RESEARCH PROGRAM ON
Climate Change, Agriculture and Food Security

SITUATION ANALYSIS AND NEEDS ASSESSMENT REPORT

PAILOM VILLAGE
Savannakhet Province, Lao PDR

A Selected Climate Smart Village Site

April 2015

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Suggested citation

Bui Tan Yen, Jerome Villanueva, Anousith Keophoxay, Angela Grant, Soytavanh Mienmany, Phonevisay Silivong, Khamphamy Khodyhotha, Alice Ferrer and Leocadio S. Sebastian. 2015. Situation Analysis and Needs Assessment Report for Pailom village and Savannakhet province – Laos. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), Copenhagen, Denmark.

Titles in this series aim to disseminate interim climate change, agriculture and food security research and practices and stimulate feedback from the scientific community.

Published by the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

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Summary

The Situation Analysis and Needs Assessment is part of the baseline study of CCAFS climate-smart villages in Southeast Asia. Focus group discussions, key informant interviews, and collection of secondary data were conducted from the village to provincial levels. The Pailom village, one of CCAFS benchmark sites, is located in Champhone district, Savannakhet Province, Laos. Savannakhet province is lowland at the western part and the upland at the eastern part. The province, including Pailom village, frequently experiences drought and crop damage from pests and diseases. Rice production is the main source of people's livelihood. Due to lack of irrigation and low fertile soil, rice yield is low, ranging from 1.5 to 4.5 tons per hectare. The increasing population growth and negative impacts of climate change contribute to the yearly food shortage in the area. The number of migrant workers from the rural area of the province to the cities and neighboring countries, especially Thailand is increasing.

There are not many organizations operating in Pailom village and it is equally uncommon to find organizations working on food security and food crisis issues. Information networking for agricultural activities is mainly established between farmers. There is poor dissemination of agricultural information or technical support from agricultural extension workers and responsible agencies. The identified priorities of farmers in Pailom village include strengthening and promoting agricultural research extension to gather information on fertilizer management, sustainable agricultural production techniques, pest and disease management, and adoption of drought and salinity resistant crop varieties and appropriate husbandry techniques.

Keywords

Pailom, Laos, situation analysis, needs assessment, village, CCAFS

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Abbreviations

CSA	Climate Smart Agriculture
CC	Climate Change
CCAFS	Climate Change, Agriculture and Food Security Program of CGIAR
CGIAR	Consultative Group on International Agricultural Research
CSV	Climate Smart Village
DAFO	District Agriculture and Forestry Office
PAFO	Provincial Agriculture and Forestry Office
FGD	Focus Group Discussion
IRRI	International Rice Research Institute
NGO	Non-Government Organization
OBS	Organization Baseline Study
PC	People Committee
VBS	Village Baseline Study
KIP	Laos currency (USD1= Kip8092)

1. INTRODUCTION

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) is a strategic ten-year partnership between the CGIAR and Future Earth to help the developing world overcome the threats posed by a changing climate, to achieve food security, and to improve agriculture and livelihoods. In 2014, CCAFS South East Asia region began identifying and implementing Climate Smart Villages (CSVs). Six CSVs were selected in three countries: Vietnam, Cambodia and Lao PDR. The objectives of CCAFS CSV are to increase the adaptive capacity of small-holder farmers in light of climate change effects, improve livelihoods by sustainably increasing productivity and resilience, mitigate climate change by reducing greenhouse gases (GHGs), and enhance national food security and development goals.

This report presents the results of the situation analysis and needs assessment (SANA) for Pailom village in Champhone District, Savannakhet Province, Lao PDR. The SANA was conducted in conjunction with, and to complement other CCAFS studies in Pailom village including the village baseline study (VBS) and organizational baseline survey (OBS). The situation analysis is a broad and comprehensive review of information related to climate change, agriculture, and food security. The needs assessment provides information to make decisions regarding key priorities, challenges, opportunities for CCAFS interventions. Both systematic analyses were conducted at the provincial, district and CSV levels.

The aims of the SANA are to:

1. Understand the broad context of climate change, agriculture and food security at the provincial, district and village levels.
2. Be used as a guide to CCAFS project implementation
   - › Reveal key priorities, local attitudes and core issues for CCAFS planning.
   - › Identify stakeholders (people, groups and institutions) that can influence on the outcomes of the project.
   - › Aid in the design of an appropriate modality for introducing key interventions.

Identify capacity building needs for the community and project implementers.

3. Be used as a baseline to monitor and assess the changes occurring in the area through time in relation to adaption and mitigation to climate change.

2. METHODOLOGY

The data collection for this study used methods developed and provided by CCAFS (http://://ccafs.cgiar.org/where-we-work). Information on 15 key subject areas: natural resources utilization; organization landscape; information network; mitigation measures; production and livelihood systems (including markets); current and past natural resources management initiatives; food security status and tends; demography; climate change perception; institution landscape governance; social and gender differentiation; hazard and vulnerability; local climate information; health and nutrition profiles; and stakeholders was collected through focus group discussion, key informant interviews, and collection and assessment of various reports and records available.

The members of the Pailom CSV team include representatives from the International Water Management Institute, the CUSO International, the Mekong Development Center, the National Agriculture and Forestry Research Institute, and the Provincial Agriculture and Forestry Office of Savannakhet. In October 2014, the team conducted focus group discussions as part of the CCAFS village baseline study (VBS), and interviews with key informants including extension officers, farmers, and representatives of local organizations. Additional information, particularly at the provincial and district level, was collected through a comprehensive desk review of documents collected from different information sources: local statistics, government reports from relevant local organizations, and previous studies carried out by other international organizations.

3. SITUATION ANALYSIS

3.1 GEOGRAPHICAL LOCATION

Savannakhet province is located in the southern region of Lao PDR, approximately 470 km from Vientiane capital. It was established in 1895 and shares border with Khammuane Province in the North, Saravane in the South, Quang Tri Province in Vietnam in the East, and Mukdahan and Nakhon Phanom provinces in Thailand in the West. Its geographic coordinate is between 16° and 17°N and between 105° and 106°E.

The province has a total land area of 21,774 km^2 with an average elevation of 144 m ABS. The elevation reduces from East (1350m) to West (75m). The landscape varies from low-lying floodplains to foothills and mountains. Most (90%) of the province is flat land, and only 10% is hilly (Figure 1). The western part of the province close to the Mekong River is considered as lowland area. This is the largest rice cultivation area of Laos. Savannakhet is connected to Thailand, other areas of Lao PDR, and Vietnam via road No. 9, and it is linked to China and Cambodia via road No. 13. The province is lying on the East West Economic Corridor of Laos (Andriesse and Phommalath 2012).

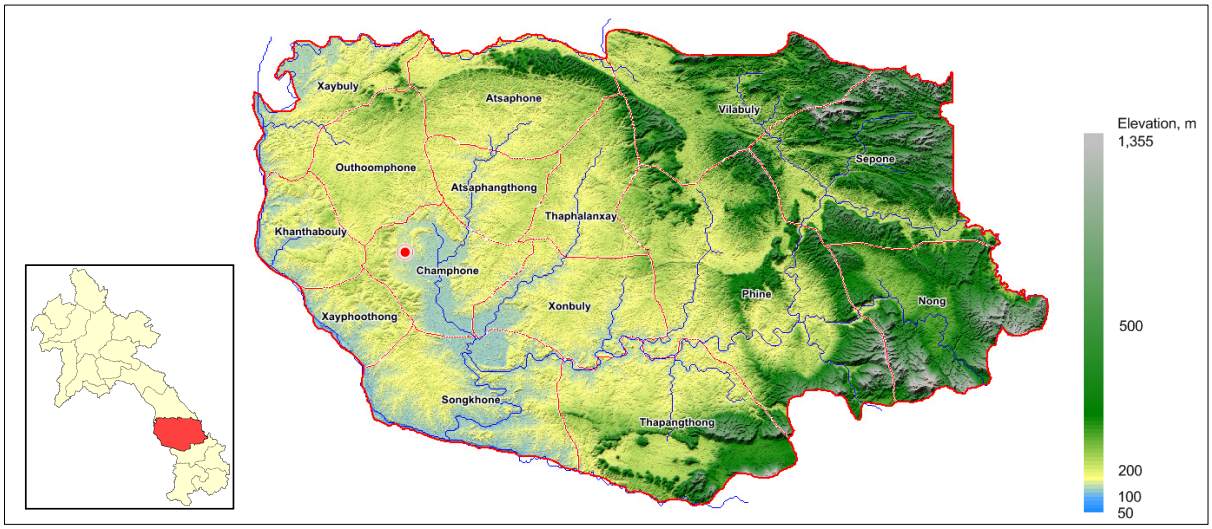


Figure 1. Topographic map of Sanvannakhet province with location of Pailom village (red circle)

Pailom village is located in Champhone District, Savannakhet Province. It is far from the main town, about one hour away via a bumpy road with many potholes, making it difficult to access. Pailom is a predominately agricultural-based community, where 90% of villagers are mainly engaged in rice paddy cultivation.

3.2 DEMOGRAPHICS

Sanvannakhet Province has 15 districts (Table 1) with a total population of 900,000 people (2011), which accounts for about 13% of the country's population. The province is the most populous in the country. According to the 2005 Census, the average population growth rate in Savannakhet was 2.1%/year, similar to the rate at the national level (IUCN and NERI 2011). The average population density is 35 persons/km^2 (Figure 2).

The province has 49 ethnic groups, each is characterized by its own culture and tradition. The majority of the population in Savannakhet is Lao Lum, accounting for about 62% of the population, followed by Phu Tai (15%), Ma Kong (9%), Ka Tang (9%), and others (5%) (Somphong 2004). There are no major differences between groups in terms of natural resource management and livelihood (SmartWood 2006).

About 63% of the population is in working age (16-60 years old). Members of the labor force have relatively low education level; most are mainly engaged in subsistence agricultural production and have little experience with commercial agriculture or off-farm works. These are the main disadvantages of labor force in Savannakhet.

