questions (Appendix 3) with a total of 296 local community participants, 39% of whom were women, representing various sectors. Each FGD in the 12 villages had an average of 30 participants. The FGD used participatory social and resource mapping to guide the community members and determine their aspirations for their com munities (Appendix 4). To quantify the assessment, the team also introduced a scoring system to assess the status of their natural resources using pre-identified indicators(Appendix 5).

Prior to the field survey, the team conducted a series of workshops to review and become familiarized with the research design. Since the design was prepared in English, the workshop was also used to review the translation in Khmer. The interview schedule was prepared using several references and was further refined by the team during the workshop.

For the FGD guide questions and key informant interview schedule, the team was asked to prepare the guide questions based on the list of information needed.

2.3.2.2 The Survey Team

The survey team (Appendix 6) was composed of nine WWF staff headed by the Community Extension Team Leader. Several team members were involved in rapid geographical assessments in communes surrounding Phnom Prich Wildlife Sanctuary (PPWS)[3] that were conducted by WWF in 2001. Others underwent training on Participatory Rural Appraisal as a preparation for this research.

2.3.3 Data Processing and Analysis

Qualitative data was gathered throughout the survey on communities' level of awareness and perception about forestry, land and other NRM related laws. Analysis of elementary statistical outputs such as frequency counts, mean and percentage distributions was primarily used[4]. These results were used to select priority communes; hence data were analyzed across the three community clusters.

Yim Prya during household surveys

[3]Phnom Prich Wildlife Sanctuary is a protected area adjacent to the MPF covering around 225,500 hectares. WWF is also working with a few communities around this mentioned area.
[4]Percentage computation is based on total number of responses, excluding missing data - those in the "don't know" and "no answer" categories. Total number responses upon which percentages are computed are shown in parenthesis and are signified with letter N in each table.

3 PRESENTATION OF FINDINGS

3.1 Respondents' Profile

Around 43% of households in the study area were interviewed - 568 households from 14 villages. Of these, 34% were female, 97% married, and a majority of the respondents were thirty years of age. A total of 43% were educated to primary school level and a further 5% reached secondary school. There were eleven ethnicities represented: Phnong[5] (45%), Khmer (33%) and Lao (13%). Other ethnic groupings of resondents were Cham, Kampuchea Kraom, Rode, Charay, Kroll, Toum Poun, Kreung, and Stieng. Animism was prevalent (47%), among the Bunongs and Buddhism (52%) among all other ethnic communities.

Table 3.1. Respondents Profile

Category	N[6]	%
Gender		
Female	191	33.6
Male	377	66.4
Civil Status		
Married	549	96.6
Single	9	1.6
Widowed	10	1.8
Ethnicity		
Bunong	254	44.7
Khmer	189	33.3
Cham	6	1.1
Kroll	13	2.3
Lao	73	12.9
Kampuchea Kraom	1	0.2
Toum Poun,	14	2.5
Rode	2	0.4
Charay	14	2.5
Kreng	1	0.2
Steing	1	0.2
Religion		
Animism	264	46.5
Buddhism	295	51.9
Islam	7	1.2
Christian	2	0.4
Educational Attainment		
Primary	246	43.4
Intermediate	2	0.4
Secondary	27	4.8
College	3	0.5
Non - formal	3	0.5
None	287	50.4

[5]Also spelled Phong in other literatures.
[6]N will be used for single responses and n will be used for multiple answers.

Age Bracket		
15 - 19	5	0.9
20s	135	23.8
30s	189	33.0
40s	149	26.3
50s	60	10.6
60s	23	4.1
70s	5	0.9
80s	2	0.2

3.2 Socio-Demographic Profile

3.2.1 Population Size

Mondulkiri province has five districts and 21 communes. While this province is recorded as having the lowest number of inhabitants of any province (Cambodia Statistical Book, 2006), its population has been steadily growing for the past few years. Data from 2002 (population 40,194) to 2005 (population 49,612) show a 23% increase or an average growth of 3,139 individuals per year[7]. The projected average growth rate for Mondulkiri for the year 2005-2006 is 2.87% (Cambodia Statistical Yearbook, 2006).

Table 3.2. Population Distribution by District, 2005

Districts	2005 population	% of total provincial population	No. of families 2005	Total no. of communes	Total No. of Villages
1. Kaev Seima	14,623	29	3,042	5	25
2. Kaoh Nheaek	13,211	27	2,735	6	26
3. Pech Chenda	8,414	17	1,775	4	18
4. Sen Monorom	9,205	19	1,965	4	14
5. Ou Reang	4,159	8	834	2	7
Total	**49,612**		**4,415**	**21**	**90**

Source: SEILA database, 2005

Table 3.2 shows that, based on 2005 data, the eight communes covered by the study have a total population of 16,983 individuals comprising 3,542 families. Communes with the highest as well as the lowest population are all found in the western cluster. Sre Sangkum, which is the center of economic activities in Kaoh Nheaek District, has the highest population at 4,152 individuals followed by Nang Khi Loek with a population of 2,614. Srae Huy has the lowest population at 1,324 individuals or 258 households.

Comparing across clusters, Table 3.3 shows that the western cluster with five communes has the highest population followed by the southern cluster at 10,597 and 3,772 individuals, respectively. The total population of the three clusters comprises about 34% of the total Mondulkiri population of 49,612 (2005 data).

Table 3.3. Population Distribution in the Study Area, 2005

Province, District, Communes	Total Population (2005)	No. of Families	% over provincial Population	% Over Total Cluster Population
Mondulkiri	**49,612**	**10,351**		
Southern Cluster	**3,772**	**807**	**7.6**	22.2
Bu Chri	2,344	470	4.7	
Krangteh	1,428	337	2.9	

[7]Computed.

Western Cluster	**10,597**	**2,268**	**21.4**	62.4
Srae Sangkom	4,152	865	8.4	
Srae Huy	1,324	1,324	2.7	
Sokh Sant	2,093	516	4.2	
Ou Buon	1,383	303	2.8	
Roya	1,645	326	3.3	
Northern Cluster	**2,614**	**467**	**5.3**	15.4
Nang Khi Loek	2,614	467	5.3	
Total Population in study area	**16,983**	**3,542**	**34.2**	**100**

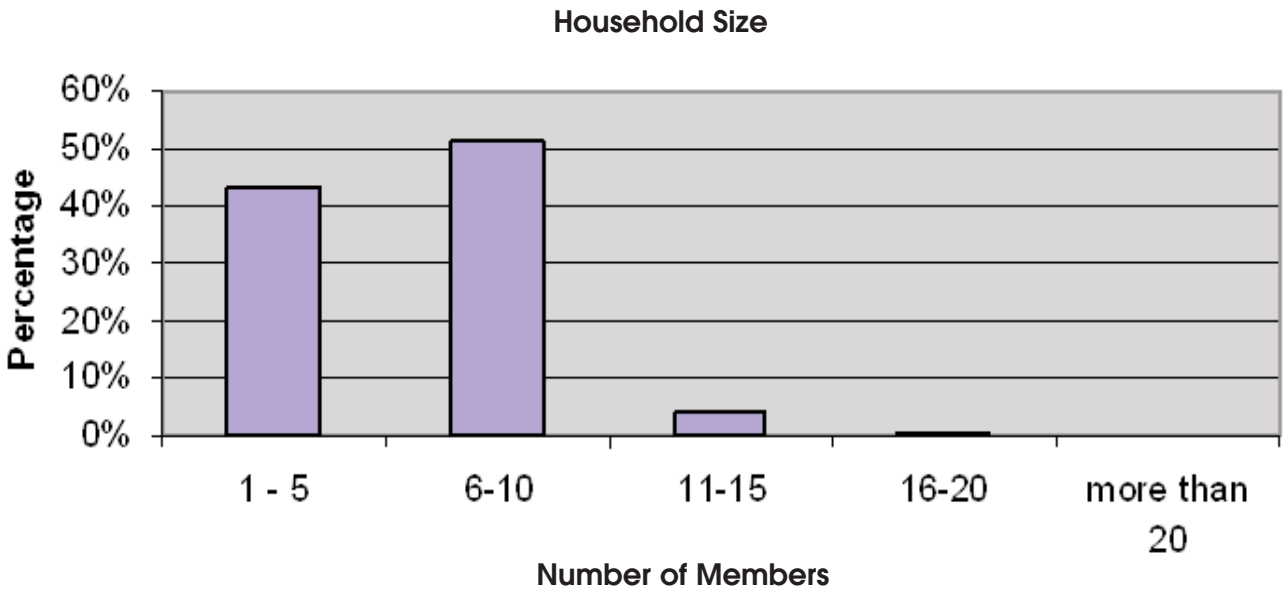
Source: SEILA Database, 2005

3.2.2 Household Size

The Cambodian Statistical Book for 2006 cited Mondulkiri as one of the provinces having the highest average household size at 5.7 based on 1998 data. In the study area, the mean household size was found to be larger at 6.2 persons per household. Figure 2 shows that half of the respondents had household sizes of 6-10 members. Among the Bunong, most households were extended composed usually of two to three families. There were also cases of four families living under one roof resulting in more than 20 members in a household.

During the FGDs, the communities shared the information that among Bunong families, newlywed couples were required to stay with either the wife's or husband's parents for about two to three years before they were allowed to live in a separate house. This was mainly for traditional reasons, but they also said that this had an economic impact because of the need for labor for farm activities. The higher the number of household members, the more labor there was available. Further discussions, however, revealed that there was an ongoing change in attitude towards the number of children couples wanted to have. This will be discussed in the following section.

Figure 2. Household Size



3.2.3 Population Growth

The trend in population growth in the communes around Mondulkiri was examined taking into consideration both the natural population growth and the increase brought about by migration.

3.2.3.1 Migration Trends and Patterns

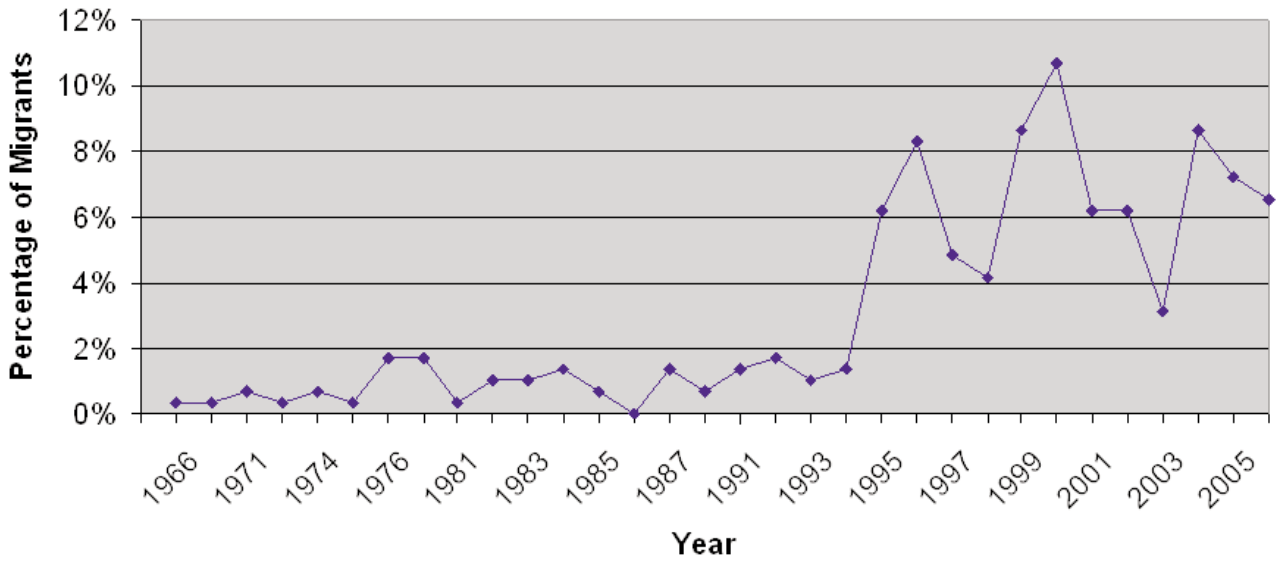
Based on the focus group discussions conducted with the selected community members in 12 villages, the Bunong were considered the original inhabitants in these areas with an average of 20 families per village in the 1960s.

> "*There were only Bunong here before and we mainly used Bunong in communicating with each other, but later there were Khmer people who married Bunong and came to live here.*" - Respondent from Srey Houy

The earliest migration recorded in the survey was in 1965, but in the 1970s, the social unrest in the country forced some people to move out of their villages. They began moving back only during the mid 90s after the country's political situation had stabilized. In the studied villages, migration increased from 1995 to 1999 (Figure 3) as several organizations like the Red Cross and UNTAC started a project returning war refugees to their original settlements. Some returned on their own initiative. Around 2000 there was a large population influx and the population increased again over the three years following 2003 with Bu Chri as the favorite destination, registering 64% of the migrant respondents who had arrived in the period from 2003 up to the time of this survey. This commune has been the favorite destination for the last five years because of the development and improvement of the road from Sen Monorom (capital town of Mondulkiri Province) to Kaoh Nheaek District (district situated in the northern and western part of the province) making these areas more accessible. The travel time to Bu Chri is now only 45 minutes by motorbike compared to a day's travel time in 2001 where, during the rainy season, people had to ride elephants in order to reach this commune. Srae Huy and Roya have also become popular destinations among migrants during the past three years. Sokh Sant, on the other hand, received less migrants over the last five years and, in fact, among all the migrant respondents in Sokh Sant, the last movement was eight years ago and there has been no recorded migration over the last five years in the survey.

Three villages were researched to demonstrate the migration trend around MPF[8]. This was done to illustrate the contribution of migration to the population growth in the area.

Figure 3 . The Estimated Migration Trends in Three Villages Neighbouring MPF.

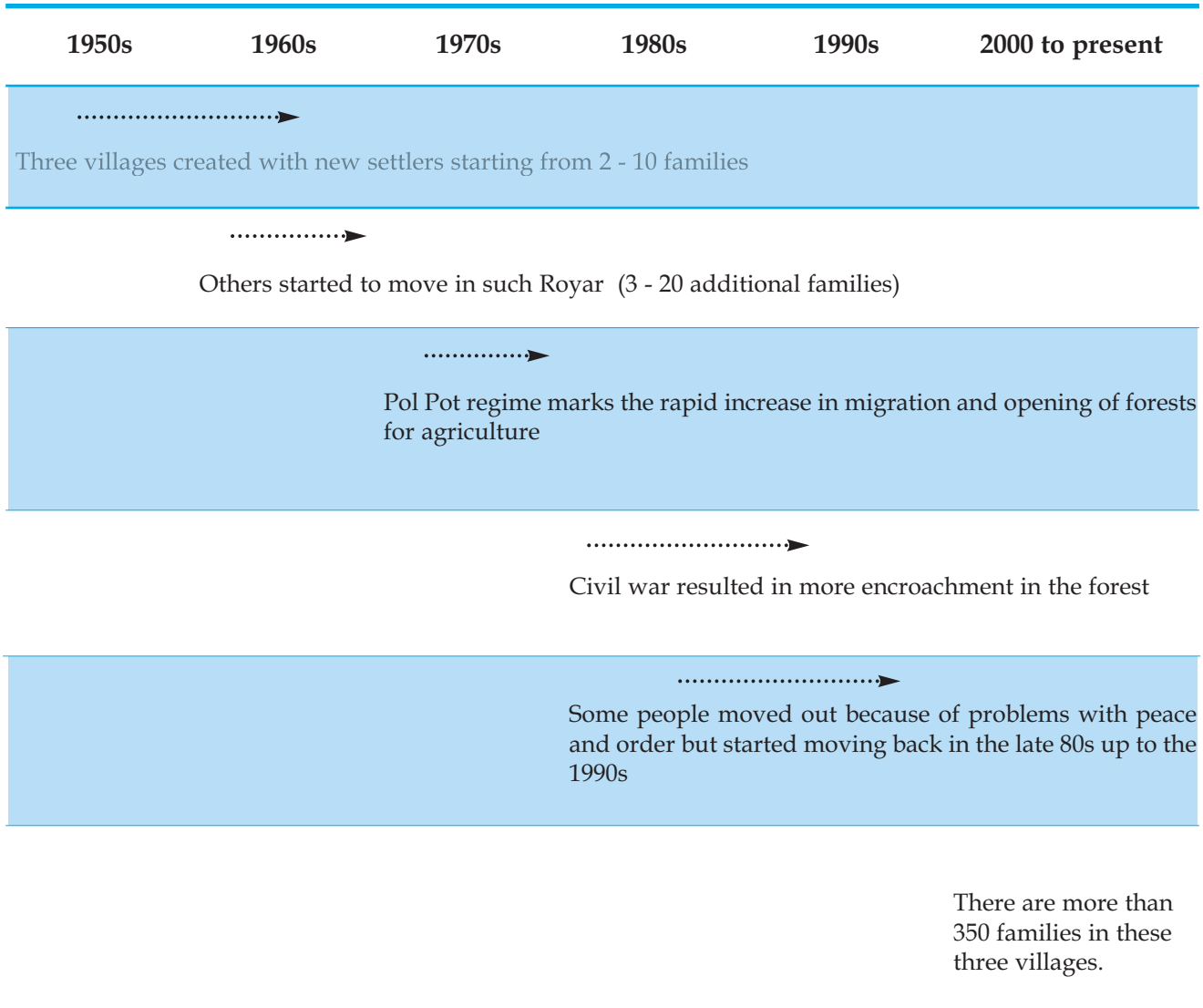


[8]Based on previous studies conducted by WWF in 2001
[9]The y-axis in this figure represents the percentage of migrants who moved in a given year on the x - axis.

The settlements in Sre Thom and Pou Rapet started as early as the 1950s with very few families; two in the former and 20 in the later. The Royar settlement, on the other hand, began a decade later with only three families. The small number of village occupants was maintained until the late 1960s when people from adjacent villages started to settle in. As demonstrated in the case of Sre Thom, which increased by 20 members in a span of one year compared to the slow movement of only three additional families in the 15 years between 1951 and 1966.

The 1970s, however, presented a different situation for the MPF. The "migration pattern" was historically the result of the social unrest during the Pol Pot regime. This difficult period saw the rapid increase of in-migration around MPF. According to accounts of elders in the villages, most people were moved to Kaoh Nheaek District, as there was more land available for cultivation. From 1979 to the 1990s, displaced villagers started moving back to their former residences along with new settlers (people from refugee camps who were from different provinces and were helped by UNTAC or the Red Cross organizations to resettle).

Figure 4. Summarized Historical Timeline of In-migration Trends in 3 Villages around MPF, Sre Thom, Puo Rapet and Roya



Source: FGDs; secondary data from previous WWF research in 2001 for villages in Royo, Srae Kthum and Pou Rapet.

The trend was more in-migration rather than out-migration. Significantly, respondents did not have plans to return to their previous settlement or go to other places for the next few years for the same reason - lack of land.

The average number of years at their current residences was 9.5 years. The earliest recorded migrant in the survey arrived 41 years ago and the newest migrant arrived only three months prior to the time of the survey. Rapid immigration happened in the last three years as can be observed in Figure 3.

Table 3.4. Length of Stay in Current Residence

Year	Bu Chri	Krangteh	Srae Huy	Roya	Ou Buon Leu	Sokh Sant	Srae Sangkom	Nang Khi Leok	Total for all communes	
									N	%
Less than a year	1				2				3	10
1-4 years	26	3	16	6	9		3	11	14	25.5
10-19 years	3	2	10	4	15	6	4	30	74	25.5
5-9 years	7	7	16	11	20	1	7	35	104	35.9
20+years	2		3	4	9	5	9	3	35	12.1
Total	**39**	**12**	**45**	**25**	**55**	**12**	**23**	**79**	**290**	**100**

Source: WWF Household Survey, 2006

Comparing across clusters - the western communes, where more land was available for cultivation, received the highest number of migrants at 59%. In the northern cluster, the high migrant percentage was mainly due to war refugees who were repatriated after the civil war. Several new villages or groups were, in fact, rebuilt or established as a result of this. A case for example is Srey Chri, a group located in Nang Bou village in the northern cluster. Almost 100% of residents were migrants and most of them moved only in 1998 coming from a refugee camp near the Thai border.

Table 3.5. Distribution of Migrants Across Communes

Communes	No. of respondents	No. of migrants	% over total respondents	Within province	Other province	Other countries
Northern Cluster	**167**	**91**	**54.5**	**56.2**	**42.7**	**1.1**
Nang Khi Loek	167	91	54.5			
Western Cluster	**287**	**169**	**58.9**			
Ou Buon Leu	68	56	82.4	45.1	54.9	
Roya	49	25	51.0	64.0	36.0	
Sokh Sant	26	12	46.2	90.9	9.1	
Srae Huy	108	53	49.1	54.0	46.0	
Srae Sangkom	36	23	63.9	8.0	92.0	
Southern Cluster	**114**	**54**	**47.4**			
Krangteh	18	14	77.8	58.3	41.7	
Bu Chri	96	40	41.7	35.9	61.5	2.6
Total	**568**	**314**	**55.3**			

Source: WWF Household Survey, 2006

The study showed that migration patterns during the early period were mostly within the province. Migrants from other provinces dramatically increased in the 1990s. The survey showed that at present, a majority of migrants came from other provinces (52%), the majority of which came from Kampong Cham (39%) and Prey Veng (20%) Provinces. There was also a high percentage (48%) of circulating migrants (i.e. internal migration within the province[10]).

Table 3.6. Origin of In-migrants in the Study Area

Source Provinces	N	%
Kampong Cham	45	31.7
Prey Veng	24	16.9
Bantey Meanchay	21	14.8
Ratanakiri	11	7.7
Kraties	9	6.3
Svay Rieng	8	5.6
Takeo	6	4.2
Siem Reap	6	4.2
Stung Treng	4	2.8
Phnom Penh	3	2.1
Kampong Thom	2	1.4
Oddor Meanchey	2	1.4
Preah Vihear	1	0.7
Total	**142**	**100**

Source: WWF Household Survey, 2006

Table 3.7. Destination of Migrants from Kampong Cham and Prey Veng

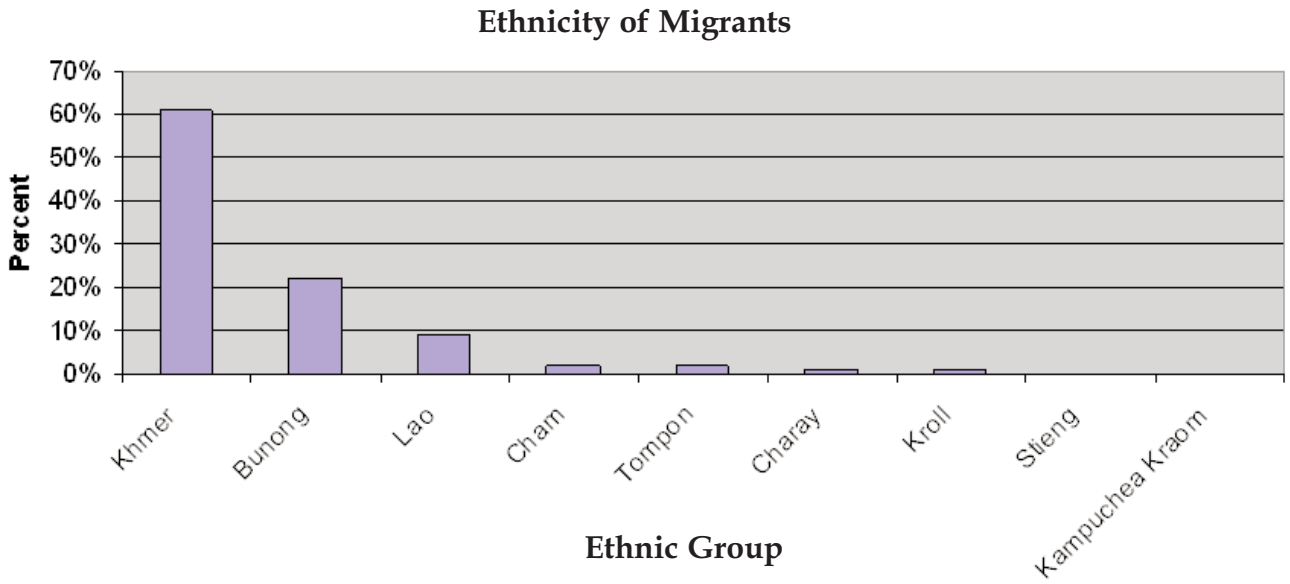
Communes	K. Cham		Prey Veng	
	N	%	N	%
Ou Buon Leu	18	40.0	5	20.8
Bu Chri	11	24.4	7	29.2
Srae Sangkom	10	22.2	3	12.5
Nang Khi Leok	3	6.7		
Krangteh	1	2.2		
Sokh Sant	1	2.2		
Srae huy	1	2.2	7	29.2
Roya			2	8.3
Total	**45**	**100**	**24**	**100**

Source: WWF Household Survey, 2006

[10]Types of circulating movements are from one commune to another to be near the sources of their income such as streams, ponds, farms, or water source. There was also the creation of new groups within the villages due to expanding numbers of households or sometimes they moved the whole village because of the belief that there was bad luck in the old village as when people became sick or when people died.

Migration also created friction among different ethnic groups in the study area. During the FGDs, some community members reported to have experienced conflict arising from the entry of non-indigenous Khmer and Cham migrants who had different farming practices from the indigenous groups in the area and tended to clear more land. This unintentionally pushed the IP groups further into the forests resulting in the opening of more areas for agriculture and settlements.

Figure 5. Ethnicity of Migrants



Note: *Bunong movement is mostly circulating migration (aside from 5 Bunong respondents who migrated from Ratanakiri, Stueng Treng and K. Cham)*

3.2.3.2 Pull Factors

Better economic opportunities, specifically in search of land to cultivate, were cited as the reason for migrating by 64.3% of the respondents who migrated in the study area. Another reason for migrating was to increase their proximity to their sources of income (11% of the migrants) such as fishing, a source of water for their farms or to be near their existing farm (i.e. not necessarily opening up new areas). Land as a pull factor had its highest impact in Ou Buon Leu followed by Nang Khi Loek.

Non-economic reasons for migrating included bad health or belief that current area was responsible for widespread illness or bad events. Some families were forced to leave their old settlements because of these reasons. Some were war refugees who resettled in the area with the assistance of Red Cross and UNTAC.

Srae Sangkom, being the center of economic and social activities in Kaoh Nheaek District, received the highest number of migrants who were in search of better economic opportunities (this was not necessarily an agriculturally based livelihood) followed by Bu Chri which, while not the primary economic center, has been rapidly developing for the last two years and is the most accessible area among the communes studied. Most of them were invited by relatives or family members who moved there earlier.

Table 3.8. Destination of Those Who In-migrated in Search of Land

Communes	N	%
Northern Cluster	**35**	**21.7**
Nang Khi Loek	35	21.7
Western Cluster	**97**	**60.9**
Ou Buon Leu	40	24.8
Roya	16	9.9
Sokh Sant	3	1.9
Srae Huy	23	14.3
Srae Sangkom	16	9.9
Southern Cluster	**28**	**17.3**
Bu Chri	26	16.1
Krangteh	2	1.2
N	161	100

Source: WWF Household Survey, 2006

3.2.4 Population Density

Cambodia's average population density is 74 persons per square kilometer. It is noted that elevated or mountainous provinces are more lightly populated. Mondulkiri is mountainous and has a low population density of 2 persons/km² (Cambodia Statistical Book, 2006). But the intense migration and population growth (which increased by 16% from 2002 to 2005 or by nearly 800 individuals in the study area) is now resulting in denser populations around the MPF. Presently, the eight communes have an average population density of 4 persons/km², which is higher than the provincial record. Ou Buon Leu has the highest population density area with 13 persons/km² (SEILA Program Database, 2005).

Table 3.9. Population Density by Commune, 2005

Province, District, Communes	Total Population (2005)	Total land area (km²)	Density relative to total land area (person/km²)	Total agricultural area (km²)	Density relative to agricultural areas (person/km²)
Mondulkiri	49,612	14,862	3	no data	
Kaoh Nheaek District	13211	5,718	2	163.60	81
Pech Chenda District	8414				
Northern Cluster	**2614**	**1,068**	**2**	**11.32**	**231**
Nang Khi Loek	2614	1,068	2	11.32	231
Western Cluster	**10597**	**4,649**	**2**	**152.28**	**70**
Srae Sangkom	4152	629	7	47.50	87
Srae Huy	1324	575	2	5.03	263
Sokh Sant	2093	1,431	1	52.10	40
Ou Buon	1383	108	13	37.70	37
Roya	1645	1,906	1	9.95	165
Southern Cluster	**3772**	**1294**	**3**	**4.1**	**920**
Bu Chri	2344	499	5	1.4	1674
Krangteh	1428	795	2	2.7	529
Totals	**16,983**	**7011.53**	**2**	**167**	**101**
Average Density Across Communes			4		378

Source: SEILA Program Database

When computed for the community management zone of the MPF, the average population density was found to be 24 persons/km². Table 3.10 shows the different density for each community cluster within their corresponding community use zone. The western cluster appears to be the densest cluster. This was expected since this is where Kaoh Nheaek District is situated along with its capital, Srae Sangkom, which had the highest population among the studied communes.

Table 3.10. Population Density by MPF Management Zone, 2005

Province, District, Communes	Total Population (2005)	Community Use Zone Area (km²)	Density Relative to Community Zone
Northern Cluster	**2614**	**186.00**	14
Nang Khi Loek	2614		
Western Cluster	**10597**	**327.00**	32
Srae Sangkom	4152		
Srae Huy	1324		
Sokh Sant	2093		
Ou Buon	1383		
Roya	1645		
Southern Cluster	**3772**	**155**	24
Bu Chri	2344		
Krangteh	1428		
Total Population in study area	**16983**	**668.00**	25

Source:WWF Map and SIELA database for the population

3.2.5 Fertility

Other factors contributing to population growth, in addition to migration, include population increase from fertility and reduction through mortality. These were examined to a limited extent due to the paucity of available data.

The fertility rate in Cambodia (2005) decreased from 6.30 in 1998 to 5.95 (Cambodia Statistical Yearbook, 2006). According to the 2005 Cambodia Demographic and Health Survey (CDHS), 40% of married women are using a family planning method, of which 27% are using modern methods and 13% are using traditional methods. The CDHS noted very low knowledge of any contraception method among women from Mondulkiri and Ratanakiri, where only three-quarters of women have ever heard of any method. Mondulkiri (together with Ratanakiri) is reported to have the lowest contraceptive use among the provinces in Cambodia. This is consistent with the information gathered in this study, which found that very few of the married couples were using any contraceptive method.

In the study area, however, there seemed to be an apparent change of attitude towards the number of children women wanted to have. In the past, most parents wanted to have more children to provide additional labor for economic activities. The majority of parents interviewed (60.5%) did not want additional children due to the financial burden.

Table 3.11. Attitude on Wanting Additional Children

Category	N	%	Remarks
Want more children	181	39.5	6 of the female respondents who still wanted to have children were above 35 years old
Do not want more children	277	60.5	42 of the female respondents who did not want additional children were 36 - 45 years old which is still within reproductive age; the rest (105) were from 18-35 years old
Total	458	100	Married female respondents who were aged 15-45 and married male respondents of all ages

Source: WWF Household Survey, 2006

Only 21% of respondents were using either natural or artificial birth spacing methods, mainly because of inadequate knowledge, despite the presence of family planning programs in most communes. Table 3.12 shows the distribution of birth spacing methods being used.

Table 3.12. Types of Birth Spacing Method Used

Methods	n	%
Natural/Traditional[11]	1	0.9
Artificial /Modern[12]	54	49.5
Did not specify	32	29.4
Contraceptive Pills	16	14.7
Ingestible	6	5.5
Total	***109***	***100***

Source: WWF Household Survey, 2006

Access to artificial methods of birth spacing is limited and seasonal for various reasons. Poor health care services and facilities are only available while health centres are often un-staffed and distantly situated. During the rainy season, access to these facilities is difficult resulting in stoppages in the supply of contraceptive pills and injections to women resident in remote rural areas. Table 3.13 ranks the reasons for not using birth spacing methods in the study area.

Table 3.13. Ranking of Reasons Cited for Not Using Birth Spacing Methods

Reasons	Percent Distribution (%)
1. Did not know the methods	67.0
2. Afraid of the side effects to their health	11.3
3. Financial - not enough money to buy	8.7
4. Other reasons (did not specify or thought they were too old but were in fact still in reproductive age)	7.0
5. Cannot use because of health reason	5.2%
6. Did not have or difficult access to family planning services (e.g.health center was far) this was only limited to respondents who wanted to use but had no access	0.9%

Source: WWF Household Survey, 2006

NOTE: *Only 56% of the respondents who were not using birth control methods agreed to be interviewed.*

[11] Traditional or natural birth controls (rhythm, calendar, periodic abstinence, withdrawal).

[12] Modern or artificial method (pills, condom, IUD, injection, implants, LAM, EC).

When contraceptive use was compared against ethnicity, as shown in Table 3.13, Khmer couples registered a higher percentage of use by almost 50% compared to the other two major groups in the study area. Reasons behind this trend were not uncovered by the study but might be a potential area for future research.

Table 3.14. Prevalence of Birth Spacing Usage Depending on Ethnicity

Status	Bunong		Khmer		Lao	
	N	%	N	%	N	%
Using	15	15.7	26	29.5	8	18.2
Not using	87	85.3	62	70.5	36	81.8
Total	**102**		**88**		**44**	

Source: WWF Household Survey, 2006

3.2.6 Population Composition

3.2.6.1 Gender Distribution

Based on the SIELA database, gender distribution in the province is relatively balanced at an almost 1:1 ratio. There has been no significant change in gender distribution in the last four years. This ratio was reflected in the results of this study where the households were composed of 50.6% females and 49.4% males (Table 3.15).

Table 3.15. Gender Distribution in Mondulkiri Province, 2005. Communes Female Male

Communes	Female	Male
Mondulkiri	24,978	24,634
Northern Cluster	1343	1271
Nang Khi Loek	1343	1271
Western Cluster	5338	5259
Ou Buon Leu	671	712
Roya	798	847
Sokh Sant	1108	985
Srae Huy	672	652
Srae Sangkom	2089	2063
Southern Cluster	1904	1868
Krangteh	746	682
Bu Chri	1158	1186
Total Population	8585	8398
Percent Distribution (%)	50.6%	49.4%

Source: SEILA Database 2005

3.2.6.2 Age Distribution

The Cambodian population is characterized as young due to a baby boom period following the end of the war in 1979. Around 60.8% of Cambodians are 24 years of age or younger (Cambodia Statistical Book, 2006). This is also true in the study area where a large proportion of the population falls within the age range of 0-17 years (54%) and 18-64 years (43%). Only 4% of the population is 65 years or older (SEILA Program Database, 2004).

Table 3.16. Age Distribution of Mondulkiri Province

Age Bracket	Female		Male		Total	%
	N	%	N	%		
0 - 5 years	1578	19.2	1658	20.2	3236	19.7
6 - 14 years	2068	25.1	2129	26.0	4197	25.5
15 - 17 years	620	7.5	673	8.2	1293	7.9
18 - 64 years	3645	44	3416	41.7	7061	43.0
Over 65 years	329	4	318	3.9	647	3.9
TOTAL	**8240**		**8194**		**16434**	

Source; SEILA Database 2004

3.2.6.3 Ethnicity and Language

Mondulkiri is one of the provinces in Cambodia with a strong indigenous community presence. Approximately 60% of the total population in Mondulkiri is indigenous (FFI, 2006). Bunong constitutes more than half of Mondulkiri's total population. Other indigenous ethnic minorities are Kraol, Jarai, Mel, Stieng, Tampuen, Kavet, and Brao. Lao is considered a semi-indigenous group (FFI, 2006).

Eleven ethnic groups made up the population in the study area. Bunong constituted 45% of the total population of the study. The other major groups were Khmer (33%) and Lao (13%), the latter mostly resided in the northern cluster which had the most diverse ethnic grouping (8 ethnicities) among the communes studied (Table 3.17). Southern and western clusters were originally inhabited by Bunong people until the early 80s when the Khmer people started moving into these areas for reasons stated in section 3.2.2.2 of this paper. This, and the increasing accessibility of the area due to road improvements, has also made it attractive to other groups like the Cham.

The Bunong people are believed to have a traditional subsistence way of life and had a higher dependence level on natural resources from the area. Subsistence activities included chamkar farming, fishing, hunting and other NTFP collection. But their practice of shifting cultivation was no longer being widely practiced because of emerging land scarcity brought about by several factors such as increasing population, regulations in forest clearing under forestry laws, and exposure to other agricultural practices brought in by the non-IP settlers in the area.

A traditional Phnong house

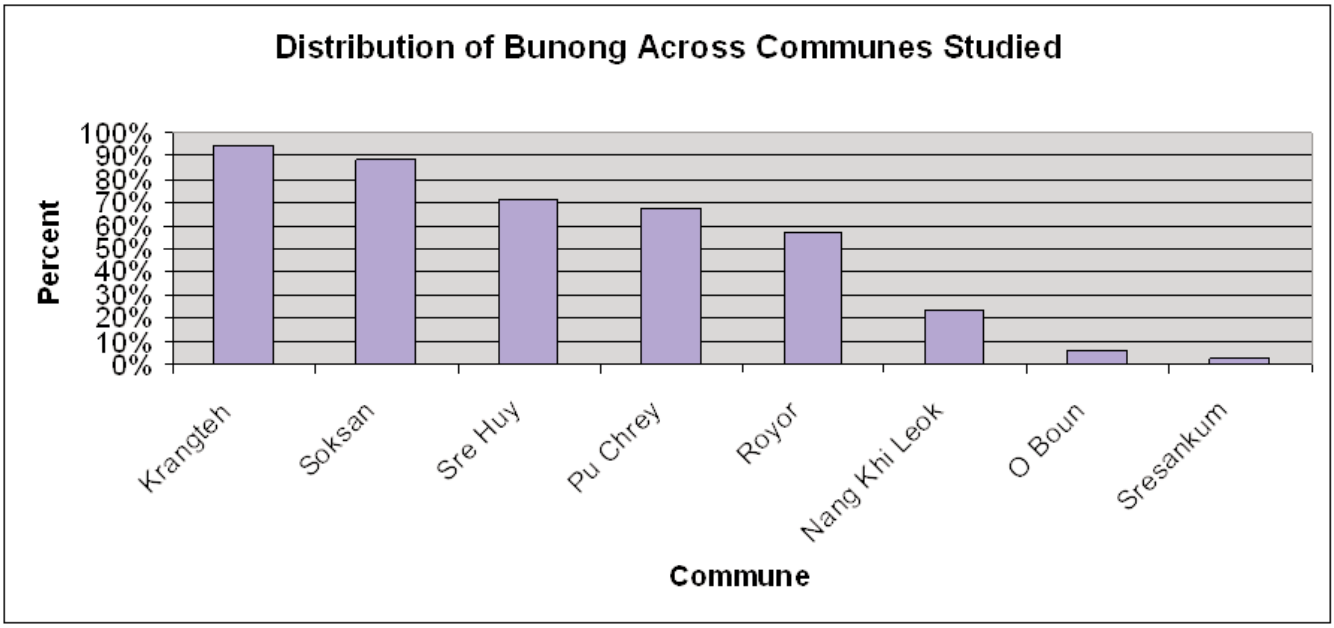
"In the past, all the people in our village were Bunong. There were around seven families and were mostly farmers. But as time went by Phnong people got married to Khmer people (five families)" - People from Chourl village

Table 3.17. Distribution of Ethnic Groupings Across Communes

Ethnicity	Survey Data (%)	Distribution across communes	Provincial Data (%)
1. Phnong	44.7	Highest in Krangteh, Sokh Sant, Bu Chri, Roya	54
2. Khmer	33.3		35
3. Lao	12.9	Mostly found in Nang Khi Loek	No data
4. Kroll	2.3	Distributed in Roya, Nang Khi Loek and Srae Huy	1
5. Toum Poun	2.5	Mainly in Nang Khi Loek	1
6. Charay	2.5	Mostly found Nang Khi Loek	No data
7. Cham	1.1	Mostly in Bu Chri, some in Ou Buon Leu and Srae Huy	3
8. Rode	0.35	Nang Khi Loek	No data
9. Kampuchea Kraom	0.18	In Ou Buon Leu	No data
10. Stieng	0.18	In Nang Khi Loek	3
11. Kreung	0.18	In Nang Khi Loek	1

Source for the provincial data – The Phnong, NGO Forum, FFI; WWF Household Survey, 2006

Figure 6. Distribution of Bunong Across the Communes Studied



Source: WWF Household Survey, 2006

3.2.6.4 Religion

Mondulkiri is largely inhabited by indigenous communities. These indigenous communities practiced Animism, a religious belief based on natural spirits and worship of ancestors (FFI, 2006). Religious ceremonies are often conducted by offering animals and wine to the spirit of their ancestors in designated spirit forests and are mostly offered as a thanksgiving or request for good health and bountiful production. With important decisions such as selling land or animals, spiritual guidance is also sought from spirits within the forest. Interviews from key informants confirmed that these ceremonies and beliefs still exist within the study area. A significant number of the Phnong respondents are Animists (47%).

Most dominant religion in the area was found to be Buddhism (52%). Other religions in the area were Islam and a few individuals had converted

A few Bunong, especially those married to Khmers, had started practicing Buddhism (14 of the 568 respondents) and one had converted to Christianity (in Krangteh) because of the presence of Christian groups working there.