Table 1. Sub-administrative units of Savannakhet province

No.	District	No. of village[1]	No. of households[2]
1	Khanthabouly	94	19,229
2	Champhone	170	18,422
3	Songkhone	142	15,920
4	Xonbouly	107	7,696
5	Thapangthong	77	5,171
6	Outhumphone	106	12,706
7	Atsaphangthong	61	6,608
8	Atsaphone	97	8,271
9	Phalanxay	78	5,227
10	Xayphouthong	63	8,796
11	Xaybouly	89	8,797
12	Phin	116	8,032
13	Xepon	160	8,400
14	Nong	78	3,714
15	Vilabouly	103	5,343
	Total	1,541	142,332

The field survey conducted in 2014 shows that Pailom village had 669 people, including 430 women and 239 men. Most people were born and raised in the village. Houses in Pailom village have a compact layout. There is an increasing trend among villagers, especially the men, in moving out of the village to find work

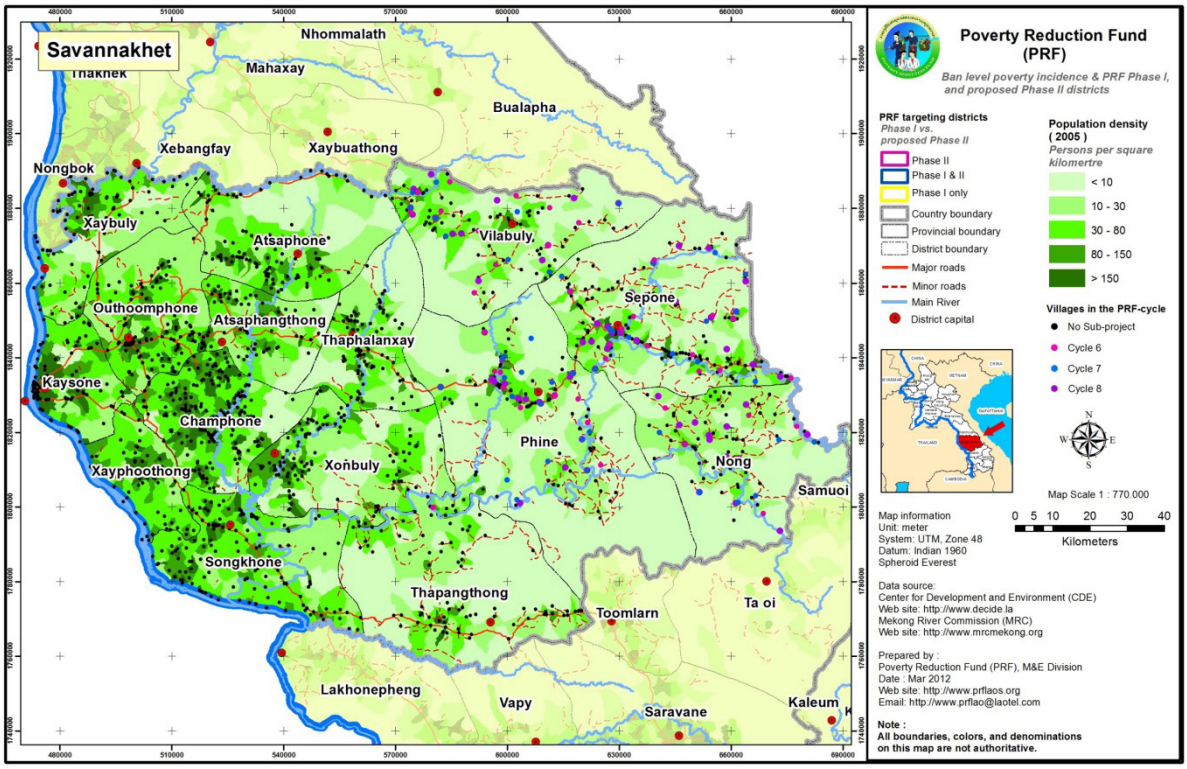
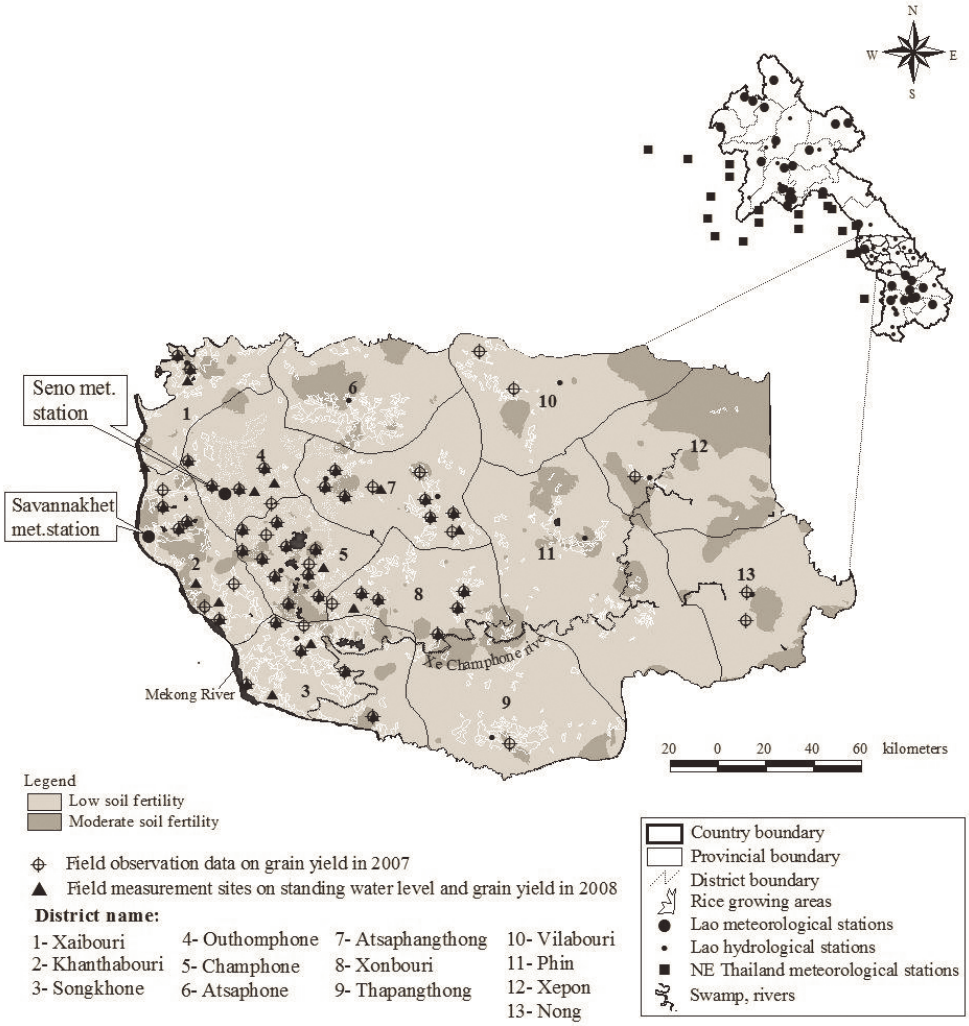


Figure 2. Map of population density (persons/km^2) of Sanvannakhet province in 2005

3.3 LOCAL CLIMATIC INFORMATION

Figure 3 shows the location of two meteorological stations (one national station and one provincial station) and 11 hydrological stations within and nearby Savannakhet province. Savannakhet has a tropical monsoon climate. The average annual temperature is 26.5°C. Temperature is highest in April and May (nearly 30°C) and lowest in December to January (22°C) (Figure 4b).



Source: Inthavong, Fukai, and Tsubo (2011)

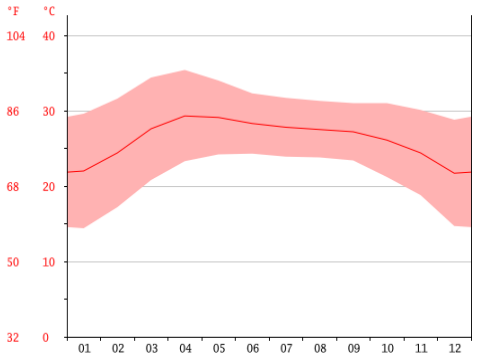
Figure 3. Location of meteorological and hydrological stations (black circle) within and around Savannakhet province

There are two main seasons in Laos: The rainy season and the dry season. Rainy season often starts in May and lasts for five months or until October. The dry season is from November to April. The average annual rainfall is approximately 1,450mm. The distribution of annual rainfall is significantly higher in the northeastern upland region (1800-1900mm) than in the southwestern lowland region (1300mm) of the province. Nearly 90% of annual rainfall is during the rainy season and only 10% during the dry season.

The highest rainfall is in August, about 345 mm (in Savannakhet City) (Inthavong, Fukai, and Tsubo 2011; Kosaka, Takeda, Sithirajvongsa, and Xaydala 2006). Inthavong et al. (2011) showed the mean monthly rainfall observed over 20 years (from 1985 to 2008) (Figure 4b) and found that annual variation in early-season rainfall had a large influence on the spatial variation in field water availability, which contributed to the year-to-year variation in time of rice sowing and transplanting.

The average number of hours of sunlight per year is 2,280, which is about 256.8 hours longer than the national average. However, this climate condition does not influence agricultural production, especially industrial plantations, including sugarcane, cassava, rubber, and more (IUCN and NERI 2011).
The farmers in Pailom make use of a variety of indigenous weather forecasting techniques. There is a belief that heavy rains are signs of the early onset of the cold season and lots of fruit on the mango trees in March.

a



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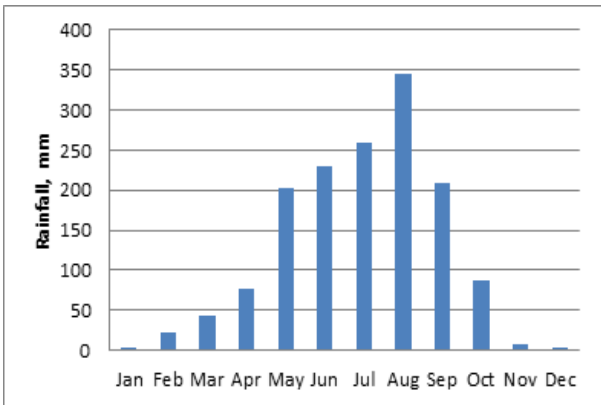


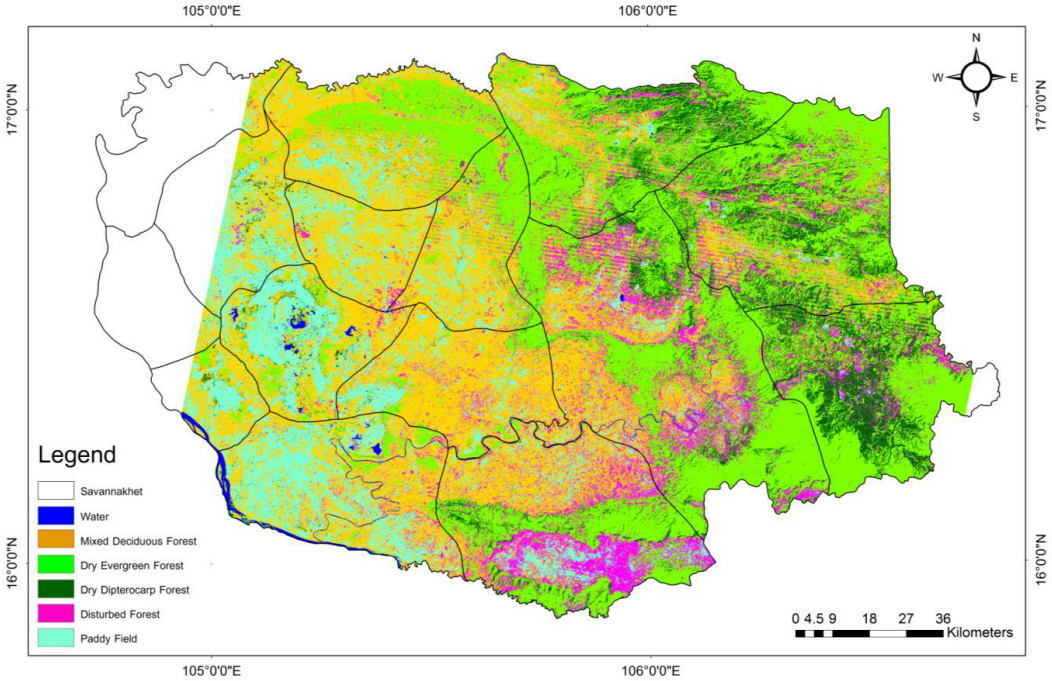
Source: Inthavong, Fukai, and Tsubo (2011)