Table 3.18. Distribution of Religion and Ethnicity

Ethnicity	Buddhism		Animism		Christian (N)	Islam (N)
	N	%	N	%		
Bunong	14	2.5	239	42.1	1	
Khmer	188	33.1	0	-		1
Lao	70	12.3	2	0.4	1	
Charay	8	1.4	6	1.1		
Toum Poun	5	0.9	9	1.6		
Kroll	6	1.1	7	1.2		
Cham		-		-		6
K. Kraom	1	0.2		-		
Rode	1	0.2	1	0.2		
Kreng	2	0.2		-		
Total	**295**	**51.9**	**264**	**46.5**	**2**	**7**

Source: WWF Household Survey, 2006

3.2.7 Literacy and Educational Attainment

Educational attainment for Mondulkiri and Ratanakiri[13], according to the Cambodian Statistical Yearbook, is very low with high numbers of the population not able to attend school, especially among females (Table 3.19).

Table 3.19. Educational Attainment for Mondulkiri and Ratanakiri (2000)

Education Level	Male (%)	Female (%)
None	59.9	75.1
Pre-school	0.4	0.4
Primary (completed; not completed)	27.8; 2.9	18.8; 1.8
Secondary (completed; not completed)	8.4; 0.5	3.5; 0.15
Higher than secondary	0.0	0.0

Source: Cambodia Statistical Yearbook, 2006

In this study, 50% of the respondents claimed having attended school, but most of them went through primary level only (see Table 3.1 Respondents' Profile). Whether they completed this level or not was not in the scope of the study. For those who did not attend school, a high number of them were Bunong. According to respondents, low educational attainment was due to the lack of schools during that time. Most of them had a chance to study during the Sihanouk Regime.

Whether respondents were literate or not was not considered within the scope of this study. However, previous studies reported that among highland minorities, the literacy level is quite low at 5.3% among the male population and as low as zero percent for females (Cambodia Statistical Yearbook, 2006). A study by International Cooperation Cambodia (ICC) in 2003 to assess the literacy level of the hill tribe population in Mondulkiri Province also reported a 4% literacy level among Bunong groups.

Respondents were also asked about their capacity to send children to school. Of the 331 respondents who had children of schooling age, 76% were able to send all of their children to school, while 20% could send only 1 or 2 of their children. This was especially true of families with more members. Only 4% of the households interviewed could not send any of their children to school.

[13]There is no data segregated for Mondulkiri

Provincial data recorded a high percentage of out-of-school youth in 2004 at 37% in the province and 34% in the study area. Interestingly, the southern cluster, which has more access to education, registered a high out-of-school youth rate compared to the more remote areas like Nang Khi Loek (Table 3.20).

Table 3.20. Youths in School at the Study Area

Communes / Districts	Youth Attending School (ages 6-17)			Youth Not Attending School (ages 6 -17)			% of Children attending school
Communes	**Female**	**Male**	**Total**	**Female**	**Male**	**Total**	
Mondulkiri	4954	5251	10205	7898	8345	16243	62.8
Northern Cluster	261	274	535	392	424	816	65.6
Nang Khi Loek	261	274	535	392	424	816	65.6
Western Cluster	1198	1187	2385	**1645**	**1692**	**3337**	**71.5**
Ou Buon Leu	150	207	357	187	257	444	80.4
Roya	90	115	205	148	190	338	60.7
Sokh Sant	312	199	511	395	359	754	67.8
Srae Huy	62	91	153	231	216	447	34.2
Srae Sangkom	584	575	1159	684	670	1354	85.6
Southern Cluster	290	281	571	**580**	**592**	**1172**	**48.7**
Krangteh	162	149	311	322	375	697	44.6
Bu Chri	128	132	260	258	217	475	54.7
Total Population	1749	1742	3491	2617	2708	5325	65.6

Source: SIELA Database, 2005

3.2.7.1 Reasons for not Studying

Schools were usually situated far from residences, about one to two kilometers away and even more than two kilometers for some. However, this was not seen as the primary reason for not sending children to school, it was rather due to financial limitations among the respondents. As can be seen in Table 3.22, only 11% lived near the school, but the majority were more than one half kilometer away and some even more than 2 kilometers.

Table 3.21. Ranking of Reasons Cited for not Sending Children to School

Reason	Percentage (%)
1. No Money	48.9
2. Far from school	17.8
3. Children do not want to or afraid to go to school	15.6
4. Illness	8.9
5. No school in the village	6.7
6. Need to help with household income	2.2

Table 3.22. Distance to School for Households with School Children

Distance	N	%
Less than 500 meters	34	11.1
Less than one kilometer	161	52.8
1 - 2 kilometers	86	28.2
more than 2 kilometers	21	6.9
Outside the commune	3*	1.0

*Phnom Penh, Kampong Cham, Sen Monorom

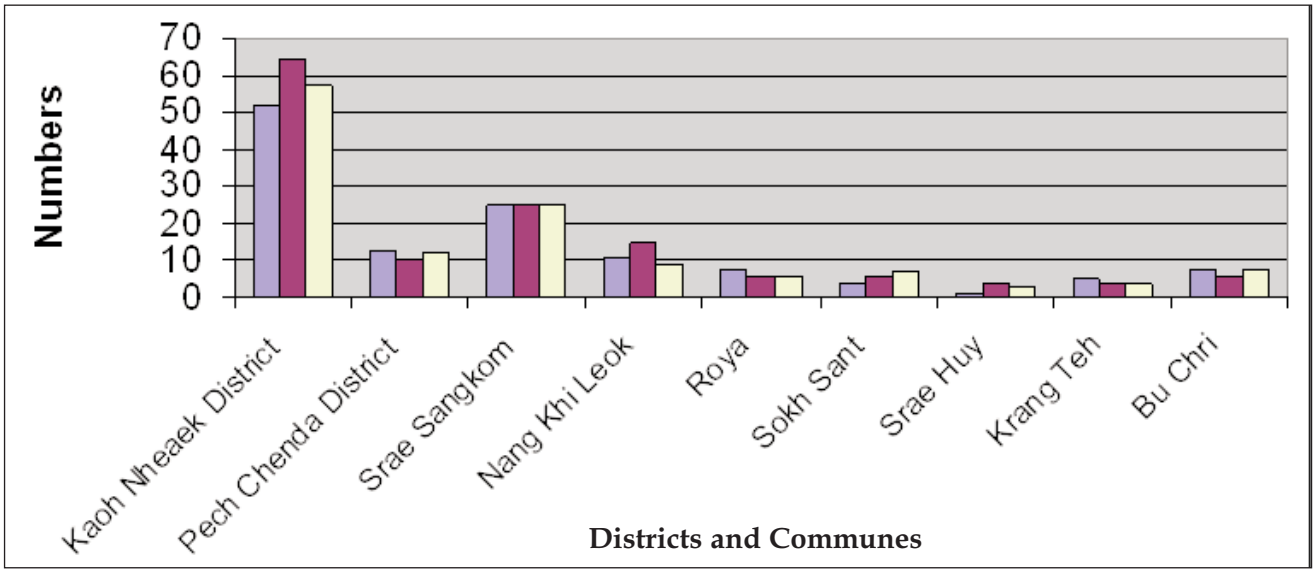
Source: WWF Household Survey, 2006

Children in Peam Chemiet village

3.2.7.2 Status of School Facilities

All villages had primary grade schools and Srae Sangkom had one secondary school as well. However, provincial data (SEILA Database, 2004) shows a shortage of classrooms and teachers in the remote areas (northern and western clusters). This survey found that there were more classes than classrooms and teachers, which resulted in multi-grade classes. This situation was the opposite in Pech Chenda District (southern cluster) where there was an apparent lack of utilization of school facilities. In this district, there were more classrooms than classes and teachers.

Figure 7. Comparison of Educational Facilities Against Number of Classes and Teachers



Source: SEILA Data Base, 2004

3.2.7.3 Issues related to education

Discussions with community members revealed that there were irregularities in teaching as most teachers were from Sen Monorom and other districts. They often tended to stay away a long time when they went to visit family. According to the FGD participants, sometimes they had classes only three times a week. The elders, in fact, aired concerns about the poor education service in their community as affecting the future of their children. Even at the time of the interviews, it was difficult to get appointments with the teachers because most of them were in Sen Monorom.

Other Children don't go to school because they have to help in household and farm works such are looking after animals.

3.2.8 Health and Sanitation

3.2.8.1 Sanitation

Sanitation in the study area can be generally described as of poor condition mainly because of limited access to clean water and lack of sanitation facilities. None of the households interviewed had toilets. Occupants used the bush areas.

3.2.8.2 Access to Health Services

Access to basic health and social services was relatively low in the areas studied as a result of inadequate facilities and poor service quality. Only 53% were using the health post/center services due to poor services, irregular reporting of health post staff, distance of health centers, and lack of money. People had the expectation that health posts provided free health services, but according to respondents, as an example, they had to pay for other services like wound dressing at around 10,000 Riel. For medicine, they had to pay 500 Riel every time they got it from the health center. Only pre-natal check-ups were free of charge.

Table 3.23. Reasons for Not Accessing Health Center Services

Reasons	*n*	%
Poor health service/no staff	91	43.1
Far from health center	52	24.6
No Money	31	14.7
No health post/center in the village	18	8.5
No serious illness	12	5.7
Prefer to use traditional medicine/treatment	5	2.4
Do not know where the health center is	2	0.9
Total	***211***	***100***

Source: WWF Household Survey 2006.

Because of factors mentioned above, the majority (45%) of respondents administered self-treatment (i.e. bought medicine in the village without prescription) while 13% still resorted to traditional medicine for treatment because remedies were, according to them, readily available in the forest, especially for common ailments.

For serious sickness, however, they often went to the health centers/posts. Some were combining traditional treatment with medicines that were bought without a prescription. They resorted to private doctors that were available in the villages. The so-called private doctors were individuals who were trained as paramedics in the refugee camps during the civil war/Pol Pot regime.

Table 3.24. Treatment for Serious Ailments

Treatments	Common Illness		Serious Illness	
	n	%	n	%
Medicine/self treatment	239	44.8	136	28.0
Combination of TM* and NTM**	98	18.4	63	13.0
Health Posts/Centers	74	13.9	16	3.3
Traditional medicine/treatment	70	13.1	37	7.6
Private Doctor	52	9.8	188	38.8
Hospital	0	0.0	45	9.3
Total	***533***	***100***	***485***	***100***

Source: WWF Household Survey 2006.

3.2.8.3 Main Causes of Morbidity

Mondulkiri is among the seven provinces in Cambodia with a high incidence of malaria. Data from 2005 reported that among Out Patient Department (OPD) malaria cases, 7.1% are from Mondulkiri (Cambodia Statistical Yearbook, 2006). Most of the respondents (67%) reported malaria as the most common disease contracted. This was followed by fever, colds, and diarrhea. People reported that the highest incidence of these illnesses was during rainy season - especially diarrhea episodes, probably as a result of poor sanitation. This was also, according to them, affecting their capacity to work and their productivity. The rainy season is an important time for preparation of the land for the planting of rice. Other reported diseases were lung and heart related diseases, dengue and hepatitis.

Table 3.25. Common Illnesses Reported

Diseases	*n*	%
Malaria	377	67.4
Fever	341	61.0
Colds	248	44.4
Diarrhea	58	10.4
Typhoid Fever	39	7.0
Stomach ache	33	5.9
Lung related diseases	27	3.8
Asthma	5	

*Traditional medicine
**Non traditional medicine

Diseases	*n*	%
Cough	9	
Lung disease	5	
Pneumonia	2	
Dengue	3	0.5
Arthritis	4	0.7
Heart-related diseases	6	1.1
Heart attack	2	
High blood pressure	1	
Heart disease	3	
Bloated stomach	1	0.2
Anemia	1	0.2
Hepatitis	1	0.2
Indigestion	1	0.2

Source: WWF Household Survey, 2006

3.2.8.4 Main Causes of Mortality

Child Mortality. There is no available data on Infant Mortality Rate (IMR) in the province, but the survey indicated a very low incidence of death among children 6 years old and younger. Only 12% of households interviewed reported child death over the last two years with the following top 3 causes: malaria, serious fever and diarrhea.

Adult Mortality. Mortality among adults was lower than child deaths at 8% with cited causes as malaria, diarrhea, and lung diseases.

Table 3.26. Major Causes of Mortality among Children aged 6 and Under

Causes	Child Deaths	
	n	%
Malaria	21	31.3
Serious Fever	13	19.4
Diarrhea	6	9.0
Lung disease	3	4.5
No specific reasons provided	14	20.9
Number of households with reported death	**67**	**12.0**

Source: WWF Household Survey, 2006

3.2.8.5 Access to Clean Water

Another factor affecting the health condition of people living in the area is access to clean water. Various NGOs are presently working on establishing clean water sources by installing bore-holes at strategic points within the communities. However, streams and rivers still remain the major sources of domestic water use due to the limited number of the pump wells. One pump well was servicing an average of 28 houses.

A high percentage of the residents around MPF were largely dependent on water resources from the different tributaries of the Srepok River for domestic use. These are, however, usable only during the rainy season when the water volume and quality is good. During dry months, most of the streams run dry.

Table 3.27. Types of Water Sources

Water Sources	*n*	%
Hand-pumped tube well	298	52.5
River/Streams	292	51.4
Rivers	237	41.7
Streams	51	9.0
Ponds	4	0,7
Ring Well	76	13.4

Source: WWF Household Survey, 2006

Table 3.28. Distance from Water Sources

Distance of Water Source from houses	*n*	%
Near the house (less than 100 m)	274	48.2
a few blocks away	137	24.1
less than 1 km	112	19.7
1-2 kilometers	32	5.6

Source: WWF Household Survey, 2006

Table 3.29. Ratio of Available Hand Pump Tube Wells per Household

Cluster, District, Commune	Village	Household Number (2005)	Estimated No. of Hand Pumped Tube Wells	Ratio
Northern Cluster - Kaon Nheaek District				
Nang Khi Loek	Peam Chi Miet; Nang Buo; Kaoh Moueleu; Kaoh Meul Krom	389	12	1:32
Bu Chri	Bebai	266	No data	
Western Cluster - Kaoh Nheaek District				
Ou Buon	Ou Buon Leu, Srey Choun	303	10	1:30
Roya	Roya	97	5	1:19
Sokh Sant	Klang Le; Ou Agnor	153	5	1:0
Srae Huy	Srae Huy; Chol	183	9	1:21
Srae Sangkom	Serei Rot	58	2	1:29
Southern Cluster - Pech Chenda District				
Krangteh	Krangteh	59	No data	

Source: Indicated in the 3 – Dimensional Map of MPF by Key Informants.

4 ECONOMIC PROFILE

4.1 Property and Land

There were two major types of land holdings among the respondents: residential land and agricultural land. Land for agrarian activities was categorized into three types depending on their location and uses as:

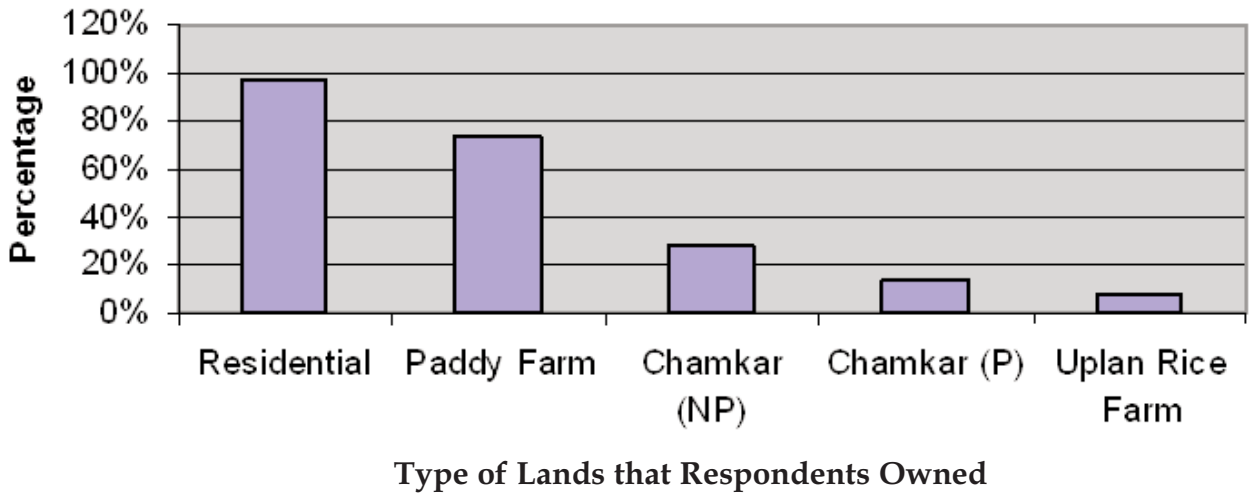
- Non permanent chamkar (the local term for field) – shifting farms which are cultivated for a number of years then left to fallow. This type of farm is diminishing as trends slowly shift towards permanent cultivation. According to villagers, few families are practicing shifting agriculture at present. Fruits and vegetables are the main crops. Some are planting rice.

- Permanent chamkar – old shifting farms that are being permanently cultivated mainly for vegetables, fruit trees and a few for upland rice.

- Rice farms - further divided into lowland rice farms (also referred to as paddy farms) cultivated mainly for lowland rice and are located in mostly flat and low lying areas; and upland rice farms used mainly for cultivating upland rice and usually in higher elevation.

About 97% of the respondents claimed to have residential lots while the rest rented or borrowed from relatives. An estimated 95% owned a piece of land used for agriculture. Figure 8 shows that aside from residential land the most common type of land owned by the respondents were paddy farm and chamkar.

Figure 8. Land Ownership



Source: WWF Household Survey, 2006

The land acquisition system was very informal in almost all of the villages and was dependent on getting permission from the village or commune chief. There was, however, a perceived openness in accessing land as the majority of respondents claimed land without securing permission from the commune chief or village chief – indicating a problem in land encroachment. This was common for a chamkar, where 89% of land was acquired without permission (very common in Srae Huy and Roya villages(Table 4.1).

Issues related to inadequate land sufficiency arose when children marry. If the family did not have enough land to give to the couple they were forced to clear the forest for new agricultural areas. They were aware of forestry laws, but according to them, their subsistence was more important.

Table 4.1. Type of Land and Means of Acquisition

Land Type	Acquired with Permission (%)*	Acquired without Permission (%)*
Residential	33.8	66.2
Lowland rice farm	31.5	68.5
Swidden Farm	28.5	71.5
Upland rice farm	21.6	78.4
Chamkar	10.6	89.4

Source: WWF Household Survey, 2006

**Multiple answers*

4.2 Size of Land Holdings

The average size of land owned by each household (including residential) was about 1.62 hectares. Among the agricultural land, upland rice farms were usually large, mostly ranging from 3 to 7 hectares per household while chamkars (either permanent or non-permanent) were relatively small compared to the rice farms. Lowland rice farms were very important among the communities in Mondulkiri because the majority considered rice production as their main source of subsistence. The most common farm size was 3 to 4 hectares.

In terms of production, while the upland rice farms were relatively larger, they were less productive compared to lowland farms. Upland rice had lower yields compared to lowland rice which was why, during the series of FGDs with community members, the most commonly expressed need was improved technology in rice production.

Agricultural farms were generally one kilometer away from residences except for lowland rice farms which were about two kilometers away. Normally, lowland rice farms in the villages were clustered in one part of the village. For some families, chamkars were located adjacent to their homes.

Table 4.2. Average Size of Land According to Land Type

Type of Land	Ave. Area (hectares)	Ave. Distance (km)
Residential	0.5	
Upland rice farm	2.6	1.58
Chamkar (NP)	1.2	1.1
Chamkar (P)	0.82	1.18
Lowland rice farm	3	1.3

Source: WWF Household Survey, 2006

Table 4.3. Size of Land

Size of land	*Reside- ntial*	*Lowland rice farm*	*Permanent Chamkar*	*Non permanent Chamkar*	*Upland rice farm*
	%	%	%	%	%
0.5 hectares and below	75.9	5.7	49.3	32.1	0.0
> 0.5 hectare but less than 2 hectares	15.0	12.7	25.3	35.2	16.7
> 2 but and less than 5 hectares	5.6	68.2	17.3	28.4	59.5
> 5 but less than 10 hectares		11.2		3.1	21.4
10 and above		1.0			

Source: WWF Household Survey, 2006

4.2.1.1 Housing and Amenities

Shelter is a basic need and generally used as an indicator of the standard of living or the level of development in a community. According to the indicator used by UNDP in assessing poverty levels in Cambodia (Poverty Index, 2006), the higher the percentage of houses with thatched roofs, the less developed the communes are. Using this economic indicator, the study area can be described to be very poor. The commune with the highest percentage of thatched houses was in Krangteh.