Figure 4. Variation of monthly (a) temperature (http://en.climate-data.org/location/1358/) and (b) rainfall in Savannakhet province

3.4 NATURAL RESOURCE UTILIZATION

3.4.1 Land use

Savannakhet Province has large forested areas. In 2000, forest land covered approximately 70% of the province. The natural protected forest can be found in Phou Xang Hae, Dong Nadet, and Don Phou Vieng districts and a natural production forest in the Dong Sithouane district. The eastern part of the province, including Vilabouri, Xepon and Nong districts, is mainly covered by deciduous dipterocarp forest (Inthavong, Fukai, and Tsubo 2011). The present distribution of forest types over the province is shown in Figure 5. Currently, Savannakhet Province has a total forest area of about 1.1 million ha, including conservation, protection and production forests, representing about 52% of the total provincial area (IUCN and NERI 2011).



Source: Vicharnakorn, Shrestha, Nagai, Salam, and Kiratiprayoon (2014)

Figure 5. Distribution of Land-cover types in Savannakhet province

Table 2. Land use change in Savannakhet Province between 1990 and 2000 (unit in 1000ha)

	Area, 1000 ha		Variation
Land cover type	**1990**	**2000**	
Dense forest	1,203	1,075	-128
Dry dipterocarp	631	641	10
Lower dry evergreen	4	3	-1
Lower mixed deciduous	134	66	-68
Upper dry evergreen	36	28	-8
Upper mixed deciduous	388	330	-58
Gallery forest	10	4	-6
Plantations	0	3	3
Potential forest	625	665	40
Bamboo	57	9	-48
Poor forest	535	598	63
Shifting cultivation	33	58	25
Woodland	32	51	19
Savannah/open woodland	19	38	19
Shrub or heath	13	13	0
Agricultural land	243	307	64
Rice paddy	225	285	60
Other agricultural land	0	2	2

	Area, 1000 ha		Variation
Land cover type	**1990**	**2000**	
Grassland	18	20	2
Other lands	37	42	5
Urban and infrastructure	16	18	2
Barren land/rock	3	3	0
Swamp	3	3	0
Water surface	15	18	3

Source: Somphong (2004)

Forestry is the second most important sources of income in the province, after agriculture. However, this natural resource is declining quickly due to increasing population, expansion of settlement area and agricultural land, and deforestation. According to Kosaka et al. (2006), over 10 years, from 1990 to 2000, land use pattern of the province changed significantly (Table 2). The province lost 128,000 ha of dense forest while agricultural land increased 64,000 ha. In 2005, 60% of Savannakhet province was under forest land but it dropped to 52% after five years (IUCN and NERI 2011).

Based on the statistical data provided by Savannakhet PAFO, the province has 1.5 million ha of arable land, representing about 68% of the total provincial land area. However, a large share of this land is considered to have low fertility. Currently, about 209,589 ha (14% of total arable land or 9.6% of the total provincial area) is being used for agriculture production. The remaining 86% of arable land is not yet utilized for any purpose (IUCN and NERI 2011).

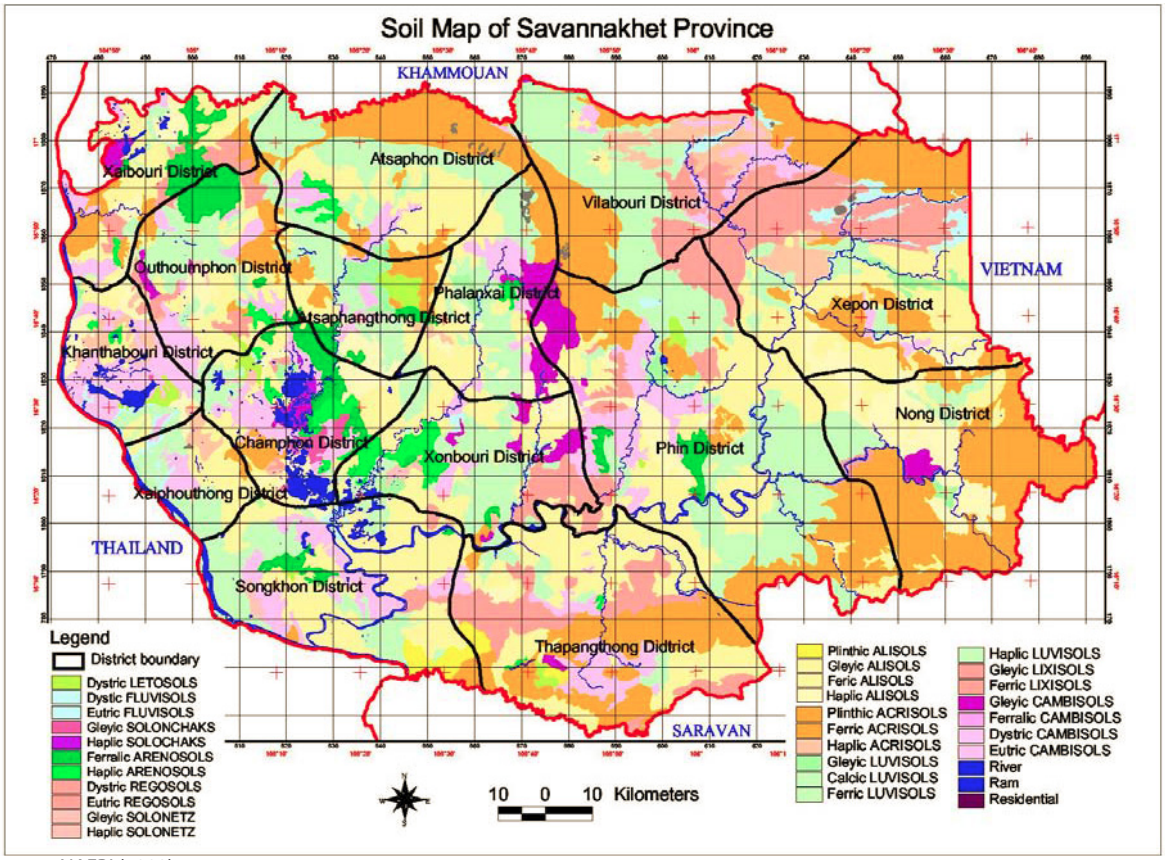
Agriculture is the most important economic sector in the province, and rice is the most important crop. Savannakhet is the province that has the largest paddy rice area in Laos, covering about 194,157 ha or 21% of total national rice area (Boulidam 2012). Most of rice cultivated lands are located in the central, south-western and north-western corners of the province. Generally, the rice fields are situated in flat and gentle slopping (0–8%) lands (Inthavong, Fukai, and Tsubo 2011).

Shifting cultivation still exists in some districts of Savannakhet province. Slash-and-burning practice has been destroying natural resources. In 2001, this practice was found particularly in Phin, Xepon, Vilabuly and Nong districts, with a total of about 2,500 ha. Nowadays, under the national program on stabilization of shifting cultivation, which was carried out by government agencies (PAFO and DAFO) in collaboration with international organizations (SIDA, FOMACOP, CIDSE, OXFAM, and Action North Sud), the area of shifting cultivation has significantly reduced.

In upland areas, however, agro-forestry practices that can still be considered as shifting cultivation continue to exist. During the first year, villagers apply the slash-and-burn practice to clean new land plot and cultivate rain-fed rice or other cash crops (e.g. sweet corn, watermelon, beans, etc.), mixed with perennial crops (i.e. fruit trees or timber). For the first three years, they harvest products from annual crops while fruit trees and timber are still small. When perennial crops grow up with closer canopy and production of annual crops reduced accordingly, they start slash-and-burn in a new plot.

In Pailom village, deforestation is rampant, but there still remains one community forest with high tree density. This forest is an important community resource supplying food/NTFP and wood for the village. With permission, the villagers can cut down trees for timber used for village construction such as temple, school and village office. For firewood, villagers have to go to the forested area in NongBone village, approximately 4 km outside of Pailom.

Figure 6 illustrates 11 soil groups (FAO-UNESCO classification system) in Savvanakhet province, consisting of Fluvisols (FL), Arenosols (AR), Regosols (RS), Cambisols (CM), Acrisols (AC), Solonchaks (SC), Solonetz (ZN), Lixisols, Alisols (AL), Leptosols (LT) and Luvisols (LV). Cambisols group covers almost low land area where paddy rice is grown, including 3 main soil types: Ferralic CAMBISOLS, Dystric CAMBISOLS and Eutric CAMBISOLS (Boulidam 2012). In general, soils in Savannakhet are characterized by low fertility.



Source: NAFRI (1992)

Figure 6. Soil Map of Savannakhet province

In 1996, a soil survey was conducted in Savannakhet province. The sampling density is about 50–100 ha per sample pit. Each district had an average of 26 samples for identifying soil type, soil depth, soil texture, slope, and topsoil fertility. The dominant topsoil texture types are coarse textured– sand, sandy loam, and loamy sand, which account for 4.5%, 38% and 41% of total land area, respectively. Less than 20% of land area have the clay loam and loam texture. In the subsoil layer (below 20 cm), typical soil textures are sandy

loam and clay loam, account for 67% of the total area. The soil depth varies greatly among soil types, with deep (more than 100 cm) soils being the predominant category, covering about 78% of the province, whereas shallow and thin soils account for less than 6% (Inthavong, Fukai, and Tsubo 2011).