4.2.1.2 Housing Materials

Most families lived in a simple dwelling with few possessions. Wood, bamboo planks and grass were the predominant materials used in constructing houses. Based on the actual observation of WWF staff during the individual household survey, there was a high percentage (60%) among respondents who had thatched roofs compared to those using galvanized zinc. This percentage is similar when compared with provincial data where there are a higher percentage of houses with thatched roofs within the communes studied. Galvanized zinc was the second most common material used in the area. Other less commonly used materials included cement, synthetic sheets (tong) and asbestos (prosemum). Houses walled and floored with bamboo also ranked high among respondents. Wood was also a common material used for floors and walls.

Table 4.4. Materials for House Construction

Materials	*Roof (%)*	*Floor (%)*	*Walls (%)*	*Provincial Data (only for roof) (%)*
Thatch	60			50
Zinc	36			20
Bricks	4			
Cement				30
Bamboo		80	76	
Wood		17	24	
Soil/ground		3		
Total	568	568	568	

Source: WWF Household Survey, 2006 and SEILA database, 2005

Table 4.5. Percentage of Houses According to Roof Material

Materials	*Northern Cluster*	*Western Cluster*	*Southern Cluster*	*Total*	*%*
Thatch	70	180	90	340	59.9
Galvanized iron	92	91	19	202	35.6
Bricks	5	13	4	22	3.9
Others		3	1	4	0.7

Source: WWF Household Survey, 2006

Table 4.6. Percentage of Houses According to Type of Floor Material

Materials	*Northern Cluster*	*Western Cluster*	*Southern Cluster*	*Total*	*%*
Bamboo	132	252	69	453	79.8
Wood	27	29	38	95	16.7
Ground/Soil	7	4	6	17	3.0
Cement	1	1		2	0.4
Wood and bamboo		1		1	0.2

Source: WWF Household Survey, 2006

Table 4.7. Percentage of Houses According to Type of Wall Material

Materials	*Northern Cluster*	*Western Cluster*	*Southern Cluster*	*Total*	*%*
Wood	51	45	42	138	74.8
Bamboo	114	238	73	425	24.3
Wood and bamboo		4		4	0.7
Cement		1		1	0.2

Source: WWF Household Survey, 2006

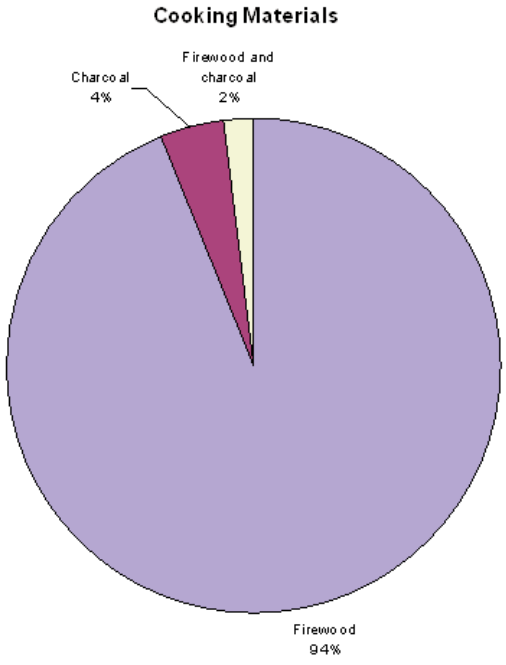
Cooking and Lighting Material

Firewood is the most commonly used fuel for cooking among Cambodians, especially those living in rural areas. Latest records show a growing use of modern sources like liquefied petroleum gas or butane as the percentage of households using firewood declined from 90% in 1998 to 83% in 2004 (Cambodia Statistical Yearbook, 2006).

In Mondulkiri, people living in the province's capital, Sen Monorom, were widely using butane for cooking. However, the study area which is rural in nature, registered a 100% usage of fuel wood either in the form of charcoal (4% of the households interviewed) or firewood.

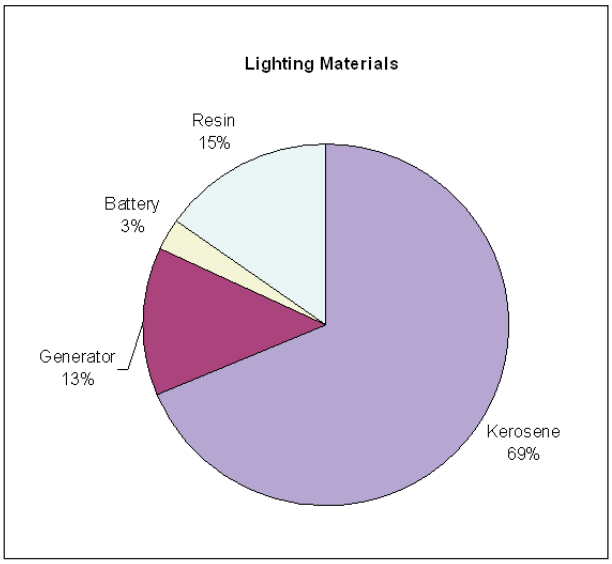
Kerosene was the most common source of lighting energy for 72% of the households. Generators were also becoming popular in the area as some houses had makeshift movie theaters in their backyards. A few houses were still using resin to fuel their wick lamps.

Figure 9. Cooking Materials.



Source: WWF Household Survey, 2006

Figure 10. Lighting Materials



Source: WWF Household Survey, 2006

4.3 Livelihood Activities and Labour Force

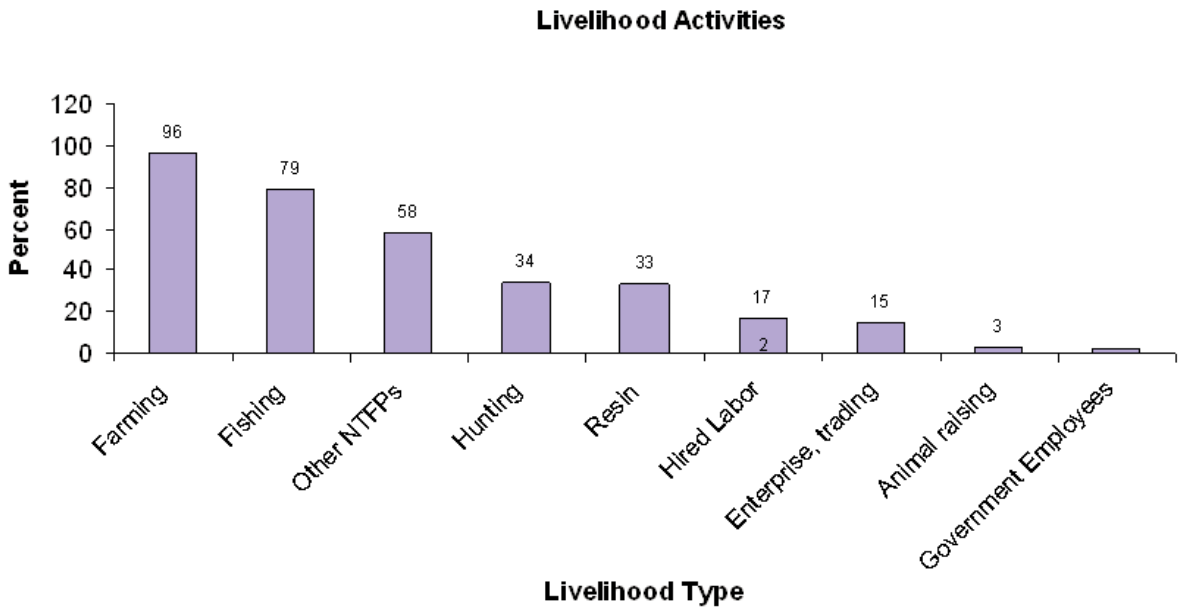
Farming (96%) and fishing (81%) were considered the principal livelihoods, but most households, especially among the tribal communities remained dependent on the forest for their economic survival. According to the account of the local communities, agricultural production and fish catch (average of 2.8 kg per fishing time) have continued to dwindle causing more and more non-indigenous people to collect forest resources to augment their cash incomes.

Almost all households interviewed (92%) gathered forest products either for trading or for household use. The important non-timber forest products collected to augment cash income were resin, wildlife, honey, orchids and sleng seeds (collected from Strychnos nux-vomicae tree). Wild vegetables and fruits, fuel wood, grass, bamboo, and wood for house construction were other products collected for non-commercial purposes.

The other 4% of the population that were not farming were engaged in trading/commerce or employed in private or government offices.

In addition to farming and resource-based production activities, several households were involved in other income generating activities such as merchandise/trading within the village and as hired labor in agriculture, forestry or the mining industry.

Figure 11. Livelihood Activities in the Study Area



Source: WWF Household Survey, 2006

Table 4.8. Distribution of Livelihood Activities Across Communes

	Farming		*Fishing*		*Hunting*		*Resin Tapping*		*Others**	
Communes	**n**	%	**n**	%	**n**	%	**n**	%	**n**	%
Northern Cluster										
Nang Khi Loek	161	96.4	153	91.6	83	49.7	33	21.3	54	9.5
Western Cluster*										
Ou Buon Leu	63	96.9	34	50.0	2	2.9	16	23.5	37	6.5
Roya	49	100	46	93.9	32	65.3	15	100	15	2.6
Sokh Sant	22	88.0	18	69.2	3	11.5	4	15.4	10	1.8
Srae Huy	103	97.2	95	88.0	23	21.9	23	41.8	50	8.8
Srae Sangkom	35	97.2	26	72.2	4	11.1	14	53.8	25	4.4
Southern Cluster										
Krangteh	18	100	7	38.9	3	16.7	14	87.5	4	0.7
Bu Chri	96	100	68	70.8	45	46.9	70	74.5	43	7.6

Source: WWF Household Survey, 2006

**Others include, merchandise/trading, government employment, hired labor, animal raising*

When asked what they considered as their primary livelihood, in terms of contribution to their income (cash and non-cash), almost all (93%) rated farming, specifically rice cultivation, as their most important source of income. For the respondents who were not farming, their main sources of income were trading, wine-making, money lending, wages (hired labour), NTFP collection, fishing and animal raising. All of these respondents were from the northern and western clusters.

In Bu Chri, most farmers planted peanuts or corn instead of rice because some agricultural areas were not suitable for rice cultivation.

Villagers also supplemented agricultural activities to offset income shortfalls and gain additional income while waiting for harvest time, which takes around five to six months after planting. Harvesting usually takes place from November until December.

All members of the family contributed to the labour pool in every household's economic activities. The males played major roles in fishing, hunting, resin collection and the hiring out of their labor services. Animal-raising was the domain of females who also contributed significantly to farming activities such as weeding, land preparation and harvesting.

Table 4.9. Source of Labor Force

Livelihood	***Labor Force***
Farming	Family, son helping most of the time
Fishing	Male spouse
Other NTFPs	Family, mostly male spouse and son
Hunting	Male spouse and son
Resin	Family but mostly male spouse
Hired Labor	Mostly male spouse and son, some female spouse
Animal raising	Primarily female spouse
Government Employees	Family, primarily male spouse
Enterprise, trading	Mainly male spouse

Source: WWF Household Survey, 2006

4.3.1 Agriculture

The districts around MPF form the largest tract of agricultural land in the province of Mondulkiri. The total agricultural area in Kaoh Nheaek is estimated to be about 9,261 hectares constituting more than half (58%) of the total area and in Pech Chenda 1,848 hectares comprising 12% of the total area. Other districts have very limited agricultural areas with less than 1,000 hectares total (Provincial Department of Agriculture, 2005).

Table 4.10. Agricultural Land Area, Mondulkiri Province

District	*Upland (ha.)*	*Lowland (ha.)*	*Total (ha.)*	*Percent Distribution*
Kaoh Nheaek	26	9,235	9,261	58.1
Keoseima	770	2,341	3,111	19.5
Pech Chenda	916	932	1,848	11.6
Sen Monorom	638	255	893	5.6
O reang	811	25	836	5.2
Total	**3,161**	**12,788**	**15,949**	**100**

Source: Annual Report for 2005, Provincial Department of Agriculture, Mondulkiri Province.

Rice was the primary agricultural product for communities around the MPF. Other important crops were corn and peanuts, but these were planted mostly in chamkars or farms near houses, streams or rivers. Corn was planted in small quantities and mostly as a subsistence crop. Peanuts, on the other hand, were planted on a bigger scale as a cash crop. Peanuts were grown during the early rainy season from May to June.

Vegetables were mostly planted in people's backyards or on the riverbank for households that lived near the river or streams. The vegetables that were commonly planted were squash, cucumber, wax gourd, eggplant and sesame seed. Like corn, these were grown in small quantities and mainly for household use.

Villagers also planted fruit trees such as papaya and banana in their chamkars. Cashew growing was becoming popular in some communes, especially in the Southern cluster (Bu Chri and Krangteh). More and more forests along the roads were being cleared for cashew plantations.

Cassava plantations were also being introduced to the area and several farmers had tried planting a cassava species that is used for flour production. According to the farmers, however, and much to their disappointment, this had not been profitable. Soya bean farming was also increasing in Pu Chrey commune.

There was an apparent shift from swidden to sedentary forms of farming. Continuing migration and the introduction of new cash crops (soya, cassava, and cashew nuts) has somehow influenced these changes. Evidence of which can be seen in old chamkars that have been planted with these types of crops. At present, a few indigenous peoples have embraced these new forms of farming, but since the technology may be somewhat different

Villagers normally grow vegetables along river or stream banks. Grown vegetables are mosthy for heusehold use

from their traditional practice, it is proposed by this study that the transfer of these new technologies may be necessary. However, this does not encourage that traditional systems should be changed, but rather improved when necessary.

The Department of Agriculture reported a positive food balance in the study area for 2005. However, the interviews indicated otherwise. Farmers continually experienced poor production and most respondents (53%) claimed not to get sufficient production even if farm size was relatively large at 1.5 hectares. Most of the families who experienced production shortages had more than 6 members. Poor production over the last three years was attributed by the respondents to irregular rainfall and decreasing soil productivity. This was mainly according to the local knowledge of the respondents. There is no technical data on soil productivity and rainfall irregularity to validate and support this claim. Research on soil productivity is beyond the scope of this research.

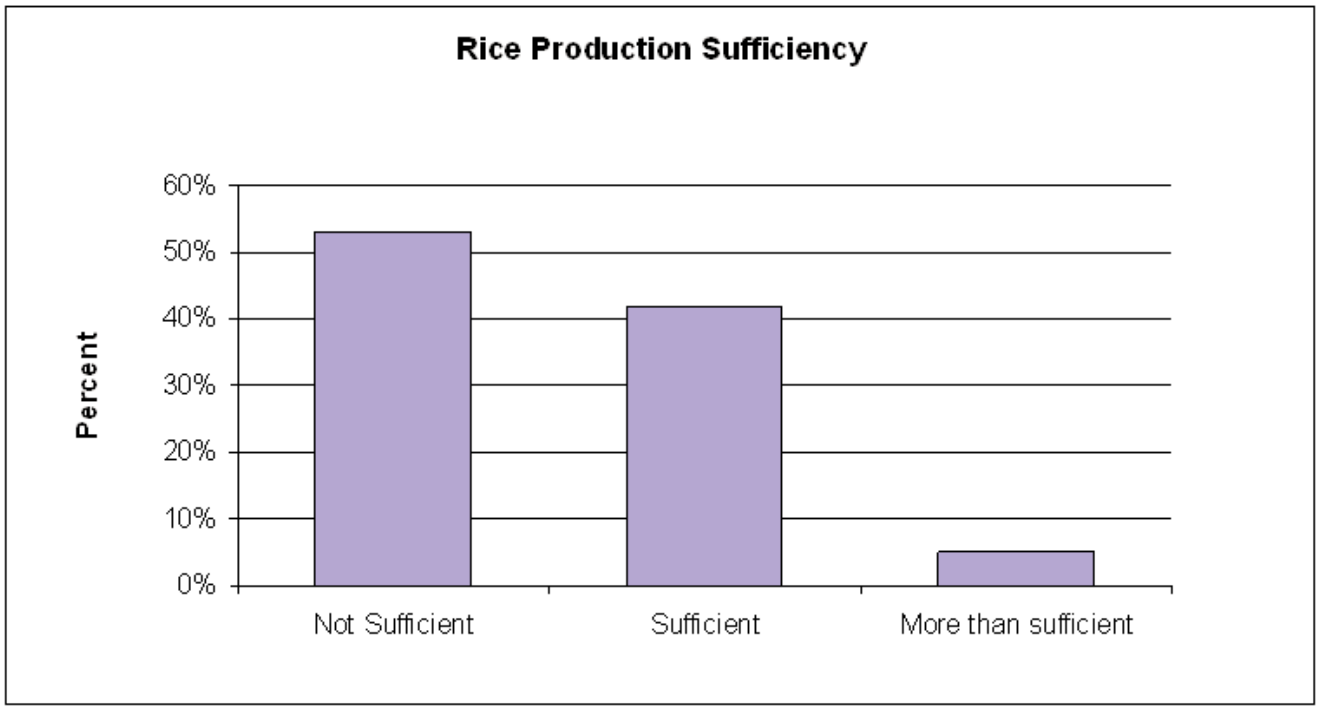
There were no irrigation systems. All farms were rain fed which explains why only one cropping happens annually. Infestation in rice was also reported to contribute to low production, intensified by a lack of improved technology or the lack of access to it if it was available. Aside from the Department of Agriculture, which was providing services in a few select communes, there were no other organizations working in these areas focusing on agricultural support. Services within the Department of Agriculture included piloting high yielding rice varieties, distributing vegetable seeds and training village veterinarians. The first two services were piloted only in Sresankum (in Kaoh Nheaek District) and in Busra commune (in Pech Chenda District). Table 4.12 is the list of the reasons cited to affect rice production, ranked according to number of responses.

Table 4.11. Rice Production in Mondulkiri Province, 2005

District	*Population*	*Cultivation Area (ha.)*	*Harvest Land*	*% area cultivated*	Yield kilo/ha	Food Demand	Food Balance
Kaoh Nheaek	13,090	9,261	9,070	98	1,933	1,872	7,890
O reang	3,880	836	693	83	1,783	555	136
Senmonorom	8,648	893	714	80	1,783	1,234	(525)
Pech Chenda	7,703	1,848	1,585	86	1,650	1,102	354
Keoseima	14,070	3,111	2,852	92	1,450	2,012	290
Total	**47,391**	**15,949**	**14,914**	**94**	**8,599**	**6,775**	**8,145**

Source: Annual Report for 2005, Provincial Department of Agriculture, Mondulkiri Province

Figure 12. Rice Production Sufficiency



Note: Of the 547 farmers, only 527 were planting rice; and 10 respondents did not answer on production sufficiency; n = 517; 10 of the farmers were not planting rice. All were from Pu Chrey.

The average number of months in which a family's total rice production was consumed was around 7 months. About 13% of the respondents reported consuming their total rice stocks within only three months of the harvest. The majority managed to make rice stocks last for 6 - 9 months.

Table 4.12. Ranking of Reasons Cited to Affect Rice Production

Reasons	*n*	%
Inadequate rain or source of water (irrigation)	380	92.2
Flooding; not good weather condition	24	5.8
Poor soil condition	16	3.9
Lack of agricultural technologies (fertilizer, pesticide)	13	3.2
Lack of farm implements or animals for farming	31	7.5
Insufficient labor force	53	12.9
Pests	104	25.2
Insects	68	16.5
Weeds	26	6.3
Wildlife	26	6.3

Source: WWF Household Survey, 2006

When rice was not available, people had to resort to buying from the village market (35%) or borrowing from relatives (26.0%). As an alternative to this, NTFP's were collected (19%) either to supplement staple food needs or as a source of cash to buy rice. Table 4.13 shows the specific NTFPs being collected to compensate for rice production deficiency.

Table 4.13. Other Sources of Produce

Sources, if insufficient	n	%
Buy from the village[14]	88	34.6
Borrow from relatives	66	26.0
Work as hired labor	22	8.7
Collect NTFPs	49	19.3
Collect resin	19	38.8
Collect wild potato in the forest	15	30.6
Not specified type of NTFP	13	26.5
Collect sleng seeds	4	8.2
Hunting	2	4.1
Sell Animals	9	3.5
Sell other agricultural products	7	2.8
Do other businesses (rice wine making, sell dresses in the village, etc.).	6	2.4
Note: multiple answer	254	

Source: WWF Household Survey, 2006

The 20 households who claimed to have a sufficient production to sell a portion of their rice yield sold the excess predominantly within their own commune and village. Most sold around 20% of their total rice yield. But 30% of these households had sold up to 50% of their crops in the last year.

Table 4.14. Comparison of Lowland Rice Farm Size Over Production Sufficiency

Farm Size	Not sufficient		Sufficient		Excess	
	N	%	N	%	N	%
Less than 1 hectare	18	9.4	6	3.2	-	-
1 hectare but less than three hectares	98	51.0	83	44.6	9	42.9
3 hectares to 5	70	36.5	91	48.9	11	52.4
More than 5 but less than 10	6	3.1	3	1.6	-	-
More than 10 hectares	-	-	3	1.6	1	4.8
Average farm size	2.3		3		3.5	

Source: WWF Household Survey, 2006

Note: Of the 27 respondents who reported more than enough production, 48% (13 households) had more than one farm; multiple answer; N = 27

[14]Did not specify the source of cash used in buying rice

Table 4.15. Comparison of Family Size With Production Sufficiency

Family Size	*Families with Inadequate Production*		*Families with Sufficient Production*		*Families with excess production*	
	n	%	n	%	n	%
1 to 5 members	120	44.0	85	39.2	7	25.9
6 to 10 members	138	50.5	121	55,8	19	70.4
11 to 20 members	14	5.1	10	4.6	1	3.7
More than 20 members		-	1	0.5		
Average family size						

Source: WWF Household Survey, 2006

Table 4.16. Average Land Size and Family Size Over Production

Level of Production	*Average Family Size*	*Average Lowland Farm Size (has.)*
Inadequate	6	2.3
Sufficient	6	3
Excess	7	3.5

Source: WWF Household Survey, 2006

Communes in the southern cluster reported the highest level of insufficient rice production. These two communes are located at a higher elevation and very little land in this area is suitable for rice cultivation. In Bu Chri, for example, less than one percent (0.58%) of the total commune area was under agriculture. The rice area in Krangteh was even smaller at 0.18% of the total commune land area. Most farms were chamkars (Table 4.18)

Table 4.17. Communes with a High Incidence of Insufficient Rice Production

Communes	*n*	*%*
Northern Cluster		
Nang Khi Loek	80	50.0
Western Cluster*		
Ou Buon Leu	25	41.7
Roya	18	37.5
Sokh Sant	8	36.4
Srae Huy	44	44.0
Srae Sangkom	17	48.6
Southern Cluster		
Krangteh	17	100
Bu Chri	64	85.3
Total	**273**	**52.8**

Source: WWF Household Survey, 2006

Farming was mostly non-mechanized and plows and harrows pulled by cows or water buffalo were used in land preparation. There were a few families that used hand tractors. Of the 547 farming families, 49 reported using hand tractors. Of the 49 families using hand tractors, 20 owned them while 29 hired others with tractors to cultivate their farms. Hiring costs according to them was a costly input to farming; costs for tractor services were around 150,000 Cambodian Riel (est. US$37.50) for one hectare.

The majority of the households (92%) also raised animals as an alternative and complimentary activity. Animals were used for home consumption or to be sold at the market oftentimes to compensate for a shortage of rice. Animals, especially cattle, were also an important emergency source of cash in times of need and are significant in a social context on occasions like wedding ceremonies and death anniversaries.

Table 4.18. Families Raising Animals and Animals Being Raised

Animals Being Raised	*n*	*%*
Families Raising Animals	524	92.3
Chicken/duck	399	76.1
Pig	376	71.8
Cow/Cattle	341	65.1
Buffalo	240	45.8
Duck	77	14.7

Source: WWF Household Survey, 2006

4.3.2 Fishing

Fishing is a major contributor to the food security and nutritional requirements of Cambodian people. It serves as a basic livelihood resource for a great many Cambodians, especially those living near bodies of water. Cambodia has some of the largest fisheries in the world, consisting of diverse fish populations and producing over 400,000 tons of fish catch per year (Introduction to Cambodian Fishery, 2004).

Villagers fishing in Srepok river

All villages in this study were engaged in fishing with the highest number of fishing families located in Roya, Nang Khi Loek, and Srae Huy. These communes were all proximate to major streams and/or the Srepok River. However, very few considered fishing as a primary source of income. Most rated fishing as second or third in terms of contribution to their income. Except for the 13% of respondents who claimed fishing as a full-time activity (they fished regularly or year round), most worked part-time in fishery-related activities which meant they did not fish for most of the year and fish were caught mostly for family consumption. Fishing activity was also limited by the number of available boats used for fishing. For example, in the two villages along the Srepok River (Khum Mouel Leu and Khum Mouel Kraom), only 10 people were reported to own fishing boats. But because of strong social relationships in the village, they had developed a sharing mechanism. They fished as a group with 3-4 families at a time and then rotated the use of the boat with other family members.

Fishing was also a group activity, especially among the Bunong people. An informal grouping for fishing activities existed. Each group was usually composed of 3-5 families. During the peak fishing months of October and November (after the monsoon rains), these families traveled up to the farthest streams in their villages and even inside the protected forest to fish in their oxcarts. During these months, one would normally see groups of usually 3-4 oxcarts together engaged in fishing activities. They would stay for a week until they had caught enough fish to meet their protein needs for at least a month. Fish catches were divided equitably among the members of the group involved in the fishing.

Fishing was primarily for household consumption except for a few (12%) who did trade within the village and nearby in Ratanakiri Province. Marketing of fish catch was mostly done within the community. Traders coming from Lumphat[15] District in Ratanakiri or from the district capital of Kaoh Nheaek regularly visited the area to buy fish.

Some of the traditional fish traps being used by local communities

[15]Ratanakiri is one of the provinces in the Northeast Region of Cambodia where Lumphat District is located. It is located in the northern part of the MPF. Mondulkiri and Ratanakiri Provinces are bounded by the Srepok River in the north.

4.3.2.1 Fishing Equipment

The use of traditional fishing equipment like t'nor and tru was not common. Hook, line and gill net were reported as the most commonly used equipment (Appendix 7).

While most fishermen had resorted to using modern technologies such as gill and cast nets, some had resorted to more destructive methods like grenades and electric fishing.

Table 4.19. Fishing Gears Commonly Used

Gears used in fishing	*n*	%
Net	196	43.8
Gill net	377	84.3
Cast net	84	18.7
Seine net	1	0.2
Hook and line	312	69.9
Dak Nonong	6	1.3
Santouch	1	0.2
Bongkay	8	1.7
Tru	5	1.1
T'nor	5	1.1
Chenieng	3	0.6
Ong rot	1	0.2

Source: WWF Household Survey, 2006

Table 4.20. List the Fish Species Commonly Caught by the Respondents

English Name	Khmer Name	n	%
Striped Snakhiead	Roh	124	28.2
	Chhang	103	23.0
Climbing Perch	Trey kranh	86	19.2
Walking Catfish	Trey ordengroeng	75	16.7
Spuntius	Speun	58	12.9
	Pava mok pee	40	8.9
	Chang vachhot	36	8.0
Bronze feathered back fish	Trey chhlath	34	7.6
	Pacehi	27	6.0
	Khan	23	5.1
	Small fishes	21	4.6

Source: WWF Household Survey, 2006

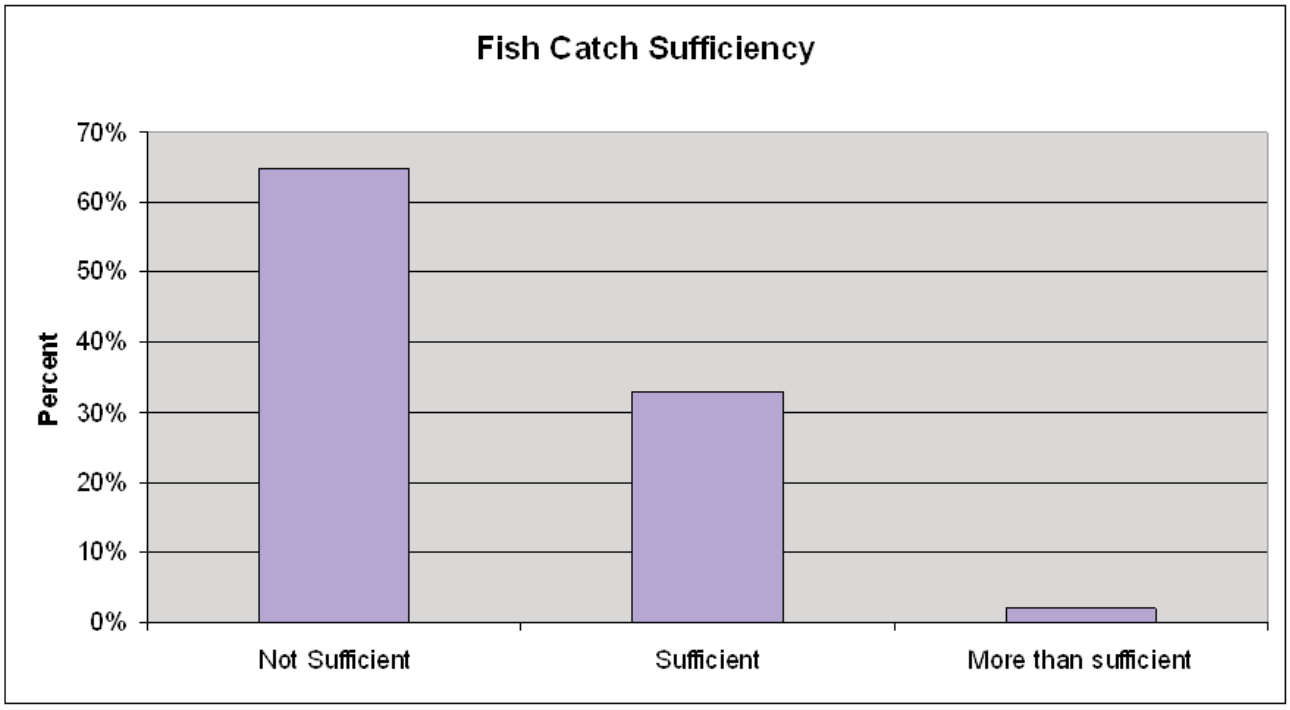
Note: % represent percentage of respondents who cited catching certain fish species.

The respondents shared a common concern for the dwindling fish catch that had occurred over the past few years. They reported a big decline in their fish catches, with daily catches averaging 2.85 kg with a maximum of 35 kg and minimum of less than ½ kg. The most frequent catch was 1.5 kg. The effect of a growing human population on fish resources was already being felt by the local people. They were beginning to recognize the inability of fish resources to cope with the growing demand from an increased human population in their area. According to them, there was increasing competition for fish which had affected per capita fish catches. This was aggravated by the use of unsustainable fishing activities such as grenades and electric shock devices. There was also a perceived decrease in the water level in streams and rivers. According to respondents, they had been noticing a decrease in the water level over the last three years and believed that this was somehow affecting fish abundance in the area. Some respondents believed that the building of a hydropower plant as one possible reason for changes in water level.

Commercial fishing was likewise identified as major factor affecting fish catch. According to key informants interviewed during the study, a further threat to fishing activity is the increasing number of commercial fishers in the Srepok River who are outsiders. Fishermen from Kraties and Stung Treng have moved in to fish in the Srepok River because of the decline in fish catch in their areas. These fishermen once fished in the big rivers nearby their areas like Sesan and Sekong whose decline in fish abundance is believed to have started after the damming activity in Vietnam.

The communes living near the Srepok River (Nang Khi Loek and Roya) were less vulnerable to a decline in fish catches: less than 50% of the respondents reported a decline in fish catches. Other communes, however, even if they were near the major streams like O'Chbar and O'Chemiet, still suffered from low catch numbers and fishing only occured during the rainy season as these streams dry up in the dry months (80-90% of respondents complained of reduced fish catch).

Figure 13. Fish Catch Sufficiency



[16] Prahok is fermented fish paste made from small-low value fish such as trey riel. Fish are salted and dried for a few days, after which they are stored in large ceramic pots or plastic containers for a few days. This is a main product in which seasonal excess of fish is stored. Prahok and other forms of preserved fish are vital for nutrition and food security of the rural poor especially during the dry season (Mekong River Commission, 2004).

4.3.2.2 Fishing Areas

The most commonly fished areas were O Chbar (mentioned by 71% of the fishing households), O Rove (21%) and O Te (17%). These are major tributaries to the Srepok River. Ponds (tropeang) were also important fishing areas for 15% of the fishing households. As these water bodies start to dry up every season, communities travel far to harvest from tropeangs and streams to catch all the small fish left in them. These small fish are usually then used for prahok[16] , a traditional fish paste and an important ingredient in traditional Khmer foods. Often mosquito nets are used to catch the smaller fish, which has proven to be destructive and detrimental to other wildlife species inside the MPF. According to Martin Von Kaschke, former WWF Technical Advisor for the MPF, these fishing practices greatly affect other wildlife inside the protected forest. Fish, crabs, and frogs in the tropeangs are important prey for cats, tigers, leopards, bears, and birds. He also stressed that this "feasting time" for some of these animals is important as it marks the beginning of the dry season and is also the period of time in which their young are born.

Table 4.21. Perceived Reasons for Fish Decline

*Reason for changes**	*n*	*%*
Use of illegal gears	242	74.9
Over fishing due to increase in population	58	17.9
Decrease of water in streams, rivers, dams	21	6.5
Hydro power in Vietnam	2	0.6

**multiple answers*

Table 4.22. Fishing Areas

Fishing Areas	*n*	*%*
Streams	344	74.9
Srepok River	73	15.9
Ponds	67	14.6
Rice fields	26	5.7
Dams	12	2.6
Lakes	8	74.9
Streams Where Respondents Commonly FishedStream		
O Chbar	244	70.9
O Rove	71	20.6
O Te'	60	17.4
O Ten	43	12.5
O Chemiet	42	12.2
O Prong	28	8.1
O Roya	22	6.4
O Leav	17	4.9
O Romorm	13	3.8
O Rovak	9	2.6
O Pyouch	12	3.5
O Kam leung	8	2.3
O Plai	7	2.0
O Ontrees	6	1.7
O Anchor	7	2.0
O Tang	7	2.0
O Nam	7	2.0

Source: WWF Household Survey, 2006

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Fish selling in the village

4.3.2.3 Fishing Seasons

Fishing was found to be a year round activity, with peak season being from January to June. Very few people fish during the rainy season because of high water levels. During this time of year, fishing is done in streams. It was estimated that one fisherman spends an average of seven months a year fishing (two weeks per month and 4 days per week). This was also true in the northern cluster where villages are near the big streams and the Srepok River. However, according to people in Nang Khi Loek, there were more abundant fish in Srepok River from November to December, but during that time most people are busy with the rice harvest. This demonstrates the priority being given to rice production by most people.

4.3.3 Harvesting of Non – Timber Forest Products

The MPF offers a variety of products that are vital to the survival of the communities living around it. These products were found to be important supplements to household income (cash and non-cash). The livelihood situation of the communities around the MPF is vulnerable to external impacts such as floods or droughts, infestations of their rice crops, and decreases in

Bamboo shoot is one of the important NTFPs for the villagers.

productivity of both their rice crops and other cash crops, which include corn, peanuts and other vegetables. During these challenging times, the community always resorts to forest products (both NTFPs and timber) as emergency sources for both cash and non-cash income. During months when villagers were hungry, they would go to the forest to collect root crops to supplement their food resources. Forest vegetables and wildlife were also important sources of nourishment and medicine. The survey revealed that almost all (92%) admitted to collecting NTFPs in the area and a high percentage of respondents noted hunting and resin tapping as an important livelihood for them; 37% were hunting and 42% were tapping resin.

NTFPs that were being collected for commercial purposes included resin, wildlife, sleng seeds, honey, and orchids. Figure 14 shows the time of year these NTFPs were being collected. The extent of collection for each NTFP is discussed in the following sections:

Other residents outside the identified commune clusters were also using resources within the regulated use zone including Spean Meanchey commune in Sen Monorom District and other communes in Pech Chenda (Bu Sra and Srae Ampum).

Figure 14. NTFP Hunting Calendar

NTFPs	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Ot	Nocv	Dec
Liquid Resin	→	→	→	→	→						⇢	→
Dry Resin	→	→	→	→	→						⇢	→
Honey		⇢	→	→	→							
Wild Vegetables	⇢	→	→	→	→							

⇢ Marks the starting month of the harvest

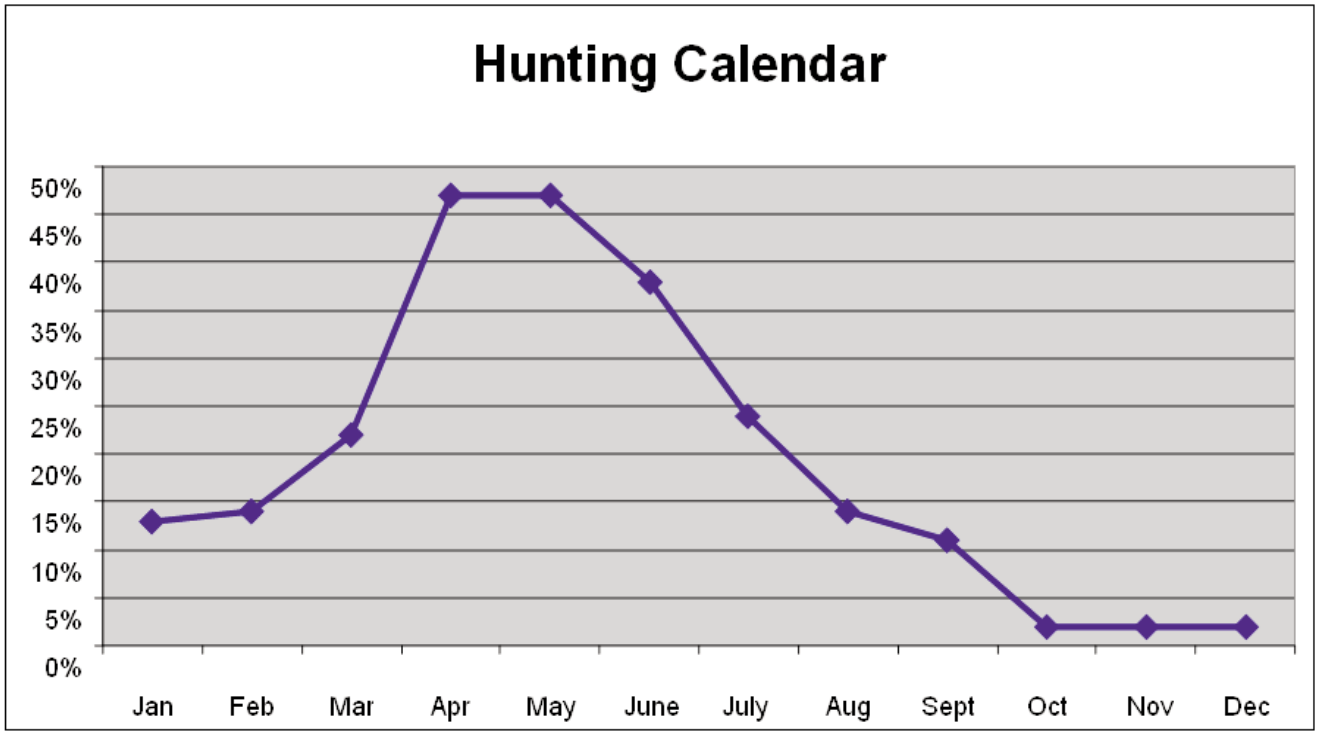
→ Continuing from previous year

4.3.3.1 Wildlife Hunting

About 34% or 195 households admitted to hunting and 12 of them even noted it as second in terms of contribution to their income, next to rice cultivation or fishing. However, the majority of households saw hunting as the least important activity in terms of income contribution. The majority of respondents who admitted to hunting were from Roya (65%) and Nang Khi Loek (50%).

Hunting was done year round, but was said to peak during the early rainy season (April to June). Hunting was also relatively common during the rainy season (June to August) and decreased towards December. Figure 15 shows the hunting calendar in the study area. Most respondents answered that the majority of hunters were from the village (52%) although the term "Some outsiders also come to hunt", was used often.

Figure 15. Peak Hunting Schedule



Source: WWF Household Survey, 2006

4.3.3.1.1 Purposes of Hunting Wildlife Species

The most commonly hunted wildlife species were the water monitor, tortoise, and civet. These are sold domestically (restaurants use wild pig, red muntjac, monitor lizard, etc.) or for the international market, mostly in Vietnam (Long tail Macaques, Douc and Silver Languars, tiger, leopard, bear products, etc.). Among the hunters interviewed, 26% of hunters admitted to selling their hunted product while 74% said they hunt mainly for food.

Figure 16. Reasons Stated for Hunting Wildlife

Table 4.23. List of Wildlife Species Hunted

Species being hunted	%age
Water monitor	34.1
Turtle/tortoise	31.4
Civet	11.4
Snake	5.1
Muntjac	3.0
Rabbit	2.8
Wild pig	2.4
Kanghen	2.4
Banteng	1.4
Birds	1.2
Komprok	0.8
Pangolin	0.6
Sambar	0.4

Source: WWF Household Survey, 2006

4.3.3.1.2 Hunting Methods

Wildlife hunting is said to be a traditional practice among villagers. Traditional hunters will generally stay close to their village and collect smaller animals such as birds, pigs and muntjac. By tradition, dogs, traps, snares, spiked bamboo, crossbows and arrows are used for hunting. The most popular methods used in hunting were found to be dogs to chase and bring down game (93%), bows and arrows, and traps. Even non-hunters who gave answers on hunting methods noted dogs as the method of hunting most commonly used.