The study conducted by Inthavong et al. (2011) shows that the rice cultivated lands in the province mostly have low soil fertility in terms of organic matter, total CEC, base saturation, total available P, and K2O. In the lowland area, more than 50% of the rice lands are on the Acrisols soil group, the highly weathered soils with a low content of primary minerals, and a low base saturation (<50%). The study also shows that in wet season, soils contains 8.2 -56.4 kg ha-1 of N, 0.6 to 43.6 kg ha-1 of P, and 38.6 to 140.5 kg ha-1 of K. Average soil indigenous nitrogen supply is lowest in Songkhone district (19.3 kg N ha-1) and higher in Champhone and Xepon districts (42.8 kg N ha-1 and 56.4 kg N ha-1, respectively). The soil indigenous phosphorus supply is lowest in Khanthabouri district (3.1 kg P ha-1) and the soil indigenous potassium supply is lowest in Xepon district (39 kg K ha-1).

3.4.2 Water resources

The main rivers that flow across the province are Mekong, Xe Banghiang, Xe Bangfai, Xe Noy, Xe Champone, Xe Sansoy, Xe Lanong, Xe Pone, and Xe Thamouak. The rivers and wetlands provide an important habitat for aquatic species, as well as a basis for irrigation system development and electricity generation. The province already has existing irrigation schemes, including Nongtao Lake, originally constructed for rice paddy irrigation. Currently, the national and provincial governments are also conducting feasibility studies for a number of additional large irrigation projects for agriculture in the area, as well as investigating and constructing a total of five hydro- electricity projects (i.e. Tad Sakok, Tad Salean, Se Lanong, Se Banghiang I, Se Banghiang II) (IUCN and NERI 2011).

There are a few ponds in Pailom and villagers use this resource for domestic water use and to collect fish, amphibians, and wild vegetables for home consumption and to sell at the market. However, the ponds tend to be shallow and dramatically reduce in size during the dry season. About 8km from Pailom is the large Soui reservoir that is abundant in natural resources. Villagers in Pailom go to this reservoir for fishing and to collect other aquatic species for household consumption and to sell for income.

3.4.3 Mining

Savannakhet Province is rich in mineral resources, such as copper, gold, ceramics, potassium, sodium, and iron with more than 10 important mineral deposits have been found in the province. The two mines already established in the province are Sepon Gold & Copper mine (Australian/Chinese investment) and a ceramics mine (Vietnamese investment). The Sepon mine produces about 100,000 ounces of gold and 60,000 tons of copper annually to the world market and employs over 4,000 people. In 2009, it brought revenue of USD$80.5 million to Laos's government. Nowadays, national and provincial governments have permitted mining companies to investigate 16 mining deposits in Savannakhet Province: gold and iron deposits in Sepon District, barite deposit in Villaburi district, sodium deposit in Champhone district and three potassium deposits in Champhone, Xonburi, Songkhone and Xayburi districts (IUCN and NERI 2011).

3.5 PRODUCTION AND LIVELIHOOD SYSTEMS

In Laos, 95% of the population depends on agriculture as the main source of livelihood, particularly in rural areas (Boulidam 2012). In 2010, agriculture contributed 49% of the total production value of Savannakhet province, followed by service and industry sectors (IUCN and NERI 2011). The main agricultural products are rice, maize, vegetables and industrial crops (i.e. sugarcane, rubber, and acacia and eucalyptus).

Table 3 shows the traditional agriculture products of Savannakhet province (IUCN and NERI 2011). Rice is a staple food for daily consumption and the main source of livelihood of Laos' people. Among the six main rice-cultivated provinces in southern Laos, Savannakhet has the largest area of lowland rice, accounting for 23% of the lowland rice area of the country (Inthavong, Fukai, and Tsubo 2011). In 2009, the province has 185,674 ha of rice.

The rice production system is classified into lowland rice and upland rice cultivation. In the lowland area, rice can be grown in the single or double rice cropping. The average rice yield range between 1.5 and 4.7 ton/ha, depending on varieties, land quality, fertilizer input and weather condition. Most of the grain production is for domestic consumption. The majority of the present production system in Savannakhet is a single wet season cropping, particularly where there is no irrigation supply. Sowing seedling is in late May to mid-June, followed by transplanting in mid-June to mid-July. However, the timing of practices depends on rainfall distribution. Besides rice production, Savannakhet province has various other annual crops (i.e. wheat, peanuts, beans, watermelon, cucumber, etc.) with total area of nearly 19,000 ha. The province also has 7 buffalo and cattle farms, 79 pig farms, 19 poultry farms and 16,183 fish ponds (Somphong 2004). The number of domestic livestock is being raised steadily.

Table 3. Agricultural production in Savannakhet Province, 2009

Products	Area(ha)	Yield (ton/ha)	Total production (t)
Rice	185,674	3.6	674,756
Single rice cropping	164,968	3.51	579,038
Double rice cropping	20,206	4.7	94,968
Upland rice	500	1.5	750
Other crops	18,930.6	5.3	100,486
Wheat	3,773.4	3.16	11,924
Peanuts	1,250.0	2.04	2,550
Yellow beans	4.4	1.14	5
Green beans	9.1	1.1	10
Beans	1,110.5	3.04	3,376
Watermelon	2,112.1	12.76	26,951
Cucumber	1,487.2	7.2	10,708
Chili	1,795.2	1.45	2,603
Eggplant	705.9	3.41	2,407
Tomato	248.0	3.54	878
Other vegetables	3,600.6	5.15	18,543

Industrial agriculture, which characterized by large- scale plantations, advanced techniques used, and commercial orientation, is relatively new introduced in Savannakhet province by foreign companies, but it is expanding rapidly. Table 4 provides a list of industrial crops grown in the province in 2009. The total actual planted area is only 17% of the planned area for planting. In terms of planted area, the top three industrial crops are sugar cane, eucalyptus and rubber.

More than 143,000 ha (about 6.5% of the total provincial land area) was allocated to plantation companies, mainly located in Xayburi, Outumphone, Atsaphanthong, Palanxay and Phin districts, but only about 25,000 ha is being used. The main industrial crop products are sugar cane, eucalyptus, rubber and cassava. In 2009, production of sugar cane and cassava were 56.4 tons and 7.5 tons, respectively.

In 2007, the province had 27 big wood processing companies. The wood processing industry plays an important role in Savannakhet's economy. According to Savannakhet PDPI, the total value of wood and products exports accounted for USD 47.5 million in 2006- 2008, approximately 3.5% of the total export value of the province. Wood and wood products are the third important export products of the province, after copper and gold (IUCN and NERI 2011).

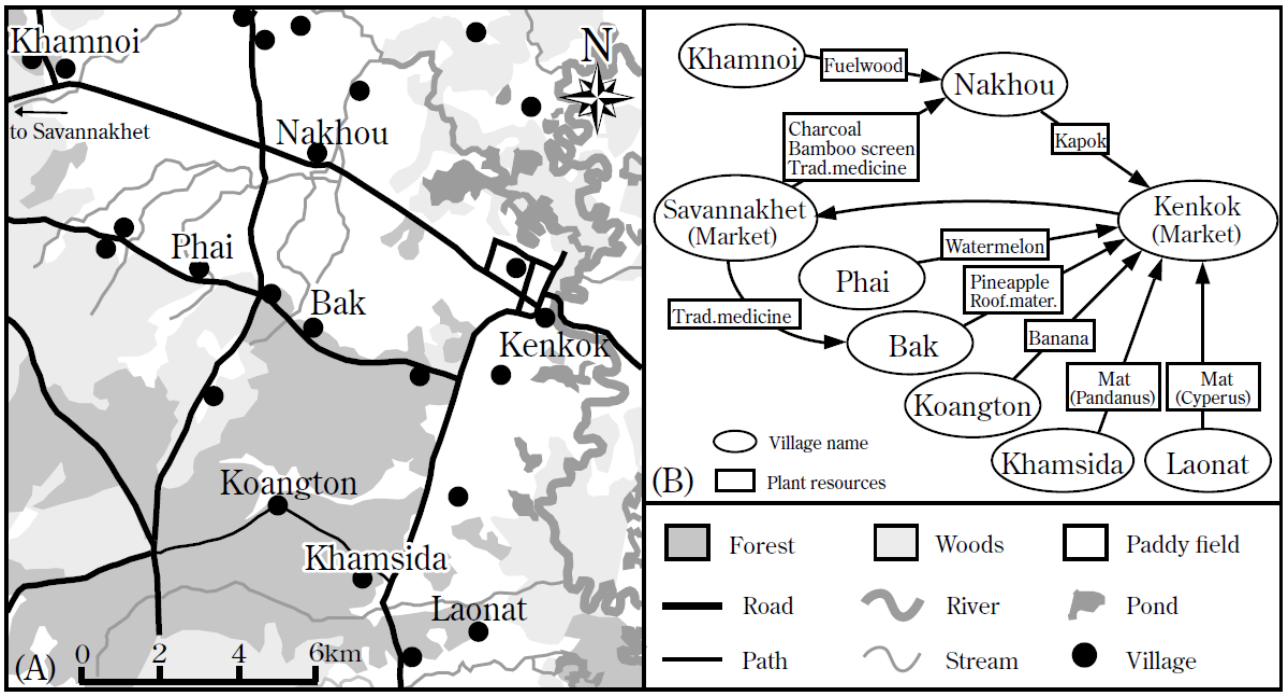
Table 4. Area and products of industrial agriculture in Savannakhet Province, 2009

Products	Planned area (ha)	Growing cycle (years)	Actual planted area (ha)	Production (t/ha)
Rubber	26,651	30-49	5,929	NA
Cassava	12,508	20-30	2,100	7.5
Eucalyptus	41,672	15-70	7,230	NA
Sugar Cane	22,000	30-40	9,620	56.4
Acacia	40,025	40	312	NA
Jatropha	100	NA	NA	NA
May Tiew (for charcoal)	100	NA	0	NA
Fruit trees	200	NA	NA	NA
Coffee	100	NA	NA	NA
Total	143,356		25,191	

Forests and other natural resources play an important role in local livelihoods. Wildlife and non- timber forest products (NTFPs) (e.g. bamboo, dipterocarp resins, medicinal plants, mushrooms, cardamom and rattan) are consumed by households as well as sold for extra cash income. They are an important part of livelihoods and safety net for rural people in terms of food insecurity (IUCN and NERI 2011). A study of Kosaka et al. (2006) conducted at communities in Savannakhet showed that other products such as wild fruits, shoots or greens could be collected anywhere in the villages, except protected areas and private land. Forest supplied the largest number of useful products. More than 100 plant species are collected and used by villagers as food (bamboo, vegetables), timber (Dipterocarpus alatus, Pterocarpus macrocarpus, Dialium cochinchinense and Peltophorum dasyrrhachis), fuel (Irvingia malayana) or basketry (Abundant Calamus sp. and Dendrocalamus strictus). Some of them had good economic value as they can be sold in local market or to traders (Dendrocalamus strictus shoots, Nephelium hypoleucum fruits, Syzygium gratum

var. gratum shoots). Fallow fields are also sources of edible plants as main ingredient of a popular Lao dish. In some areas, pineapples have become the most popular crop and income source, replacing previous upland rice. Grassland is an important source for roofing material and making brooms. Many kinds of vegetables are collected long waterside for home consumption and also sold in the market.