The use of firearms by commercial poachers has had a large influence on the current low numbers of animals. As it is illegal for civilians to carry arms in Cambodia, it is relatively easy to distinguish who has illegal intentions as well as who is supporting the poachers by supplying firearms.

Due to many years of unsustainable hunting, animal numbers are presently extremely low and local people are noticing that increased effort to protect them is needed.

4.3.3.2 Resin Collection

Resin (chor teuk) is one of the most important NTFPs being collected by rural communities in Cambodia. It is extracted from dipterocarp trees and is used as a raw material in the manufacturing of varnish, cheap soap, leather making and sealing wax. Locally, it is commonly used for caulking boats or in torches for lighting houses in the village. It is extracted by making a small cut in the resin tree and is then set alight to induce bleeding from the tree and thus encourage the resin to flow. Tree species tapped for liquid resin in the MPF are Dipterocarpus Alatus and D. intricatus.

For communities around the MPF, resin tapping was an important forest-based economic activity for a large proportion (42%) of respondents. Tapping was done primarily among villagers who lived near evergreen or semi-evergreen forests where dipterocarp trees commonly thrive. In Roya,100% of villagers, Krangteh (88%) and Bu Chri (74%) tapped resin trees. In the northern communities, resin trees are mostly found along the Srepok River. However, these northern communities no longer found it economical to collect resin because there were very few trees and these were far from their homes.

Resin trapping, also common with other livelihood activities in the villages, was a group activity, especially among the Bunong. Each group was normally composed of three to four members/ families and owned an average of 113 resin trees. There was an existing traditional ownership system of resin trees in the area and ownership was recognized and respected.

Aside from liquid resin, the other type of resin being collected was solid resin (chor reang), but only a few families were involved in this. Solid resin is collected from trees belonging to the species group Shorea, Vatica and Hopea. From among the respondents who were collecting resin, 23% percent (44 families) were collecting solid resin, most of them coming from Ou Buon Leu and Roya. One reason only a small number

collect solid resin is because it does not have much commercial value at only 500 Cambodian Riel (est. US$0.13) per kilogram compared to liquid resin which was being sold for 1,000 Cambodian Riels (est US$0.25) per liter.

Most resin trees are located in the strict protection and regulated use zones. Community members during the FGDs and resource mapping exercises estimated about 3,500 trees in the strict protection zone and around 2,000 trees in the regulated use zones.

4.3.3.3 Honey Hunting

Honey hunting has been an activity among these forest communities for a long time because of its medicinal value. Over the years, however, the demand for honey products has prompted villagers to collect it commercially - especially in the southern cluster where there is a bigger portion of evergreen and semi-evergreen forest. The dense forest with its tall trees and thick foliage provides a natural nesting place for honey-producing bees. The two honey producing bees in the area are Apis dorsata and Apis florea.

There were an estimated 200 honey hunters in two communes (Krangteh and Bu Chri) in the southern cluster. Honey hunting was also done in groups, ranging from 3-6 members in each. Relying on the skills they acquired from their ancestors, these hunters collected honey for the economic benefit. Honey hunting was traditionally mainly for household consumption, but has now shifted in priority to a commercial activity due to the increasing demand for honey products in the province. The honey hunters used only 10% of their harvests for personal consumption. Honey was being sold per liter for around 15,000 to 20,000 Cambodian Riel (estimated US$3.75 - $5).

Bees-wax, a by-product of honey collecting, was being processed into candles by the Bunong for use in traditional rituals.

Honey is also one of the commercially important NTFPs being collected by villagers. Honey hunters tend to collect the entrire honey comb which is not sustainable as it prohibits honey bees to increase their colonies

4.3.3.4 Sleng Seed Collection

Sleng trees (*Strychnos nux-vomica*) mainly grow in the north in the flatter areas of the MPF. The seeds of this 12-13 meter high tree are harvested and sold for strychnine production. The nut is used to make poison, tonicums, bitter flavouring for medicinal purposes and is used in muscle relaxant drugs (de Beer, 1993).

Commercial sleng seed collection in the area began three years ago and 27 households from western and northern communities were involved at the time of the study. These households cited outsiders who come and collect sleng seeds in their area as the ones who are usually collecting unsustainably by cutting the trees down. After cutting, the seeds are picked and soaked in a pool of water.

Non-community members seemed to have the best information about sleng seed prices and thus were the first ones to start collecting, sometimes not leaving anything for the villagers. When the price is good, sleng seeds can be sold for 1,500 Reil per kilogram. The buyers are usually Chinese traders in Ratanakiri. In de Beers' study on "Non – wood Forest Products in Indochina" he cited that there is a stable market for this product and India and Sri Lanka are the main suppliers (de Beer, 1993). The same study found that sleng seeds form Vietnam and Laos are exported to Hong Kong, Taiwan, Germany and France.

4.3.3.5 Other NTFPs

Other important NTFPs collected for household use included forest vegetables, wild fruits, root crops (manioc and wild yam), bamboo, grass for thatching, and firewood. The MPF offers a wide variety of edible forest vegetables and wild fruits which were found to be important for the survival of the forest community.

5 INSTITUTIONAL AND POLITICAL PROFILE

5. Institutional and Political Profile

5.1 Formal and Informal Governance Structure

5.1.1 Governance

Traditional forms of governance still exist in some villages that are dominated by the Bunong population. Mei Kantrin, (a term used for local leaders) are the most respected, oldest and most knowledgeable people of Bunong tradition and culture. They are responsible for maintaining peace and order in the area as well as in seeking justice for village members (MOSAIC Easternplains Team, 2003). The traditional system has now been integrated into the new political structures. Decision-making is now a joint process between the Mei Kantrin, elders and the Commune Councils. Issues are brought to the attention of the District Council if unresolved at the commune level.

5.1.2 Other Social Structures Related to Natural Resource Management

Cambodia's Administration Law of 2001, Article 43, stipulates the Commune Council's role in protecting and preserving the environment and natural resources. They also have a role in the classifying and setting of boundaries for all forests in their area of jurisdiction, in coordination with the Ministry of Agriculture, Fisheries and Forestry (Forestry Law 2002, Article 10).

The village chiefs and Commune Councils played important roles in disseminating relevant laws about NRM. There was also an NRM committee (organized under the SEILA Program) in every commune composed of Commune Council representatives, village chiefs, police, and military representatives. This committee oversaw resource management in the area and livelihoods of communities.

Other informal structures in the area were the livelihood groups mentioned in previous chapter. Economic activities like fishing, resin collecting, honey gathering and, to a limited extent, hunting, were mostly social activities – especially among the Bunong people where a group of 5-6 families usually participated in these activities together.

5.1.3 Other Key Players in Community Development

Key NGOs/Programs identified by the respondents to be working in their area:

1. SEILA Programme, being implemented through the Royal Government of Cambodia, is a program that provides the framework for the mobilization and coordination of the government's decentralization and de-concentration reforms. It aims to contribute to the poverty alleviation through good governance (SIELA Programme Annual Report, 2005).

2. International Cooperation for Cambodia (ICC) has been involved in bilingual education in Cambodia since 1996. Their program in Mondulkiri started in 2001 and is aimed at developing a literacy program and establishing a firm foundation for culturally sensitive food security initiatives.

3. NOMAD Recherche et Sutien International (NOMAD RSI) is an international organization dedicated to research and programs for health issues in remote and disadvantaged areas. It began work in Mondulkiri in 2000 with health and anti-malaria education striving for improvement of health care among ethnic minorities.

4. Action International Contre' La Faim (AICF) has been working in Cambodia since 1989, but their work in Mondulkiri started in 2002. Their project is aimed at improving access to clean drinking water in remote areas and for marginalized populations in the province. Services include construction of boreholes, rehabilitation of traditional wells, provision of rain water harvesting units and health promotion activities.

A Community participated reporting their social and resource map during one of the focused group discussions

5.2 Indigenous Knowledge Systems and Practices (IKSP) Related to Natural Resource Management

This study also attempted, to a limited extent, to investigate the presence of IKSP among the indigenous communities in the area. There was no apparent evidence of traditional forest management in the area. This could stem from having sufficient subsistence in the past and hence the lack of incentive to adopt a management role. However, the Bunong had a strong forest-based culture as indicated by the practice of "spirit forests." These forests serve as a venue for them to renew links/relationships with their ancestors and are highly respected. According to the Bunong respondents they did not use these forests for NTFP gathering or any other purposes for fear of disturbing the spirits. Therefore, this practice has contributed to the protection of select forest areas. However, this is a fading tradition within the study area. New migrants showed little respect for this custom and did not possess the same strong relationship with the forest. There are now very few patches of spirit forest left. Likewise, the pressure of increasing migrants has forced the Bunong to move deeper into the forest to establish cultivation.

Hunting was also considered a traditional practice. Despite this, elders noted during the focused group discussion that they now recognize the importance of regulating or even stopping hunting altogether.

6 COMMUNITY PERCEPTIONS AND NEEDS

6. Community Perceptions and Needs

6.1 Community Assessment of Natural Resource Status

The workshop on resource assessment status was conducted to: a) guide the community members in the assessment of the current status of their natural resources; and b) identify the natural resources in their area using pre-identified indicators. They were given a three score system using 'smiley' cut outs to indicate their assessment. Each 'smiley' represented a certain condition. For example, in the wildlife population criteria, indicators were:

few/small population; hunting methods are destructive, frequent poaching;

average population, some involve in hunting; not frequent hunting.

frequent sightings, good habitat condition, no destructive hunting.

Indicators:

1. Extent of forest cover – estimated extent of forest cover or distribution of trees.
2. Forest protection status – rate of human encroachment.
3. Fire occurrence – frequency and intensity of forest fires.
4. Non-timber forest products – diversity and avail ability of NTFPs.
5. Wildlife population – abundance and diversity of wildlife and condition of habitat.
6. Harvesting methods – destructive or sustainable.
7. Stream flow characteristic – regular or overflow after rainfall.
8. Occurrence of flood and drought – frequency.
9. Quality of stream water – turbidity; presence of pollutants.
10. Soil productivity – as indicated by production /yield.
11. Settlement pattern – rate of migration; presence of permanent or temporary settlement.
12. People's participation in natural resource protection activities – extent of participation.
13. Local ordinances on the use of natural resources – presence of effectiveness of ordinances.
14. Adoption of appropriate cultural practices in resource management – extent of adoption.

Through this exercise the communities realized

Participants of the focused group discussion putting smileys cut-outs to indicate feel of the current status of their natural reseurces

"Before, if we needed timber for our houses, we just went to the back of our houses. Now it would take us half a day's travel time to get timber." - Srey Huy respondent.

that the current mode of extraction was becoming unsustainable.
They were aware of the impact to their livelihood, but admitted to having insufficient experience to engage in sustainable forest resource management and survival had often forced them to extract unsustainably.

Community members identified the following major threats to biodiversity loss:

- Unsustainable methods in resource utilization (e.g. use of illegal gear in fishing, guns for hunting).
- Decrease of water level in streams, rivers and deteriorating water quality as a result of use of poison in fishing, throwing of waste into the river and chemical pollution from mining activity in O Nges.
- Development projects such as the hydro power dam in Vietnam.
- Increasing population, resources depleted by population pressure (more fishermen, more hunters).
- Poverty
- Destruction of wildlife habitat, cutting and burning.
- Land encroachment, clearing of forest for chamkar and settlements.
- Displacement of IPs by new comers who purchase land.

6.2 Community Perception on Natural Resource Management

Communities were aware that natural resources are becoming scarce. They were aware of the relevant laws that prohibit or regulate them from further exploiting these important natural resources. However, they believed that poverty and lack of other options have forced them to breach these regulations despite their awareness of the possible negative consequences.

The survey showed there was an average level of awareness among the respondents with 57% claiming to know, to a relative degree, the important laws on natural resource management. Bu Chri commune registered the highest level of awareness among the respondents as expected, given its accessibility and thus exposure to outside information. Also, WWF has been working here longer compared to the other communes covered by this study. The respondents' level of knowledge was, generally limited to the following aspects:

- No cutting of trees in the forest (73%)
- No hunting (66%)
- No illegal fishing (26%)
- Land laws (2%)

The commune chief and village chief play significant roles in disseminating laws about NRM as most of the respondents named them as the main sources of information. Other sources identified were NGOs (WWF), government agencies (Ministry of Environment), broadcast media (radio broadcasts and TV in some villages), and word of mouth (neighbors, relatives, friends).

When asked their opinion whether these laws were being effectively implemented or not, a proportion (40%) said 'yes' and 45% said 'no' or 'partially implemented'. The reason given was inadequate knowledge of laws and poverty which are aggravated by the presence of wildlife traders offering lucrative prices for 'bush meat'. Disrespect of the law, especially among people with political connections, was also cited in the local communities.

Some people, especially the well connected ones, do not respect the law, as indicated by 61% of the respondents who believed that forestry laws were not being implemented. Poverty was cited by 21% as the reason for this lack of implementation and inadequate knowledge of the laws was noted by 17%.

Among the 39% who said laws were effectively implemented, presence of rangers and conservation initiatives from NGOs and concerned departments were identified as contributory factors. People were beginning to understand the importance of forestry law and protection of forests and believed that they can play important roles in protecting their forest resources.

"*The people from the village respect or implement these laws but outsiders come to do illegal activities in our village.*" - Srey Chrey respondent.

"*The men who have power don't respect the law and also because they have money.*" - Respondents from all villages.

"*They are poor, they need wildlife for livelihood.*" - Srey Chrey respondent.

6.3 Community Aspirations

All villagers were conscious of the need for conservation. They mentioned their desire to see the forest back to the way it was, with lots of wildlife.

"*Our forest will decrease if we don't start conservation.*" - All respondents

"*Our vision is that people are protecting the forest and the forest will increase, wildlife will come back again because we are cooperating in conservation.*" - Nang Khileok respondents

"*We have to create wildlife protection and resource management in the community*". - O Bour Leu respondents

"*But we also want development like health centers and schools.*"- Srey Huoy respondents

7 CONCLUSIONS AND RECOMMENDATIONS

7. Conclusions and Recommendations

7.1 Socio-Demographic Issues in Relation to MPF Management

7.1.1 Increasing population and needs for more land

If the current scenarios: a) rapid migration, b) unchecked population growth, c) lack of land management frameworks and regulatory systems for opening up new land; and d) an increasing number of families needing land are not attended to, it is clear that land scarcity related stresses in and around the MPF will increase in the near future.

While population density is still low at 4 people per square kilometer in the MPF, there is already an apparent increase in the pace of habitat loss due to the need for more agricultural lands and settlement expansion. At present, population in the two districts around MPF constitutes half of the total provincial population. Population increase in this area, both births over deaths and in-migration, is high at an average of 800 people per year (or an average increase of 16% per year). This is unlikely to cede in the coming years because of the following conditions:

- Young population composition and the high household size at an average of 6.2. The birth spacing programs in the area are evidently either lacking or non-existent. The study showed a very low awareness about reproductive health and low prevalence of use of contraceptives among the respondents.

- Kaoh Nheaek District is fast becoming a commercial district and the completion of the road network connecting it to Ratanakiri and to Vietnam is expected to attract new settlers.

- Pech Chenda, with the increased accessibility brought by improved roads, has been steadly drawing migrants from nearby provinces. This is further sustained by kinship networking in the establishment of new settlers (i.e. relatives, siblings, friends invite others to come and live in the area) and the lack of regulatory policies about acquisition of new land.

- Rapid development in the province, which includes the development or improvement of tourism attractions leading to an increase in tourism activities, both local and international has the potential to draw migrants from nearby provinces. Also, the provincial government's policy for converting land for economic usage such as for mining and rubber plantations as well as the presence of big investors (mining companies and rubber plantation companies) is expected to attract more settlers to the province. Pech Chenda District is a potential expansion area for human settlements because of its proximity to the provincial town.

While the factors listed above contribute to the economic development of Mondulkiri, balancing these short-term developments with the long-term need to conserve the remaining dry forest wilderness of Cambodia is an enormous challenge. Currently, there is no provincial land use plan in place or the land use program is slow in implementation, being a lengthy process. There are a few initiatives on land use planning at the village level like the PLUP project of Wildlife Conservation Society (WCS) in Andoang Kroleang and WWF's work in Pu Tang Village. But these initiatives still need to be elevated to the district level and recognized at the provincial level.

Moreover, because of the perceived openness of the province to migrant settlers and investors, it is not surprising that land scarcity is now becoming an issue in the province. Increasing land prices are luring local inhabitants to sell their land and clear forest for new land. With most of the

remaining forests in the province declared as reserves or wildlife sanctuaries, prohibiting forest clearing and illegal land clearing has become a major issue for concerned government agencies, MAFF, MOE and environmental NGOs. Illegal land grabbing and land speculation has increased exponentially in the surrounding communities of MPF during the last year.

At the village level, the rising migration rate is creating factions among villagers as the new settlers tend to have low or no respect for traditional land and resource uses. A lack of an inherent relationship towards the forest leads to a conflicting perception of the forest as a resource. Newcomers are failing to appreciate the traditionally held belief that the forest's products should sustain them and future generations. Instead, their nature of usage is more extractive and is done without respect for the social or spiritual significance the resources have to the IPs.

The absence of an appropriate land management framework and the lack of political will to implement and enforce land laws in the province will lead to unsustainable resource utilization which poses a grave threat to the biological diversity of MPF.

There are traditional regulations adhered to in some villages concerning the approval of new settlers. As investigated by this study, village chiefs and/or commune chiefs approved or disapproved the clearing of forest for new land. However, factors such as kinship, social relationships and political motivation commonly move these local authorities in favor of the requests for land. Therefore this traditional and discretionary regulation is not enough to ensure legal and planned land use allocation around MPF.

Recommendations:

- Relative population density for land use types such as settlement and forest areas should be assessed especially in villages around MPF to determine areas of human concentration.
- Areas with low density are potential sites for migration and if no management zones are put in place, this may result in more uncontrolled opening up of new areas for agriculture and other activities. Opportunities to regulate migration could be aided with the proper identification of potential migration sites.
- A more in-depth study of the human migration pattern would be useful in establishing a strategic policy recommendation for regulating migration, which would aid in ensuring that population density around MPF is controlled and within carrying capacity. Another approach could include monitoring migration inside the community zones of the MPF. In addition, carrying capacity for the community zones could be identified and perhaps supported by a more in-depth study. Settlement expansion within the community zones need to be planned.
- Policy aimed at ensuring land tenure should also be improved. The current weak tenure system poses threats to existing land uses in the area as new comers clear land for agricultural production. Compounding this is unregulated land speculation in the area. Socio-economic development should be coupled with improving implementation of policy on land tenure and in ensuring land security among indigenous communities. While migration can be difficult to prevent, it could possibly be regulated by putting systems or mechanisms in place both at the village and provincial level.
- Since the area was originally settled by and mostly dominated by IPs, interventions can be done in revitalizing the sense of ownership to their traditional lands and their inherent rights to protect and conserve it. At present, they tend to give these up to migrants very easily, which should not be the case. One approach could be to increase their awareness about IP rights in general and to their rights over their traditional/indigenous land.

7.1.2 Increasing population and poor education and health services

All villages in the study had health centers and primary schools. The generally poor service and the irregular availability of health workers and school teachers were the main issues in the study area for these services. The occurrence of limited health services was apparent from the causes of mortality, especially among children. There were reported cases of children suffering from illnesses commonly curable with medical intervention, but were unable to access professional medical care, sometimes resulting in death. Poor sanitation, which the respondents also acknow ledged, contributed to frequent occurrences of diarrhea and related illnesses in the villages, again, especially among children.

Concerning education, problems were attributed to inadequate facilities and poor delivery of services. One example of this limitation was the irregularity of classes, (i.e. three times in a week and sometimes only in the morning) observed during this study and reported during the focused group discussions. Likewise, low access to formal schooling for indigenous communities also contributed to the very low literacy level in the area.

Conclusively, the growing population and the poor status of education and health services around MPF is contributing to the current status of resource use therein. The assessment showed that the local communities around MPF consider the forest resources as an immediate source of cash or non cash income in times of emergency such as serious illness or inadequate production. Thus, insufficient access to services and stable livelihood sources can exacerbate the deterioration of biodiversity inside MPF. Therefore, efforts should also be invested in improving social services for communities around the MPF. Improved health status and improved education will provide a framework for stable livelihoods in the future and lessen pressure on the natural resources of MPF in addition to proper management and policy.

The following specific recommendations are put forward to focus on future community development work in the areas of population growth, education and health.

Recommendations:

- Implement a monitoring program on the delivery of health and education services. This can be an area of collaboration among NGOs working on these services.
- Apart from improving health and education services, another integral part of community development work is intervention to address the growing population trend in the area. Promoting family planning will primarily improve the reproductive health of women and the general welfare of the family and will likewise lessen pressure on natural resources. In addition to regulating migration, as recommended in section 7.1.1, improving the use of birth spacing can play a key role in managing population growth in the area. Specific interventions can include: a) increasing awareness and education about reproductive health relating it to the general welfare of their family and to the sustainability of the natural resources in their community; b) include the people entering reproductive age, which comprises more than half of the population, as a target for reproductive health education; c) provide adequate information about reproductive health, ensure regular availability of supplies from concerned institutions and provision of quality services. All of these and a campaign for advocacy in birth spacing can provide couples with better options to plan their families.
- Water supply and sanitation also remain an important area of rural improvement. Although several organizations started providing these services by supplying and constructing hand -pumped tube wells, deep wells, and water filters, there are still numerous underserved households. Access to clean water is still challenging in terms of time spent on acquiring it, which should otherwise be spent doing other productive activities, especially among women. Educating people about the importance of sanitation facilities like having a toilet is an important priority as this affects the health of the local communities.

7.2 Community Livelihood (Economic Issues/Situation) in Relation to MPF Management

7.2.1 Agricultural Production.

In comparison to the density over total commune land area, relative density in agricultural areas is high, at an average of 378 people per square kilometer. In addition to population growth, deteriorating land productivity is another factor contributing to the increasing shortage of arable land and thus supporting the current activity of rapid forest clearing.

The soil type in MPF is generally characterized as infertile, especially in the northern section. Only a small portion of land in the southern and western sections and areas along the Srepok River are considered fertile. The MPF Management Plan (2004) cited the relative fertility of soils in MPF as follows: the central portion of the SPZ is dominated by very infertile acid lithosols (144,823 ha), while the south is dominated by relatively fertile basic lithosols (35,924 ha) and regurs (43,761 ha). The northern section of the MPF is dominated by infertile plinthite podzols (97,826 ha) with moderately fertile alluvial lithosols (22,457 ha) along the Srepok River. The western section, in Koh Nhek District, is dominated by fertile grey hydromorphic soils (37,142 ha).

Findings from this study showed inadequate rice production. A high percentage of the respondents fail to meet sufficient rice production for the family's needs. Most families consume their produce in up to 7 months and then borrow money or rice from their relatives to supplement their needs. Some go to the forest to collect forest products either for cash or staple food. For some families, their farm size is just not enough to provide sufficient production, especially when the family size is big. Traditionally, a parcel of land was divided amongst the offspring. Eventually portions become too small to be productive, forcing members to look to the forest for land.

Recommendations:

Efforts should be exerted in improving agricultural production among communities around MPF. Substantial investment should be allocated to increasing productivity to address rapid agricultural expansion around MPF.

Strategies or assistance can include:

- Promoting home gardening and agro-diversification;
- Providing an adequate source of water to support more than the seasonal cropping, for at least two harvests per year;
- Promoting sustainable agriculture and introducing low input technologies. Replicating other technologies that have proven to be effective like alley cropping, integrated pest management, crop diversification, use of green manure in rehabilitating old/abandoned ricefarms. Research can be conducted to identify crops or legumes that are suitable for the soil type around MPF, or species indigenous to the area to avoid introducing non-endemic species.
- Better access to credit facilities, agricultural extension service and training. Provide farmers with loans and credits to improve yields in their existing farmland rather than clearing forest to create new farmland.
- Discouraging farming in marginal land.
- Suitable combination of agricultural products that can be promoted in agri-diversification and in introducing or adapting technologies to improve rice production.
- Soil analysis and identification of crops that can be used as green manure to rehabilitate mar ginal farm land.

7.2.2 Collection of Non-timber Forest Products

The study showed that people around MPF have high dependence on natural resources inside the MPF. As their principal livelihood activities (fishing and farming) are vulnerable to natural calamities, infestation, and trends in production, the resources inside the forest serve as emergency support. The community members resort to NTFP collection to augment their principal sources of income or to supplement any insufficiencies brought on by a variety of factors. If rice production is poor, there is the opportunity to supplement dietary staple food

from the forest through the gathering of root crops and the hunting of a protein source.
Aside from emergency needs, the forest supplies household needs like fuel for cooking and wood and bamboo for constructing houses. Grass is another important NTFP resource for livestock and as roofing material for the majority of houses.

Some NTFPs are collected for commercial purposes like resin, honey, and wildlife. In the resource mapping exercise, it was found that collection often takes place in the proposed conservation areas of MPF. The implementation of the protected forest management plan will have implications on the collection of these NTFPs. Further studies should be done to assess current collection practices, to assess their sustainability and/or identify technologies that can be introduced to increase production and minimize impact to ease the pressure on these resources. Registering the owners and collectors of these resources is one strategy for the regulation and monitoring of destructive practices. Organizing the collectors and involving them in the management of these resources can promote self-regulation and self-monitoring.

Recommendations:

Forest resources are key-to supplement rice production, to provide help in times of food emergency, to provide shelter, etc. WWF will help to understand this system better through the identification of the location and ownership rights patterns for NTFPs through survey and 3D modeling. Plus, WWF will examine ways of cooperative marketing of these products and find marketing opportunities that enhance livelihoods.

Specific activities can include:

- Inventory important NTFPs like sleng trees and resin trees to assess need for re-stocking and propagation methods;
- More in-depth assessment of livelihoods in priority areas to assess livelihood capital and factors affecting these capitals for communities to ensure that strategies in livelihood address the weakest links;
- Encourage sustainable resource use. Harvesting forest products rather than destroying. This entails an inventory of the different harvesting methods and assess whether these are sustainable or not and together with the community discuss how these practices can be improved if needed;
- Develop a transition plan with the resource users in the strict protection zone before implementing non-use policy. Provide alternative livelihoods to the affected community members;
- Provide market links for other NTFP products (honey, resin) and product development (e.g. handicrafts) for other NTFPs.

7.3 Other Stakeholders in MPF Management

7.3.1 General Partnership and Collaboration

There is now increasing recognition among environmental practitioners that biodiversity conservation is not merely the domain of scientists and conservationists but requires serious collaboration between all stakeholders. This project is founded on that assumption and has therefore adopted the collaborative management and co-management approach applying and adapting the lessons learned from neighboring countries that have successfully adopted this approach.

Identified factors contributing towards the success of collaboration efforts are: transparency, accountability and participatory processes among the key players. Defining clear roles, responsibilities and modalities for institutional arrangements are also recognized as important elements.

Likewise, experiences in community-based resource management projects in other countries suggested collaborative efforts as significant components of their success. "*Giving the communities the rights to manage their resources is not enough assurance for better management of natural resources. There is a need for the development of institutional mechanisms or forum where the different stakeholders can participate and discuss their conflicting interests and participate in decision-making or be able to influence policy in the process.*"(Contreras 2003)

An assessment of the different players in the area showed positive opportunities for site -specific collaboration to support provincial level collaboration.

7.3.2 Partnership with Local Authorities

In the study area, there are institutional structures within communes that can be tapped into which also provides an opportunity to improve these institutional arrangements to involve other stakeholders in the management of MPF. There are NRM committees in each village organized to oversee issues and concerns around natural resource management and livelihoods in their respective communes. These committees are composed of representatives from Commune Councils, village chiefs and NGOs working in the village. They are officially recognized by the government as part of their decentralization agenda.

These can also be a venue to proactively involve the local authorities in the management of and decision-making for MPF. Presently, there is no evidence of any local authority contribution in the maintenance of the MPF. The majority of the local authorities and local communities are ignorant of the MPF, without understanding the reason or importance of its declaration as a protected area.

Unless understood, the concept of protected area/forest will remain unappreciated and thus unsupported. So too will the realization of the economic and social benefits from the involvement in the management of the MPF.

Local officials, being the important actors in disseminating laws or other information in the villages, should have sufficient understanding not only of the relevant laws but of the concepts on environmental processes, conservation, and sustainability of natural systems. Understanding will not only help them "*appreciate conservation but, to equip them to do conservation*". (Malayang, 2001)

7.3.3 Partnership with Other NGOs

Because of the remoteness of most of the villages covered by this study, it is not surprising to note that a very limited number of NGOs work in these areas. WWF is the only organization involved in environmentally related work in these areas. Prior to the study its presence in these areas was barely known by most community members.

Interventions on providing livelihood assistance to the communities in order to lessen their dependence on forest resources are much needed to fill this gap in these communities. Also needed are interventions directed at educating the community to use forest resources in a manner to increase income from non-timber forest products.

Even with the limited numbers and a different focus, these groups can still find ways to collaborate and somewhat integrate their work in the villages. Other organizations working in the area should be encouraged to include environmental education in their activities, linking its relevance to their work. For example, the link of El Nino to the outbreaks of diseases like dengue fever, malaria, and cholera show how the environment can affect various aspects of human life.

Recommendations:

- The existing NRM committee in each commune can be expanded to include other concerned sectorial groupings. The capacity of this committee can be further improved to enable it to operate programs/projects/activities in light of the biodiversity conservation inside the MPF. This is also a means of institutionalizing the MPF agenda into the development plan of each commune and encourage each to provide financing or counterpart contribution to some management projects/activities.
- Federating or networking the different CBNRM asssociations in the eight communes around MPF will further synergize efforts towards sustainable resource management in their areas.
- Institutionalize the management plan at the local authority level through issuance of local ordinances/ orders. Include the local authorities as active partners in implementing and attaining the vision for MPF.
- Develop a programmatic approach in improving the capacities of the local authorities in environmental governance.

7.4 Community Capacity and Aspirations in Relation to MPF Management

It is interesting to note the high level of consciousness or interest among the local communities in forest protection. But the manifestation of this consciousness is yet to be observed. This could be attributed to a lack of capacity to manage or lack of immediate tangible incentive to do so. Thus, a major obstacle in achieving forest protection is capacitating these communities to be effective resource managers, which can be hindered by community characteristics such as high poverty and low formal education levels.

Poverty is very apparent as an indirect threat to the biodiversity in MPF. As noted in section 5.2 of this report, there is no organization providing support for livelihoods in any of the villages studied. Even the SEILA program, which is supposed to provide funding for livelihood activities, was not fully known to the villagers. This and the very limited or lack of access to technologies and services to improve living conditions aggravates poverty in the area and consequently creates pressures on the resources inside the MPF.

Yet, despite these challenges, evidence of a strong desire to learn proper resource management and the desire to maintain or bring back the pristine condition of their forest resource was observed during the various community meetings, FGDs and interviews in the course of this study. This creates a good starting point for community mobilization work around MPF. This desire and the presence of external facilitators will further enhance the communities' capacity to take part in the management of the forest, their livelihoods and in decision–making.

The willingness of the communities to be involved in the management of the MPF should be coupled with a political climate that encourages or supports community participation. While the declaration of the MPF included community development and has outlined strategies in drafting the management plan, during the time of this study, there was no clear legal framework available to recognize community involvement inside protected forests. This differs from Protected Areas where there is an issued Prakas for involving and organizing communities in PA management. The Community Forestry Guideline is not applicable in protected forests[17].

In the meantime, in the absence of a clear legal framework for involving communities in the MPF management, community development work should not be discouraged by these limitations. There are opportunities in the villages that can serve as entry points for involving communities, i.e. informal social structures (e.g. resin groups, honey gatherers, fishers). Different interest groups can be created as an entry point in mobilizing the community members to be involved in MPF management. Focus should be on interests that have direct effect (or impact) on the resource use inside the MPF or are affected by the restriction provided for in the management plan. Examples of these groups are the resin tappers and honey gatherers inside the regulated and strict protection zones and the fishers' association for communities along or fishing in the Srepok River and its important tributaries. The hunters are also an important target for community organizing where the approach can focus more on awareness and discussion of alternative sources of income.

Indeed, saving the remaining biological diversity and addressing the need and aspirations of a growing population is a big challenge. But it is a communal social responsibility to future generations to pass on a living planet as our ancestors provided us. Everyone must do his/her share. As Malayang (2001) declares "*Protected area management (in this country) is no longer a monopoly of the government, nor the monopoly of the civil society, nor the community, but a monopoly of "all of us together". It is a very plural process. Therefore there is a need to learn to attack each other's limitations. Government must learn to appreciate and sympathize with the struggles of civil society. So must civil society appreciate and respect the struggles and limitations of government. Communities too, must learn to respect and be respected.*"

[17] As defined in the Prakas on Guidelines for Community Forestry, areas allowable for community forestry "can only be established within the production forest of the Permanent Forest Reserves." (Article 2). Further consultation with official of Forestry Administration confirms that CF cannot be established inside the MPF.

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Appendix 1. Guide Questions for Key Informant Interviews

Key informants

Leader	Provincial officer	Enforcement group	Selected community member	Trader group
District governors Elders	Provincial/district fishery	Border/district soldier	Hunter	Resin trader
Commune leader	Agricultural district staff	Border/district police	Traditional healer	Agricultural trader
Commune council secretary	Commune health-post staff	Rangers	Resin tree owner	Traders (wildlife, fish)
Village chief	Provincial hospital		Local fisher	
	School director		Farmer	
	Teachers			

TEACHERS / SCHOOL DIRECTORS

- Are the students paying to go to school? How much?
- Are there cases of students skipping your class? What are the common reasons?
- How many classrooms in your school? Are there enough classrooms for students?
- How many teachers? Are there enough teachers? If no, why?
- Where do the teachers come from?
- How do you assess the willingness of villagers to send their children to school?
- What are the grade levels in your school?
- What is the percentage of attendance in your class? What are the common reasons for absent?
- What are the issues related to education?

LEADERS

- What are the roles of commune councils in the management for local people?
- Is there any form of indigenous governance in the village? What are these? Describe.
- What are the means of communication in the village? How do people communicate with their relatives from other places?
- What are the common reasons people use communication facilities in the village?
- How do you communicate to the provincial government in Mondulkiri?
- How is information being shared in the village or from the province?
- What are the community organizations formed in your area? Who assisted in the formation if any? When was it established?
- What are the local rules being implemented in relation to natural resource management?
- What are the issues related to enforcement of these rules?
- What are the most common violations in relation to natural resource use in your area?
- What are the roles/activities of the commune councils/community leaders in awareness raising about NRM?
- What is the role of the commune council in enforcing Forestry laws or other laws related to natural resource use?
- How do people acquire land for agriculture and residential use? Who gives approval? What types of documents are being issued? How are lands allocated?
- Do you have a commune development plan? Request a copy if available. What are your plans related to NRM in your commune?

HEALTH WORKERS

- What is the mortality rate in your village? What are the common causes? What are the common causes among children/infants? What is the trend in the last five years, increasing or decreasing? Request data if available.
- What is the morbidity rate? Request data if available.
- What is the crude birth rate? Do you have data

on number of births in a month/year? Request data if available.
- What is the most common child delivery attendance in your village? How many percent are giving birth in the health posts/centers?
- What are the most common issues related to child birth?
- Do you have a birth spacing program? What are the peoples' perceptions of the birth spacing program? Are they receptive or not and why? What are the most common methods being used by couples?
- What are the available facilities in your health posts/centers? Do you have enough facilities?
- How much do people pay to access service from the health center?
- Is there any doctor or nurse assigned in the health post? How often do they visit?
- Do you have a child nutrition program?
- What are your other health programs in your village?

Appendix 2. Survey Instrument

Survey Form for the Social Assessment of Communities around MPF
February - June, 2006

Date of Interview: _____ __
Interviewer: _____
UTM: _____

Name of Respondent (optional) _____ Village/Group: _____
Age: _____ Commune: _____

1. Gender ☐ Male ☐ Female
2. Position in the household ☐ Husband ☐ Wife ☐ Relative ☐ Others (specify)

3. Ethnicity ☐ Phnong ☐ Kroll ☐ Khmer ☐ Others (specify)

4.Religion ☐ Buddhism ☐ Animism ☐ Christian ☐ Islam
☐ Others (specify)

5. Educational Attainment

Degree	**Level of Attainment**
☐ none	_____
☐ Primary	_____
☐ Intermediate	_____
☐ Secondary	_____
☐ College	_____
☐ Non Formal	_____

FAMILY SIZE

1. How many members in the family? Male_____ Female_____ Total _____
2. Do you have plan of increasing the number of children? ☐ Yes ☐ No
3. Are you using any birth control method?) ☐ Yes ☐ No
   a) If Yes ☐ Natural ☐ Artificial
   (specify)
   b) If no, Why?_____

SETTLEMENT TYPE:

1. Is your family original or migrant settler in this place? ☐ Original ☐ Migrant
   a) Year Migrated_____
   b) Origin (Name of place)_____
   ☐ different commune; the same district ☐ different district; the same province
   ☐ different province ☐ Others (specify)

   c) Reason(s) for migrating
   _____
   _____
   d) Do you have plan of moving out? If yes, why?_____

SOCIAL INFRASTRUCTURE AND SUPPORT SERVICE

1. Education Status

a) How many of your children are at schooling age?_____ How many are studying? _____

If schooling - go to question b and c

If not schooling - go to question d

b) Educational level:

☐ primary ☐ intermediate ☐ secondary

☐ college ☐ non formal; provider_____

c) Distance of school from residence?

☐ few blocks away ☐ less than I kilometer

☐ 1-2 kilometers ☐ more than 2 kilometers

d) Reason for not studying

☐ Financial ☐ Sickness ☐ No school

☐ Far from school ☐ others (specify) _____

2. Health Status

a) What are the common ailments experienced by the family?

_____

_____

b) How do you treat these ailments? In case of serious ailments where do you go for treatment?

_____

_____

c) Did you ever go to the health center? If not, Why?

_____

_____

d) Did any of your household members die in the past two years? What caused the death?

☐ infant (1-6 years old, cause _____

☐ adult cause _____

PROPERTY OWNERSHIP AND LIVING CONDITION

1. Land Tenure

a) Do you own land?_____No_____Yes (if Yes fill up table below)

- Number of land parcel owned
- What type of instruments as proof of ownership?
- Means of acquiring the land by inheritance, bought, borrowed, or others?

Type of ownership

Type of Property	Size	Ownership	Instrument	Acquisition Means	Distance form house
Residential Lot					
Paddy Farm					
Swidden farm					
(Others specify)					

2. House Ownership

☐ Renting ☐ Owned

3. Housing Materials

a) Roofing of Houses

☐ Cogon/Grass ☐ Bricks ☐ Galvanized Iron/zinc ☐ Others (specify)

b) Walls

☐ wood ☐ bamboo ☐ cement ☐ Others (specify)

c) Flooring

☐ cement ☐ ground ☐ bamboo ☐ Others (specify)

4. Access to Potable Water

a) Source

☐ Spring ☐ Well ☐ River ☐ Ponds ☐ Water pump ☐ Others

b) Distance from water source

☐ inside the house ☐ few blocks away ☐ less than 1 kilometer
☐ 1-2 kilometer ☐ beyond 2 kilometer

5. Cooking Materials

☐ Firewood Source: _____ Distance: (m/km) _____ LPG (gas) Others_____
☐ Charcoal Source: _____ Make on your own? _____ or Buying? Where? _____

6. Lighting Materials

☐ Kerosene ☐ Resin ☐ LPG ☐ battery ☐ Electricity

7. Type of Toilet

☐ Closed pit ☐ Open pit ☐ Water sealed
☐ No Toilet Why?_____

MEANS OF LIVELIHOOD

1. What are your means of livelihood? Rate your sources of livelihood from 1-5 with 1 as the most important (main source of your income) and 5 less important (supplementary source of income)

2. Who are the members of the household mostly involved? Father, Mother, Children (male of Female). What are the ages of work forces in your family?

Check	Livelihood	Rate	Labor Force	Age
	Farming			
	Resin collection			
	Hunting			
	Trading/commerce			
	Fishing			
	Forestry			
	Skilled labor			
	Working with private company			
	Government			
	Others			

Check livelihood type Rate only the livelihood with check

Farming

a. What are your primary agricultural products both from swidden (chamkar) and rice farm?

Rice Farm(s)		Swidden Farm (s)	
_____	_____	_____	_____
_____	_____	_____	_____

b. Do you plant other agricultural crops in your paddy farm or swidden farm other than primary products? What are these?

Paddy Farm(s)		Swidden Farm (s)	
_____	_____	_____	_____
_____	_____	_____	_____

Production Level

c. What is the average yield from your farm-kilo per hectare?

_____

d. Is your production sufficient for the needs of the family?

☐ Sufficient ☐ More than sufficient - go to question g

☐ Not sufficient - go to question e and f

e. Were do you get additional rice/resource to meet your rice needs?

_____

f. How many months before you consume all your produce?

_____

g. What do you do with the excess? Do you sell them? Where? How many percent of your rice production is being sold?

_____

Farming Practice and Technology

h. How many times do you plant rice in a year? What do you plant after rice?

_____

i. What is the source of water to your farm? ☐ Rain fed ☐ Irrigation
☐ Others (specify)

j. Do you use any chemical fertilizer or pesticide? If no, what are you using as an alternative?

_____

k. Are you using any equipment in farming? What are these? Do you own these or you rent? Where do you rent?

_____

l. What other technologies are you using in farming?

_____

m. Do you allow a fallow period for your swidden farm? How many years? Is your fallow period longer of shorter that before? Why?

_____

n. Has there been any observed decrease in your production for the last three years? If yes, what do you think are the causes of these decrease in production?