Figure 7 shows the distribution of agricultural and forestry products over a larger geographical scale by trade. There is a central market in the town of Savannakhet province, where villagers can sell their products and buy goods. The bamboo screens and other handicraft products are produced in Savannakhet.



Source: Kosaka, Takeda, Sithirajvongsa, and Xaydala (2006)

Figure 7. Products of communities and their distribution in Savannakhet province

According to Andriesse and Phommalath (2012), nowadays, non-farm activities in rural area (e.g. collecting forest products, wildlife hunting, logging, etc.) do not contribute much in household income as before. Labor migration brought good opportunity for household livelihood. Remittances have become one of the main sources of income for the villagers. In Giang Pho Sy village, a household that has one or more migrant labor is able to generate an additional average income of USD 2,139 per year. Poor households mainly use remittances for their basic needs. Average households use remittances for the diversification of their income structure (e.g. cash crops, trading and services). Well-off households use this opportunity to invest on a larger scale agricultural production and education of children.

The poverty rate reflects the percentage of people living below the national poverty line[1]. From 1992 to 2009, poverty rate in Savannakhet province reduced significantly, from over 50% to below 10% (Andriesse and Phommalath 2012; IUCN and NERI 2011). However, the province was in the middle class of national poverty ranking. Figure 8 shows the distribution of poverty rate over districts in Savannakhet province. From 2005 to 2010, the province has a remarkable economic growth with provincial GDP increased by 10.5% yearly and the GDP per capita increased from USD 525 (2005) to USD 897 (2010)(IUCN and NERI 2011). However, over 84,000 people or 14,286 households were still living below poverty line, especially in the remote areas in the eastern part of the province, where road and other infrastructure is less developed and access to markets is difficult.

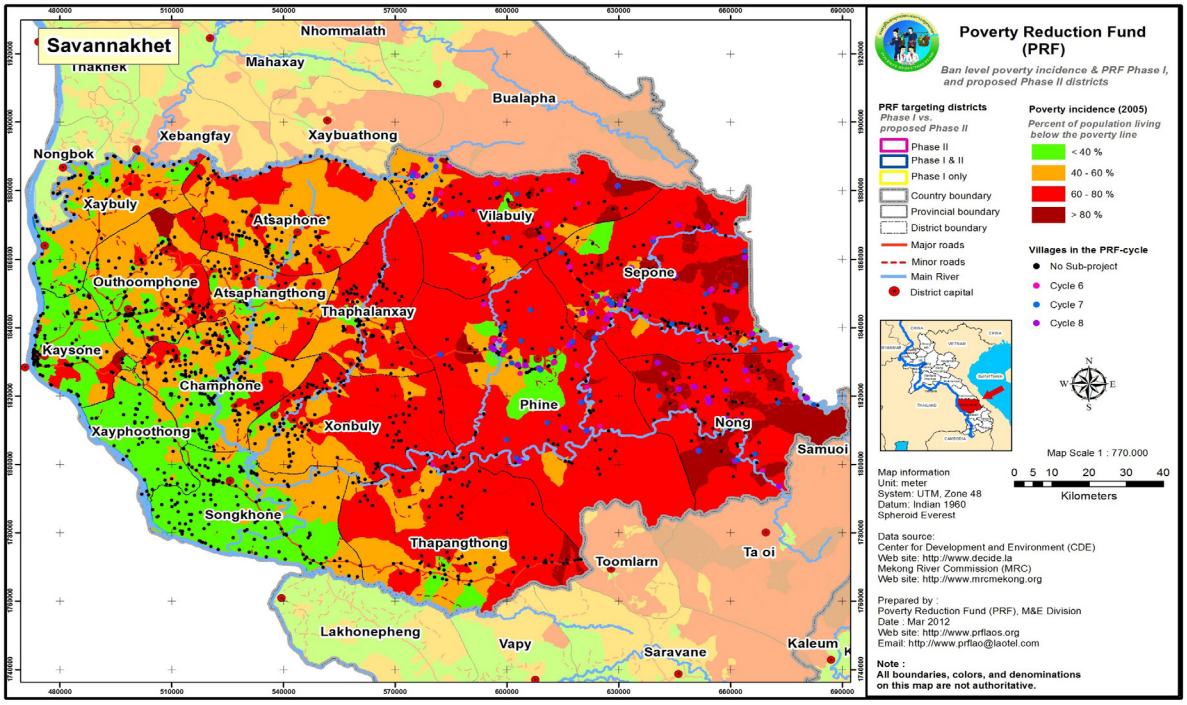


Figure 8. Poverty rate in districts of Savannakhet province in 2005

The economic growth resulted in provincial budget surpluses, expanded job opportunities in the city of Savannakhet, income generation and increased commercialized production. The physical infrastructures (e.g. rural accessibility, rural schools, health centres and water sanitation) has been improved and expanded (Andriesse and Phommalath 2012). As the negative effect of economic growth and openness in Savannakhet, various inequalities have emerged between the city and the rural areas, between men and women and between the Lao Loum (well-off lowland people) and the Lao Theung (upland people) (Cornford 2006).

1 The food poverty line in Lao PDR is understood as consuming of less than 16 kilogram rice per person per month and the general poverty is understood as food poverty line plus 20% of local price of 16 kg rice. That means households consuming and spending less than the line are identified as poor household. In general poverty in Lao PDR is understood as inability to satisfy basic needs including food consumption, clothing and housing.

Together with provincial economic growth, socioeconomic stratification within the village can also be obviously seen. Well-off households tend to develop agricultural production for both consumption and commercial purposes. This group also diversifies their income sources from relatively large paddy fields, many animals and plantations. They also hire labor and applied modern technology in farming. The middle group is often engaged in long-term investments and cash crops or mixed agriculture production and wage labour. The poor households are characterized by a large number of dependents (elders and children), small pieces of land or landless. The livelihood of poor households is based in forests and wage labor.

Although Savannakhet is one of biggest provinces in Laos, the province is not able to create enough jobs to meet employment demand. Labour migration is very popular in the province. A study of Andriesse and Phommalath (2012) showed that percentage of migrant workers in a village increased from 3% (2002) to 48% (2010). Many people migrate to cities or even other countries to find jobs. Most migrant workers are in the ages between 18 and 30 years old, where 55% are female. The increase in migration is attributed to two reasons: (1) from 2005, all citizens in Laos can obtain a passport, and (2) in 2006, the bridge connecting Savannakhet with Mukdahan (Thailand) was built. Andriesse and Phommalath also found that most of the migrant workers (91%) migrated to Thailand, and only 9% work in cities of Laos. Similarities in culture and language and a high labor demand in Thailand are advantages for migrant labors. They often come back to the village once a year during the Lao New Year. This resulted in changes in labor structure in the villages. Farming works are mainly managed by children and elders.

Meanwhile, Pailom villagr is predominantly agricultural community with 90% of the population's main livelihood is farming, particularly rice paddy farming. The minimum area of land owned per household is 0.8 ha and the maximum is 5 ha.

All household members are involved in rice cultivation. Part of grain production is used for household consumption and the rest is sold to the middlemen at a price set by the middlemen. No price negotiations take place with farmers being price takers. Farmers feel that they are being cheated as the weighing machine is sometimes not functioning. Moreover, although the planted area is increasing, rice yield has been declining for the following reasons: increase of pests and diseases, monoculture production, and soil degradation. In addition, climate change such as the hotter and longer dry season and more frequent and extreme droughts are also challenges mentioned by farmers that contribute to the decline in rice production. Under such negative impact of climate change, some households have depended on government food aid program. To deal with this problem, some farmers are using more chemical fertilizers, engage more on livestock production, and other farmers migrate to Thailand for wage labor.

About 90% of households in Pailom village raise cattle and livestock. All household members join this activity: both husband and wife take care of animals and the children are mainly responsible for feeding. The number of cows has been increasing while the number of buffalo has been decreasing. Compared to buffalo, cow brings higher income and requires less water than buffalo (i.e. for bathing). Furthermore, buffalo as a farm animal is being replaced by machines. With increasing cow herds in the village, there is a high demand on pasture land.

There are 5% of households are into fishing, 5% have supplementary household income from handicrafts (i.e making rice box, hats, mats, etc.), and 2% have a small business (i.e, small store). In Pailom, only women produce handicraft products. More households are engaged in handicrafts given that the market price of these products has been increasing.

3.6 FOOD SECURITY STATUS AND TRENDS

In Laos, rice is the staple food.. In 1990s, about of 80% of households were engaged in rice cultivation (Kosaka, Takeda, Sithirajvongsa, and Xaydala 2006). A number of changes in farming practices have taken place in the last decades (Andriesse and Phommalath 2012). New agricultural technologies have been introduced, machinery replacing human labor, and animal power, chemical fertilizers and pesticides are applied, and new crop and animal varieties are being used. Agricultural labor has better access to education and has more chances to learn innovative agricultural technologies. In 2005, the total area planted to rice in Laos was approximately 793,980 ha (about 80% of the cultivated land).In 2009, the total rice area increased to approximately 872,896 ha (Boulidam 2012).

Table 5. Rice area and yield in districts of Savannakhet province in 2008

No.	District	Rice area (ha)	Grain yield (kg)
1	Xaibouri	20,031	2800 – 4900
2	Khanthabouri	24,319	600 – 2200
3	Songkhone	39,400	900 – 3200
4	Outhomphone	31,300	950 – 2800
5	Champhone	44,800	900 – 3400
6	Atsaphone	17,119	–
7	Atsaphangthong	19,869	1100 – 3500
8	Xonbouri	15,625	1500 – 2300
9	Thapangthong	14,519	–
10	Vilabouri	5,563	–
11	Phin	10,900	–
12	Xepon	1,150	–
13	Nong	19	–

Source: Inthavong, Fukai, and Tsubo (2011)

There are many rice varieties grown in Savannakhet province, including commercial varieties (TDK 1, TDK 11, TDK 7, TDK 8, Thasano 1, PG 1, RD 6 and RD 8) and traditional varieties (Luengboonma, Douyuan, Peutnam, Jasmine, Saiyan, Khaosuong, Dou Obon, Khamnoy, Dounoy, Eephond, Dounuan, Phanbouli, and Eekhaoyai, etc.). Farmers commonly plant early, medium and late maturing varieties to have a continuous food supply in the year. Boulidam (2012) used six scenarios to simulate yield of lowland paddy rice under climate change in Savannakhet and showed that the mean rice yield up to year 2100 will vary between 3.5 ton/ha to 3.7ton/ha. The rice yield may reach highest value of 4.1 ton/ha.