_____

o. What are other problems you encountered from farming?

_____

p. Have you attended any training or meeting regarding new technologies on farming? Are you interested to learn technologies?

_____

Animal-Raising

a. What are the kinds of animals you raise?

b. What are the uses of animals you raise? (e.g. trading, household consumption, transportation farming

Animals being raised	Uses /Purpose	Animals being raised	Uses/Purpose
_____	_____	_____	_____

Fishing

a. Number of years fishing _____ ☐ Full time fisher? _____ ☐ or part time fisher
b. Where do you fish? _____
c. Kind of fish being caught _____
d. Methods/gears used in fishing
☐ gill net ☐ seine net ☐ hook and line ☐ cast net
☐ electro fishing ☐ bark poisoning ☐ others _____
e. Time spent in fishing
☐ i. How many months in a year? _____ ☐ How many weeks in a month? _____
☐ ii. How many days in a week? _____ ☐ How many hours in a day? _____
☐ iii. Time of day when fishing ☐ morning ☐ afternoon
f. Do you sell fish you caught? ☐ YES ☐ NO If no why?

_____

g. Is your catch sufficient for your family's needs?
☐ Sufficient ☐ More than sufficient - go to question h ☐ Not sufficient
h. What do you do with the excess? If selling where you do sell them? How many percent are ☐ being sold?

_____

i. What is your average daily catch? _____ kilo(s). Have there been changes in the quantity and quality of your catch for the past three years?
☐ Yes ☐ No. What do you think the reasons are?

_____

j. What is the time of year when catch is high? When catch is low?

_____

k. What are the problems you encountered in fishing?

Other Natural Resource -based Livelihood

Hunting

a) Do you hunt wildlife? ☐ Yes (go to question c - h) ☐ NO (go to question b)
b) Who do you think are usually involved?
☐ outsiders (from where) _____ ☐ insiders
c) Wildlife species being hunted?

_____

d) Method/gears used in hunting?
☐ use dog ☐ traps ☐ guns bow and arrow pit ☐ others_____
e) Purpose in hunting
☐ Food ☐ for trading ☐ Hobby ☐ pet ☐ part of tradition others_____
f) When did you start hunting?

_____

g) Do you hunt all year round? ☐ Yes ☐ No. If no what time of the year you usually hunt?
h) What are the problems/issues you encounter from hunting? Have there been changes with the quantity and quality of wildlife being hunted? ___ YES ____ NO. If yes, what are these? What do you think causes these changes?

_____

i) What is your perception about the legality of hunting?

_____

Resin

a) Do you collect resin: ☐ Yes ☐ No
b) Type of resin being collected
c) Do you own resin trees? How many? Where?

Other resources used

a) What are other forest products (both timber and non-timber) you gather from the forest and for what purpose?

Other forest products (both timber and non-timber)	Purpose/uses
_____	_____
_____	_____

Note: if possible ask the species/local common name of species being used

COMMUNITY PERCEPTION ON NATURAL RESOURCES

a. Do you know any policy or laws in protecting the forest, rivers and/or wildlife?

_____

b. If yes, what are these? Where did you learn about these? GO TO QUESTION 4

_____

c. Do you know any policies or laws in protecting the forest, rivers and/or wildlife

_____

d. Are these policies being effectively enforced in your area? If no why

_____

e. Who do you think are responsible in enforcing these laws?

_____

f. Do you think it's important to have laws in the protection of environment?

_____

Reviewed by: _____
Date: _____

Appendix 3. Design and Result of the Focus Group Discussion

I. PROGRAM

1. Opening/Preliminary Activities

- ✓ Opening Message
- ✓ Team and Participants Introduction
- ✓ Presentation of "Study" Purpose, Objectives, Processes and Output

2.Workshop Proper:

Instruction:

- ✓ Participants will be grouped according to sector.
- ✓ Each staff will be assigned a group to facilitate.
- ✓ As a process of breaking the ice and loosening up the participants, they will be asked to do an exercise in vision mapping; the group will be asked to draw the past (five or ten years) and present situation of their community guided by the pre-prepared questions. The workshop will also be used to gather additional socio-economic data. The group will also be asked to draw their vision of their community.
- ✓ Workshop output will be presented by each group (20 mins./group) and provide answers to other group's or facilitator's clarifications/questions.
- ✓ Each group will choose their facilitator and documenter during their discussion.

3. Group Dynamic activities/ice breaker

4. Plenary:

- ✓ Presentation of Workshop Results (20 minutes/group including clarification questions)

5. Focus Group Discussion

- ✓ To take off from the presentations, specifically on points that needs further probing (quantities and qualities, qualifiers, etc.).

6. Summing Up

- ✓ Next steps.

7. Closing

- ✓ Impression/feedback from the participants.
- ✓ Remarks from the commune council.

II. Mapping Workshop Guideline

1. Draw and describe a picture of your community/village before (past 10 or 20 years ago) giving extra consideration on the following aspects: (refer to data matrix for specific data needed and pointers)
    a. Village/commune history (origin, original settlers and their origins)
    b. Different land uses
    c. Forest condition
    d. Wildlife sightings
    e. Farm areas and practices
    f. Fishing condition
    g. River condition
    h. Traditional or political boundaries
    i. Resource use
    j. Settlement Characteristics
    k. Living condition of the people
    l. Population
    m. Benefits you are getting from natural resources

2. Based on the features identified in your past map, describe the present situation of your locality describing the changes over the years
    a. Extent of changes.
    b. Bad and good changes and causes.
    c. Are the causes considered threats? What are considered threats and what are not?
    d. What are the driving forces behind these changes?
    e. Steps being done by the community to address the causes? Role of women or traditional and political leaders in addressing problems in the community.
    f. Are there local ordinances being implemented to address these threats?
    g. Economic issues and concerns.
    h. Environmentally related issues.

3. Using the assessment tool provided rate the current condition based on the identified indicators. Provide and explanation and support your answers with verifiable evidences or information.

4. Based on the current situation you presented, draw a picture of your vision/dreams for your community in the next five or ten years giving focus on the following components:
   - ✓ social
   - ✓ economic
   - ✓ environmental

1. Plans to attain your vision
2. How do you plan to attain your vision/ dreams?
3. What are your needs for you to be able accomplish these
   a. capacity building needed
   b. technical assistance needed
   c. others

III. Workshop Matrixes

1. Village/commune assessment

Characteristics	Past	Present	Vision/Dreams
Settlement Characteristics			
Living condition of the people			
Population			
Forest condition			
Wildlife sightings			
Farm areas and practices			
River/Water condition			
Fishing			
Traditional or political boundaries			
Resource use			
Benefits you are getting from natural resources			

2. Needs Assessment

Needs	Potential Partner	Timeframe
1.Capacity Building/trainings		
2.Technical Assistance needed		
Other services needed		

IV. Materials

1. Flip Charts
2. Crayon
3. Meta cards
4. Marker
5. Masking tape
6. Bond Paper

V. GUIDE QUESTIONS

Characteristics	Pointers
Settlement Characteristics	• location of the houses/resettlement areas before • how many houses • type of houses before
Living condition of the people	• describe their living condition before (health, income, education, etc)
Population	• describe the population composition, ethnicity, origins • how many families are original settlers? • What year did they start settling in the area?
Forest condition	• location/areas of forests before, size, distance from the residential areas
Wildlife sightings	• show areas where wildlife are seen before • how frequent they see wildlife • what are the wildlife sighted
Farm areas and practices	• where are the farms before? • what are the types of farms? • what are the condition of farms before • what are the sizes owned by each household • level of production before • sources of water • crops being planted
River/Water condition	• show where the rivers are • identify if rivers are permanent or intermittent • water quantity and quality
Fishing	• quantity and quality of fish catch • species • frequency of fishing • volume of catch over time spent
Traditional or political boundaries	• What are the traditionally recognized natural markers (e.g. rivers, streams, roads, trees, etc.) • Show traditional and/or political boundaries
Resource use	• what are other natural resources being used before • where did you gather resources before? Distance from settlement areas, number of days spent going to the areas and time spent in gathering • volume of resource being gathered • species gathered and purposes (for trading or household consumption)
Benefits you are getting from natural resources	• describe benefits from natural resources before.

Appendix 4. Results of the Vision Mapping Exercises with Selected Communities

Past (as early as 40 years ago)	Present	Vision
Settlement Characteristics		
• Houses were made of bamboo, rattan and thatch; houses were not too big • Some villages were located in the same location where they are now like Srae Huy; but some were relocated from old locations like Roya, Srey Chrey. • Most houses were located along streams in O Chbar, O Chemiet, O Anchoar, and Along Srepok River, O Chourl • There were only a few houses then average of 45 in each village	• Now there are schools, health centers and wells • Some villages like Roya were divided into several groups • Most houses are wooden and bigger; some use zinc for roof materials • More houses are now built along the roads an estimate of 50% (or more) increase in the number of houses.	• We expect that houses will increase more and a lot of new comers • We hope that economic situation will be better in our community • Maybe new houses will be built in our old villages • To prevent illegal action like hunting and cutting down the trees.
Living condition of the people		
• Common ailments were malaria, typhoid fever and measles • People used the traditional medications because modern medicines were not available • No health centers and schools • People are well off before and people respect the traditions; • People farm but the not enough; but there are plenty of natural resources and it is easy to find timber and other NTFPs but used them mainly for household con sumption; people hunt for subsistence; • Not enough clothing but people had a special way to weave the clothes by themselves • Streams are the main source of water for domestic use; no wells • Most of the people were poor • People mainly depend on hunting and farming for a living	• The same common ailments like malaria, typhoid, colds, diarrhea and tuberculosis; have medicine for tuberculosis and malaria but not enough • People are cured at health center or use modern medicines but a lot still use traditional treatment • Villages have health centers but no hospitals • Now we have health center, school, commune security post • Quality of living is low, NTFPs are now hard to find and timber are far from the villages. • Improved farm implements, now have agricultural develop-ments but production still not enough • Now people have enough clothes • Weather has changed	• We hope that the living condition of people will improve a lot and we want development like: • More schools and hospital and enough medication • People using modern equipment/technologies • People earning a good living and are well off • People are healthier and under stand more about sanitation and hygiene and know how to take care of themselves • Teachers and nurses with experience.
Population		
• A family had five people. • In some villages (Srae huy, Roya) all of the people are Bunong and mostly farmers	• A family have 5-7 members; some families have 10 members • More people now; mostly farmers • More houses now; some houses	• A family has a lot of children • Increase in houses by around 100

• Most people are Kroll, Lao and Buong	• People from other provinces settled here; from Kampong Cham, Takeo, Prey Veng • Languages spoken are Bunong, Khmer, and Lao	• People will have better living condition • New comers will come and live with their relatives • New comers will come and live with their relatives
Forest Condition		
• There are plenty of forest before near our villages, in *Lung sung* mountain, in *Prate pond*, near O Chemiet, and other streams • There are a lot of big luxury wood like Beng, Neang noun, Koki, Kakh and Kra Nhoung • The common tree species are dipterocarps trees, koki, srlao, noun, chheuteal, kakoh, sokram, tnong • Burial forest in srey chourl and O Te There are also burial forest near our village • Plenty of forest near prate pond like Phchek,*(Shorea obtusa)* Rang, *Kang kakoh, Thoning,* Beng *(Afzelia cochinchinensis),* Sralao *(Lagerstroemia sp.)* , Sokram, *(Xylia xylocarpa) and* Chhoeuteal Toek *(Dipterocarpus alatus)* • No one exploited forest resources before. There is limited cutting of trees	• There are still burial forest and spirit forests in some villages like Srae Huy and Choul • The forest has decreased because people cleared them for farming and settlement because popultion is increasing. They exploited resources such as cutting luxury wood for cash income • Forest decreased between 50% - 80% especially during the war in 70sor Khmer rouge generation. A lot of forests were destroyed • The weather has changed, rain has become irregular • Now we have two walk 2-3 kilometers from our village to find wood for our houses • Plenty of wild bamboo, pchek, and traich *(Dipterocarpus intricatus)*	• People are protecting the forest and forest increase because we are cooperating in conservation • Forest will progress if we do conservation together and organize resource management community • It we prevent the forest, They will improve a lot • The forest will be decreased if we don't make conservation
Wildlife sightings		
• We frequently see a lot of wildlife in Tropeang • Wildlife observed before are: -kouprey -wild buffalo -gaur -tigers -deer -fawn -monitor lizards -wild oxen -eld's deer -wild dogs -wolves, -leopards -many kinds of big birds -wild boars -gibbons	• We still see same wild animals like eld's deer, wild boars, gaur, kouprey, wild dogs, deer, wild chicken and peacocks. But there are a few left (maybe 30%-40%) They ran away to the wilder ness. What's left are smaller species of animals • We loss these animals because people hunt them a lot and their shelter are now lost or destroyed. • We still saw crocodile I shallow pools	• Wild animals will come back again because we are involved in conservation, no more using of guns and no more trading • Wildlife protection community created/form with WWF and this group is serious in preventing illegal hunting • If we do not prevent, the wild animals will decrease. So we have to create the wildlife protection community • The wild animals wild decrease if we do not

- We normally see them walk pass our ricefield near our village. Sometimes they come and stay under our houses or eat our crops in the field - It common to see wild elephants before, we sometimes see them in a herd of 3- to 40 - (Pa Tet, Chohouk, Prat, Lay Kham) was full of Eld's deer, wild oxen, wild buffalos, tigers, deer, monitor lizards and birds, and kouprey, fawns, rabbits		prevent or perform the community association
Farm areas and practices		
• Farms are smaller around ½ to 2 hectare; about 10-15 hectares of farms in most villages. • There is enough rain • Shifting cultivation is commonly practiced • Traditional way of farming, use draft animals and plow and harrow. We do not use chemical fertilizers • Farms are located near Lung sung mountain, O Prat, • Plants planted area primarily rice. • Other crops planted are sweet potato, eggplant, pumpkin, sesame seeds, corn • Fruit trees like jack fruit, guava, sour soup and banana and coconut are planted in chamkar • We have enough production and some families have surplus in production and generally enough for a year round consumption; • We raise livestock and animals never had illness. These animals are important for us especially as offerings to spirits	• Farms have increased and widened (around 3-5 hectares for each family) • Ricefield are less fertile • We don't have enough rain now • We now experience low and inadequate rice production • In some villages farm size decrease from 2-3 hectares to 1-3.5	• Agricultural areas will expand more as population increase or as new comers settle in our village • We see our selves using modern farming technolgies and machineries • Our production will improve and land more fertile • Farm size will increase more as area of land will widen if the number of people increase
River/Water condition		
• The water from streams (O Chbar) was clear and safe (no pollution) and we don't need to boil before drinking; no pollution, • Rivers and streams were deep; around 7-10 meters	• O Chbar and O Prang now are dry or have little water. • Small and big ponds all dry up in summer and only few ponds are left • Some villages still use water	• The dam will be built again • We want to have enough water

• There were crocodiles in the deep pools • Big streams and natural ponds never dry up in dry season • There were lots of natural ponds	from O Chbar in rainy season and pump well in dry season • The river and stream are shal lower than before around 10 meters • Water is not clear or anymore; rubbish are seen in streams or are polluted • Action against hunger (ACF) organization the people build/ dig wells or hand-pumped tube wells so we have other source of water. But some places don't have enough water in long dry season. • There isn't enough rain now so people need more pump well.	**Fears** • The river is getting dirtier and shallower
Fishing		
• Fishes were found at Tropeang, Prat (O Ten) streams and rice fields near the village. We only need to walk half or one kilometer from our house • There were plenty of fish before like trey ros *(Channa striata)*, walking catfish *(Wallago altus)*, kranh *(Anabas testudineus)*, krabei *(Bagarus yarrelli)*, ksan, and trey sandy *(Wallago altus)*, trios chhpoen *(Barbodes gonronotus)*, kes *(Micronema micronema)*, giant catfish *(Hemibagrus spilopterus)*, sdao trascouch, trey achkok, krum, kack, chhpin, bra, proul, pava • It was easy to find big fishes then like trei kol rang, trey reach, trey frasak and we spent less time fishing but we still have enough for our food. • There are many crocodiles in O Roya • Fishing gears used were cast net, gill net, trap and hook and line, tru, trap, cast net. • People fish mostly for household use and shared among neigh bors or preserve as fish paste. • A lot of fish in Srepok River and its tributaries.	• Fish quantity and quality decreased a lot (by 70%) especially in streams near our villages. • It is difficult to fish now we spend one hour fishing and we only get one kilo or the most two kilos. • We seldom or don't see big kind of fished anymore • People go far to fish like O Rovie • Rampant use of unsustainable gears like electric shock, grenade and poisoning the streams, fishing net and big gill nets that catches all sizes of fish • Type of fish caught during rainy season are trey chrava *(Channa iluswaandadersii)*, trey kranh, ptouk *(Chana striata)*, trey krabei, trey anding *(Clarias batrachus)*, trey puck • A lot of new comers now come to fish in our area.	• Because of increase in population, maybe there'll be more declines in fish catch. • We want to disseminate the fishery law and prevent illegal fishing and encourage them to join in the conservation projects • If we protect our rivers and organize community fishery the fishery resources will improve in the future. • If we do not hurry to obey the law of resources of water fish will decrease

Resource use		
• We have rich resources from the forest then and it's so easy to find them because they are near our house and farms • The forest resources that we use are: -Timber for building our houses -Firewood for every day use in cooking our food -Bamboo shoot and differ ent kinds of leaves of other edible forest plants for our food -Wild fruits -Other NTFPS like honey and resin -Woods to make plows, rakes, and traps -Bamboos for making bas kets to store our rice harvest -Collect tubers in the forest -There are a lot of trees and full of luxury woods -Very few people during this time and like hunting wildlife. Its easy find wildlife for our everyday meal. -We use traditional instru ments like saw, ax and bow.	• There is very few forest resources left. • Forests were converted into chamkar or ricefields, and settlement areas. • Agricultural farms expanded • We still use the same forest resources but it hard to find them now. We have to go to far places and spend a lot of time to collect NTFPS, timber, firewood. It is difficult to find wildlife now • With the decrease of timber and other forest products we have to hunt for wildlife to feed our families • Now it's difficult to get timber for building our houses • A lot of cutting of trees and it's difficult to control the people	• Community members are active and taking serious initiatives in conserving and protecting our forests. • People are active in disseminating about forest protection • There is better use of timber and NTFPs.

Appendix 5. Result of the Participatory Resource Assessment[18]

Indicators	Rating	Explanation
1. Extent of forest cover		There are still small patches of forests, but the bigger forests are gone
2. Forest protection status		Cut trees for chamkar, spirit forests are still protected but some also cut even the spirit forests
3. Fire occurrence		Forests fire every year but not destroying the big forests; small trees died during forest fire people can collect resin (?); afraid about burning the forest for fear this might spread to the houses
4. Non-timber forest products (easy or difficult to find)		because still have wood to building houses and other things; the same like before
5. Wildlife population		use simple methods in hunting; still have wildlife like bangteng, civet, wild pig, peacock, wild fowl, tortoise but outsiders hunt them; no more wildlife
6. hunting methods		traditional people use traditional equipment in finding wild animals and not destructive some people use gun for hunting, lesser wildlife now and some we don't see them anymore; people use traditional gears for hunting like dog chase
7. stream flow quantity		not the same from before, there is little water in the steam now; but still has water for consumption on dry and rainy season
8. occurrence of flood and drought		Inadequate water for plants and animals; Irregular rain not enough water for agriculture
9. quality of stream water		because some people poison the streams using chemical; water quality is no longer good right now no pollution; people can still use water from the streams
10. soil productivity		low soil productivity unlike in the past; average for cropping some soil are still fertile for agriculture and don't require the use of chemical fertilizer

[18]Adapted from "Resource management for upland areas in Southeast Asia" an information kit developed by FAO and IIRR for agriculture and forestry trainers and extension workers.

11. settlement pattern	 	have a lot of people and houses people cut trees for settlement and increase in population caused land conflict in the village
12. people's participation in natural resources protection		Increase natural resources easy for the people People are willing to attend natural resources
13. local ordinances on the use of natural resources		some people like but some also don't like to obey the law especially influential people;
14. adoption of appropriate cultural practices in resource management		still practice traditional ceremonies; Bunong people still follow traditional beliefs in protecting the spirit forests
General Assessment (average)		Resource use and status is likely to be sustainable

Appendix 6. Survey Team

1. Amalia R. Maling – Survey Team Leader/Community Extension Team Leader
2. Oul Kimsear – Assistant/CNRM Unit Project Officer
3. Em Tray – SWAP Project Officer
4. Im Neoun – Community Extension Staff – Provincial Counterpart t
5. Tit Chan – Community Extension Staff – Provincial Counterpart
6. Lun Sumphos – CNRM Unit Project Assistant
7. Att Sreynak – SWAP Project Assistant – Data Management
8. Van Sanny – Community Ranger
9. Yim Prya – Forestry Administration Ranger

The survey term resting on their way to one of the study areas