In Pailom village, sticky rice is the preferred and main staple food. In the daily meal, rice is the basic food and, generally, accompanied by small portions of animal products such as chicken, duck, pork, beef, and egg,

amphibians, and fish. For the most part, these animal products originate from small household livestock production or are collected in community ponds. However, there is not enough livestock production to meet household consumption needs and additional meat is bought from the markets. Vegetables and fruits are available in small amounts and consist of chilies, papaya, morning glory, and mint. Most of the farmers collect the natural vegetable and amphibians from the paddy fields and forests. Villagers have an insufficient amount of food, especially rice during September and October.

Food crisis, in the form of rice shortages, is a recurring problem in Pailom. Small food shortages occur nearly every year and the most serious food shortage happened 30 years and 5 years ago. The more severe food crisis occurred because of severe droughts and floods in Champhone district. During times of food shortage, villagers are offered rice and corn powder (emergency food aid) by the government at a subsidized price. Also, villagers cope with the situation by seeking work as farm labour for others in the village or temporary migrate for work in Thailand to supplement their family income.

3.7 HAZARDS AND VULNERABILITY

In Laos, drought or flooding can occur at any period of the rice growing season, especially in the early and the later period of the growing season. In 1991 to 2002, several floods have significantly impacted on the lowland rice area in the Mekong River Valley, including Savannakhet, resulting in losses to more than about 70,000 ha of rice planting areas. In 2011, the tropical storms Haima and Nock-Ten caused floods and damaged more than 37,000 hectares of ricelands. More than 300,000 people were affected and the damage was estimated at more than USD 100,000,000 (Boulidam 2012). In Savannakhet province, annual droughts and flooding are more commonly seen in the eastern uplands than in other regions.

In Champhone district, people suffer from seasonal flooding every year (Table 6). Although the land is not seriously damaged by the extreme flood event but almost all products (crop, livestock and fish) are affected (e.g., strong Nock Ten typhoon in 2011 caused deep flood and damaged rice and livestock production in this area). Therefore, food insecurity is the main problem for many people during the flood events (UNDP and MAF 2012).

Meanwhile, pest and disease outbreaks during the wet and dry seasons are common problems for crops, livestock, and fishery production. However, the problems occur differently from year to year. Outbreaks of golden snail, blast, stem rot, sheath blight, foot rot and sheath rot often happened in the district. During the last 10 years, several hazards and extreme weather events that impacted on agricultural production in Champhone district were recorded.

Table 6. Impact of natural hazards in Champhone district in last 10 years

Events	% of households[3]			
	High impact	Medium impact	Low impact	No impact
1. Flood before harvest	61.33	32	4.67	2
2. Drought after planting	6	2.67	35.33	56
3. Prolonged rain/flood in wet season	54	33.34	10.66	2
4. Prolonged drought in dry season	0.67	0.67	20.66	78
5. Storms/typhoons	97.33	2	0	0.67
6. Pest and diseases in wet season	29.34	43.33	25.33	2
7. Pest and diseases in dry season	18	15.34	40.66	26
8. Land slides	3.33	0	0	96.67
9. Forest fires	0	0	0	100

Source: UNDP and MAF (2012)

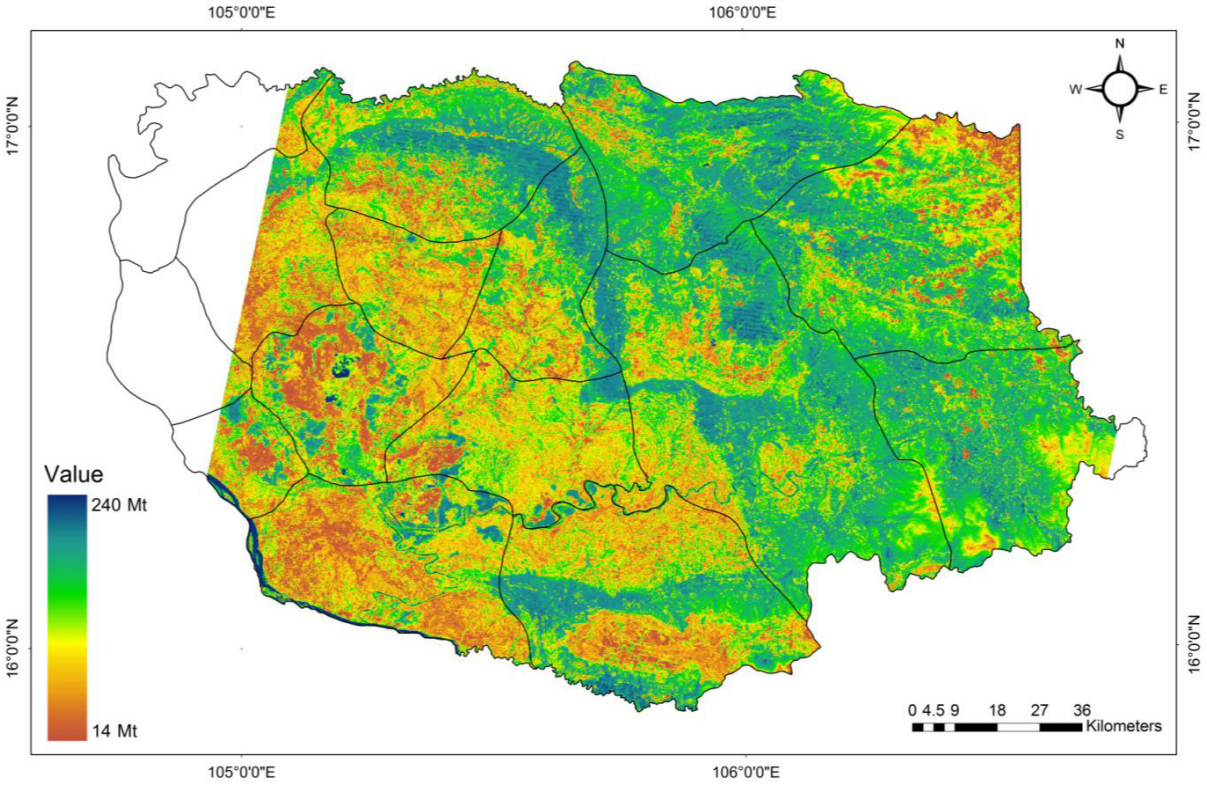
In addition, people in Champhone district have also experienced cold spells in some years. The low temperature has killed many cattle (cow and water buffalo) and poultry (chicken and duck).

In Pailom village, due to a lack of irrigation, farm land is completely dependent on rainfall, is prone to droughts, and has a deep water table, which limits production. Although flooding is a problem for most farmland in Laos, floods in Pailom do not occur due to its geographic position. However, flooding occurs in nearby villages, which indirectly impacts on Pailom village as they depend on the food supplies from these villages to meet their needs.

3.8 MITIGATION MEASURES

It is widely known that deforestation and forest degradation are major sources of greenhouse gas (GHG) emissions. The estimated global carbon dioxide (CO_2) emissions from land-use change over the 1990s had an average of 1.6 Gt $C \cdot a^{-1}$. In 2005, land-use change in Laos was responsible for 26% of the GHG emissions of the country and these emissions are expected to increase annually. Over 28 years (from 1982 to 2010), forest in the country lost a total volume of 148 million m^3 (Vicharnakorn et al. 2014).

Vicharnakorn (2014) showed that in Savannakhet, the overall carbon stock was approximately 230.50 mt, with an average of 120 t/ha (Figure 9). The mixed deciduous forest had the highest total carbon stock, followed by the dry dipterocarp forest and dry evergreen forest. The soil carbon content of the dry evergreen forest, disturbed forest, and paddy fields sites was higher than their above-ground carbon stock.



Source: (Vicharnakorn et al. (2014).

Figure 9. Carbon stock map of Savannakhet province

3.9 CLIMATE CHANGE PERCEPTION

3.9.1 Historical and future climate

The climate in Savannakhet province is dominated by the south-west monsoon with higher rainfall, air humidity and temperatures in the period between April and October. There is strong variability in seasonal rainfall distribution with seasonal droughts and floods.

Historical climate data observed over 39 years (1971 – 2009) in Savannakhet province (Figure 10) show that the annual air temperature varied between 21.17°C and 31.35°C, and averaged 26.14°C. The highest temperature recorded was 44°C in April 1974 and the lowest was 2.9°C in December 1975. From 1971 to 2009, annual air temperature increased by 0.68°C. The average annual rainfall was 1,426 mm. It was lowest (1070 mm) in 1998 and highest (1982 mm) in 2002. During rainy season, the highest monthly rainfall amount was 578.2 mm recorded in August 1974 (Boulidam 2012).

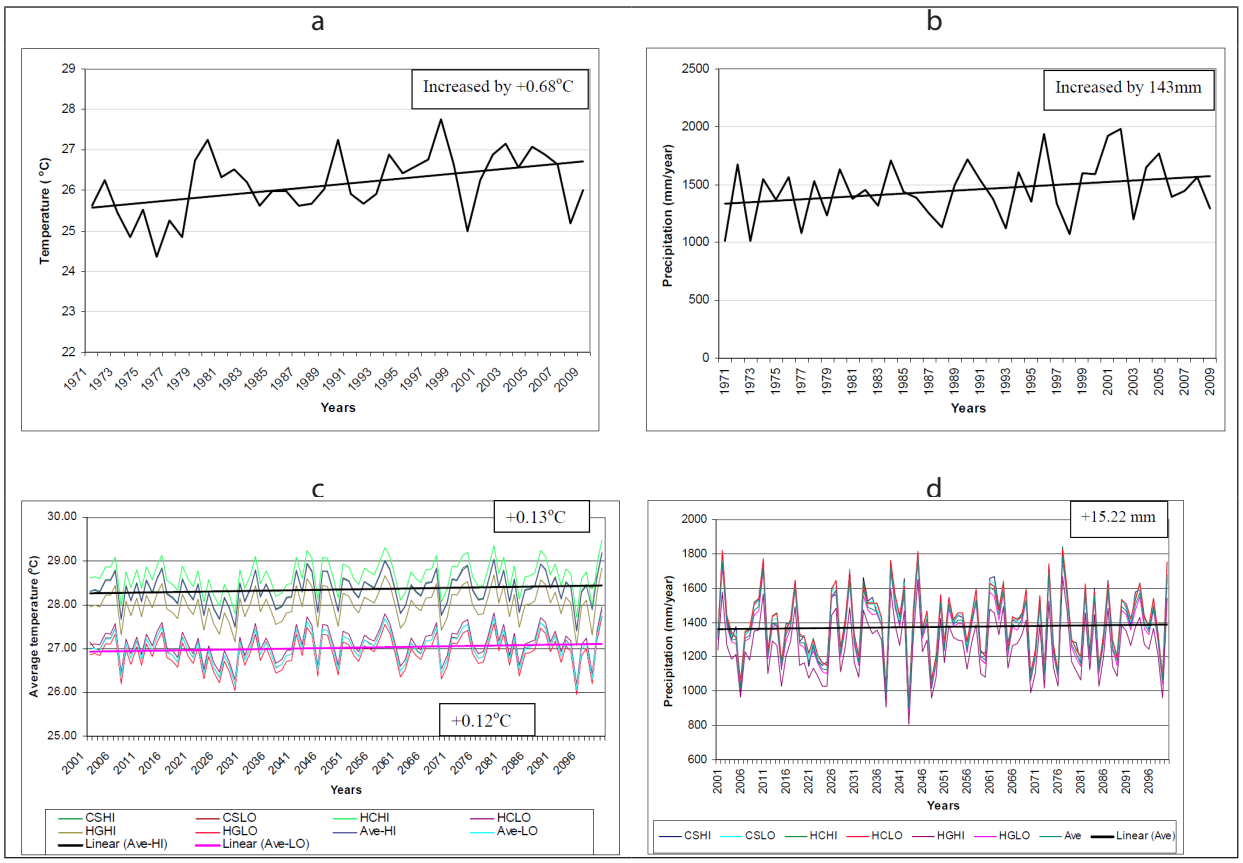


Figure 10. Observed mean annual temperatures (a) and rainfall (b) from 1971 to 2009 and predicted temperature (c) and rainfall (d) up to 2100 in Savannakhet province

Future climate condition of Savannakhet province was predicted using computer-based modelling approach. Boulidam (2012) used three models (CSMK3, HadCM3, and HadGEM) to simulate climate change in Savannakhet up to year 2100. Results of this study showed that air temperature in 2100 will increase 0.64°C to 2.40°C, depending on model's algorithm, compared with what observed from 1971 to 2009. The mean of minimum and maximum air temperature will be 22.60°C and 32.77°C, respectively. The maximum temperatures can be higher than 34.5°C until 2100. Rainfall will decrease by 1.03% to 11.39% up to 2100 in comparison with what observed from 1971 to 2009, depending on simulation model. Low rainfall (805 mm) can happen in year 2043. Drought can also occur by this year together with high temperatures. The high rainfall may happen in 2045 with annual rainfall of 1813 mm (Boulidam 2012).

3.9.2 Climate change impacts

Savannakhet province frequently faces significant impacts of climate variability as well as extreme climate events. Rice production of the province is strongly influenced by climate change. There are two types of drought, classified based on the time of its occurrence, including early-season drought (from mid-June to mid-July), late-season drought (late-September to October) (Inthavong, Fukai, and Tsubo 2011).

There are also climate-related risks in agriculture production. During unfavourable weather, diseases and insects such as grasshopper, rice stink bugs, armyworm may appear more often. These directly impact crop yield (Boulidam 2012).

Figure 11. Drought-damaged rice field Photos by Somkhit Boulidam (10 July 2010)

In practice, change in climate may lead to change in timing of field activities (e.g. land preparation, sowing and transplanting date, weeding, more). Demand on agricultural labor in new farming periods may not meet with existing schedule of labor supply.

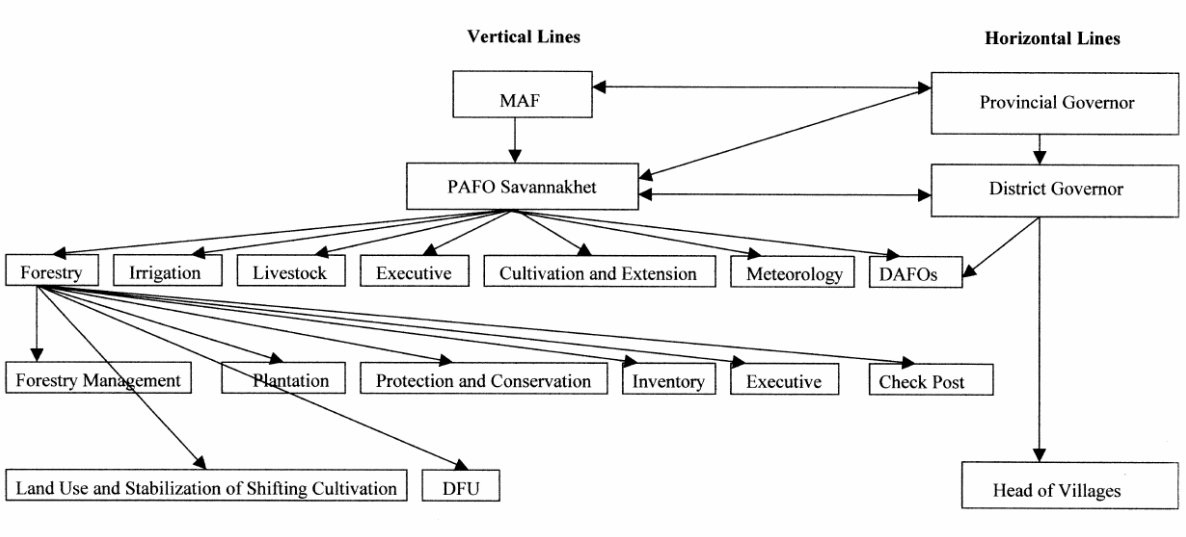
In Champhone district, people suffer from seasonal flooding every year. Although, the fields of farmers are not seriously damaged by extreme floods , almost all products are damaged (UNDP and MAF 2012). During the last 10 years, agriculture production in this district has suffered much from climate change and extreme events. Being exposed under negative impacts of climate change, farmers in Champhone have developed their own adaptation practices and measures such as using native crop variety, changing cropping calendar, improving storage, and grazing livestock in elevated areas.

Villagers in Pailom have noticed climate change in the village. They have observed approximately five years ago that the water in the ponds dried up completely due to hotter and longer dry season. To the villagers, the deforestation in the area has increased the temperature. They blamed investment companies such as the sugarcane plantation in Nong Bone Village that cut massive areas of forest for the changes in climate. The villagers want to start planting trees around the village to reduce the impacts of this change.

3.10 INSTITUTIONAL LANDSCAPE AND GOVERNANCE

Figure 12 shows the organizational hierarchy of the Agriculture and Forestry Office at provincial and district levels. The Provincial Agriculture and Forestry Office (PAFO) belong to the provincial government horizontally and vertically to the Ministry of Agriculture and Forestry (MAF). Under PAFO, there are six provincial assistance offices: the executive office, livestock office, irrigation office, cultivation and extension office, meteorology office, and the forestry office. PAFO also has local offices in individual districts, called the District Agriculture and Forestry Office (DAFO).

The main role of PAFO is governmental and strategic management for agricultural and forestry production. It manages plan and also budget for agriculture and forestry development of district office. DAFO has responsibility to implement activities at villages within the district. The organizational structure of DAFO is similar to PAFO but at lower level (Somphong 2004).



Source: Somphong (2004)

Figure 12. Organizational hierarchy of the Agriculture and Forestry Office at provincial and district levels

Others important agencies are:

1. Provincial Water Resources and Environment Office (WREO) was established in 2007. This is an important agency for reviewing and/or conducting social and environmental impacts assessments to issue an Environmental Compliance Certificate (ECCs). However, the office is only able to conduct initial environmental examinations for small scale investment projects that do not have high social and environmental risks.
2. Provincial Land Management Office (PLMO) was established in 2007. The office is responsible for land management (land use planning, allocation, land titling and collecting land fees and taxes) at the provincial level.
3. The Provincial Department for Industry and Commerce (PDIC) is obliged to manage industrial and commerce sector. The provincial Department for Electricity and Mining (PDEM) plays a key role in managing electricity and mining sector.

In terms of governance, Savannakhet province has 10 special zones established since 1995 in order to improve people's livelihood and alleviate poverty in rural and remote areas. PAFO implements projects on rural development at each special zone in collaboration with other government agencies (public health, education, industry and handicrafts, road construction, etc.) and NGOs (i.e. CIDSE, OXFAM, Action North Sud, etc.). Some activities (i.e, land and forest allocation and stabilization of shifting cultivation) are implemented both inside and outside the special zones. Among the 10 special zones, 4 zones are categorized as provincial level with activities implemented by provincial and district staffs from government agencies. The other six zones are managed by district government staffs. . The activities conducted at the provincial zones will be refined and applied in specific condition of district zones (Somphong 2004).

Provincial special zones

- Phonh Am: belongs to Atsaphone district; including 13 villages.
- Lago: belong to Xepon district; including 14 villages.
- Angkam-Namchalo: belong to Vilabouly district; including 16 villages.
- Xeku-Phoumaly: belong to Thapangthong district; including 18 villages.

District special zones

- Ladho: belong to Xepon District, including 23 villages.
- Tanvay-Lamthouay: belong to Xonbouly district, including 32 villages.
- Paloa-Asing: in Nong district, including 15 villages.
- Hoay hoy-Thoun kham: in Phin district, including 31 villages.
- Keng Cheep-Nalay: in Phalanxay district, including 15 villages.
- Xieng Kai: in Saybouly district, including 9 villages.

Beside agriculture and forestry development, socio-economic development activities have been also implemented in the special zones, including (i) expanding stable rice paddy fields to replace shifting cultivation, (ii) developing timber and fruit trees in rural area, and (iii) developing livestock (i.e., poultry, cow, pig, and buffalo).

3.11 CURRENT AND PAST NATURAL RESOURCE MANAGEMENT INITIATIVES

Natural resource management is strongly considered by Laos' government. The five action plans of the government (Somphong 2004) were:

1. Economic reform towards a market-oriented economy
2. Water resources maintenance
3. Research activities
4. Shifting cultivation stabilization
5. Human resources development

Natural resource management in Savannakhet province follows the national policies passed over from central government. The government has revised and released several policies for natural resource management since 1989. In November 1993, the government issued the Prime Ministerial Decree on

Management and Use of Forest and Forest Land. In November 1996, a new forestry law was promulgated. The mechanisms of forest management were also reformed, whereby, community control of forestlands, zoning and provision of incentives to manage forests sustainably were taken into consideration (Kosaka, Takeda, Sithirajvongsa, and Xaydala 2006).

Three major national programs for natural resource management were implemented in Savannakhet province:

- Land and forest allocation program- this program started in Savannakhet in 1996 in order to conserve and sustainably use forestry resources. Staffs from DoF and PAFO were trained to become implementers of the program. The 10 steps of the program, from preparation and planning to evaluation, were implemented with support of SIDA and FOMACOP.
- From 1996 to 2000, SIDA contributed funds to implement the program in Atsaphone, Phalanxay, Phin, Xonbouly, Vilabouly and Xephon districts, with a total of 36 villages. FOMACOP supported the project in Songkhone and Thapangthong districts with a total of 39 villages. Afterwards, the program was implemented by the District Forestry Unit (DFU) of PAFO. By the end of 2003, FOMACOP continued its support for improving the management of national production forest (Somphong 2004). As a result, the program was completed in 415 villages (27% of the total number villages in Savannakhet province).
- Establishment of National Biodiversity Conservation Areas (NBCA) - There are three NBCAs in Savannakhet,: the Phou Xang He (109,900 hectares), Dong Phou Vieng (197,000 hectares) and Xe Bang Nounh (150,000 hectares). These protected areas are rich in habitat and wildlife, including mammals, birds, reptiles, amphibians and fish and forest trees. These NBCAs were established in 1993 to 1995. There were still many communities living inside NBCAs. Besides implementing activities to conserve the natural resources, DAFO collaborated with international organizations (SIDA, FOMACOP) to improve the livelihood of communities inside the areas and also train them on how to manage the forest. The UXO, an international organization that manages unexploded bombs, and the Action North Sud, the international development organization, had also joined actions in these NBCAs to search and destroy unexploded bombs left behind from the Indochina War.
- Stabilization program to replace shifting cultivation - Although shifting cultivation still exists in rural area of Phin, Xepon, Vilabouly and Nong districts, area of shifting cultivation has reduced significantly as the result of the stabilization program. Over 5 years, from 1996 to 2001, area under shifting cultivation reduced from 5,392 ha to 2,499 ha (Somphong 2004). The program focused on the basic needs of the rural people in order to substitute their shifting cultivation practices with stable agricultural systems, e.g. coffee, fruit tree, forest plantations, livestock raising, and permanent paddy rice fields.

3.12 ORGANIZATIONAL LANDSCAPE

The following organizations related to agriculture, food security and natural resources management are operating in Savannakhet province:

The Provincial Agriculture and Forestry Office (PAFO) and its representative offices in districts (DAFO) are important agencies. The PAFO, however, has a mandate assigned by the Ministry of Agriculture and Forestry (MAF). The main role of PAFO and DAFO is governmental and strategic management for agricultural and forestry production at provincial and district level, respectively.

Provincial Water Resources and Environment Office (WREO) established in 2007 conduct initial environmental examinations, which are usable only for small scale investment projects that do not have high social and environmental risks. The Savannakhet WREO has a total of only 23 staffs, among them, 2 has a masters degree, 3 has t bachelor degree, 8 has high school level, and 8 graduated at vocational school. Many of these officers have non-environmental-related background. WREO also has many limitations in its coordination network, equipment and budget. The office has no budget for regular monitoring, observing and controlling social and environmental impacts of approved investment projects (IUCN and NERI 2011).

Provincial Land Management Office (PLMO), established in 2007, is responsible for land management at the provincial level. In cooperation with other departments, it is mainly responsible for land use planning, allocation (agriculture land, mining zone, industrial zone, residential areas, etc.), land titling and collecting land fees and taxes. Recently, the PLMO has only completed basic allocation of agricultural, forest, protection, residential and industrial land in 41 villages in Phin District as a pilot project. The PLMO has a total of 325 staffs, among them, 2 got master degree, 7 got bachelor degree, 24 got high school level, 64 of have attended vocational schools and remaining (228 people) completed secondary school and work as temporary staffs. Most of them are financial staffs that are responsible for collecting land fees and taxes for the government. (IUCN and NERI 2011).

The Agriculture Promotion Bank (APB) is a state-owned with headquarters in Vientiane Capital and a branch in each province of Laos. In Savannakhet, the APB has a representative office in each district. The APB provides low interest loans (about 7% per year) to support agricultural production.

The Policy Bank (PB) is also state-owned with headquarters in Vientiane Capital and a branch in every province of Laos. In Savannakhet, the bank only has offices in the poorest districts such as Nong, Sepon, Phin and Villabury to support poverty reduction. However, the PB operates as an agriculture promotion bank.

There are other commercial banks in Savannakhet, including the Development Bank, Banque Pour Le Commerce Exterier Lao (BCEL) and Phongsavane Bank, provide credit for any activity with a relatively high interest rate (about 17-20%).

In October 2014, an organization baseline survey was conducted in Savannakhet province. Organizations that are related to food security, food crisis and natural resources management have been surveyed. The following organizations were cited and ranked by the villagers during the Focus Group Discussion (FGD) section: (1) IRRI's project on Climate Change Adaptation in Rain-fed Rice Areas (IRRO CCARA), (2) Room to Read project, and (3) UNICEF + district hospital.[2]

IRRI CCARA is the sole organization that provides specific activities in tackling climate change. In general, there is seemingly low awareness on climate change issue and limited access to CC information particularly at the village level. It is also important to mention that at the provincial level, there is an organization

2 See the report of Organization Baseline Survey for details of these organizations.

currently being initiated by the GoL and multi-national development agency to address climate change in agriculture sector.

Of all the organizations mentioned only IRRI CCARA project is intended to address adaptation issues for farmers to withstand extreme climate events in the future by providing farmers important information on the onset and intensity of rainy season. It also promotes optimal timing of farming practices to reduce risks associated with rice production. It is important to note that the project itself is new and on-going and that meaningful project result is still being documented.

For natural resources management, any issue arising in the community is dealt by the village chief and village elders. In Pailom village, forestry is mainly a community-led initiative, where households share responsibility in making sure that forest resources in the village are kept intact. The communal land allocated by the government is predominantly managed by the community(e.g. designated land for NTFP collection, such as community forest). Water resource is scarce in certain part of the village and this is exacerbated by drought. The unknown organization promoted a rainwater harvesting scheme, but was abandoned by the community due to the introduction of a water pipeline by a private company. In Pailom, Huaybak organization is responsible in the maintenance and distribution of irrigation, a small fee is required to the immediate users. It is important to acknowledge that at the village level, management of existing natural resources is community-based and community-led in the effort.

Stakeholders

With the advantage in geographical location, natural resources and existing infrastructure, Savannakhet province attracts most of investments in Laos. In 2004 to 2010, the total FDI of USD 1.207 billion was invested in the province, of which, 29% from India (USD 350.1 million), 23% from China (USD 277.7 million), 16% from Australia, 9% from Vietnam, and the remaining 23% from other countries. A large share of total investments was for agriculture and forestry (66%) (Figure 13).

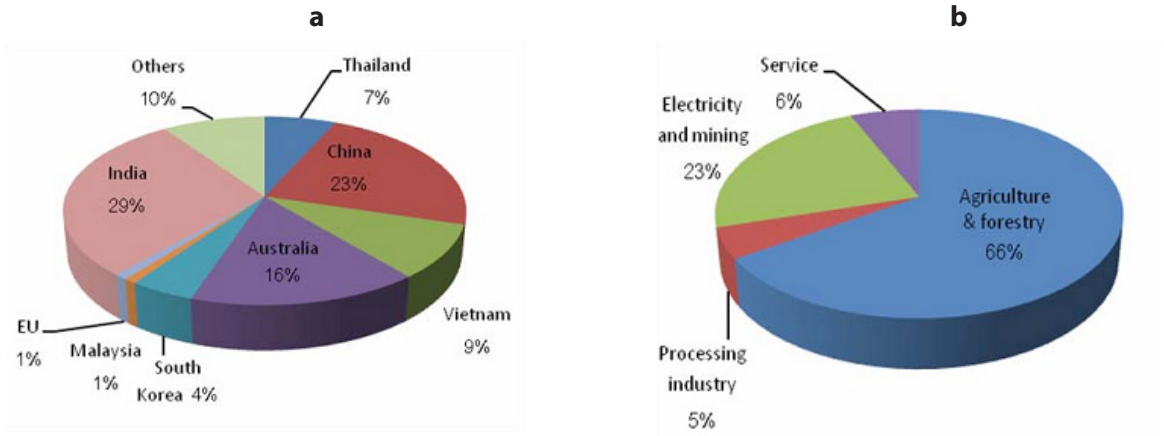


Figure 13. Share of foreign investment in Savannakhet (a) by countries and (b) by sectors between 2004 and 2008

Currently, more than 20 foreign agricultural businesses are established and operating in Savannakhet province. Big foreign companies, such as Birla- Lao (timber), Savan (Sugar cane), Mitr Lao (sugar cane), Lao- Thai Hua - Vietnam (rubber) started to expand their production into Savannakhet Province. These companies have contributed in the economic growth, socio- economic development, and have shifted traditional subsistence to industrial agriculture in the province.

No farmer association exists in Savannakhet province. Promotion of agriculture production in the province is now undertaken by financial organizations:

- The Agriculture Promotion Bank (APB) is owned by the state. It has headquarters in Vientiane Capital and a branch in each province of Laos. In Savannakhet, the APB has a representative office in each district. Through subsidies from the central government, the APB provides low interest loans (at about 7% per year) to support agricultural production. In 2009, the bank was only able to provide credits of 60.08 billion Kip for agricultural production in Savannakhet Province.
- The Policy Bank (PB): PB is also owned by the state. Similar to APB, the PB also has headquarters in Vientiane Capital and a branch in every province of Laos. In Savannakhet, the bank has offices in poorest districts such as Nong, Sepon, Phin and Villaburi. It is not mandated specifically to promote agricultural production, but supports government policy, especially poverty reduction. Because the poverty rate rather higher in rural areas than in cities, PB often functions as an agriculture promotion bank. Over 70% of PB's money is used for supporting agriculture production (i.e, rice, vegetable and fruit plantations, livestock production, agriculture processing factories, etc.). In 2009, the bank provided credits of 36.31 billion Kip in Savannakhet province.

In general, the financial capacity of both banks is limited, meeting only about 10% of the credit demand. The largest share of the short term credits is provided by domestic agricultural production-related companies. Only a small share is provided directly to independent farmers.

There are other commercial banks providing credit in Savannakhet Province with a relatively high interest rate (about 17- 20%). These include the Development Bank, Banque Pour Le Commerce Exterier Lao (BCEL), and Phongsavane Bank. The high interest rate makes access to these credit sources difficult for the households

Currently, there are 38 projects being carried out by 22 NGOs in Savaanakhet. Among them, 6 NGOs have projects related to CCAFS activities as listed in Table 7.

Table 7. NGOs and their operation in Savannakhet province

NGOs	Projects	Sectors	Districts covered
HELVETAS Swiss Intercooperation (HELVETAS Laos)	Laos Extension for Agriculture Project (LEAP)	Agriculture, Forestry & Fisheries; Education;Human Resources Development; Social Development	Thapalanxay
Japan International Volunteer Centre (JVC)	Project for Food Security and Livelihood Improvement through Sustainable Agriculture and Community Based Natural Resource Management		Phine, Atsaphone
Oxfam (Oxfam)	Several Projects	Agriculture, Forestry & Fisheries; Community Development; Emergency and Humanitarian Relief;Human Resources Development; Income Generation & Economic Development; Natural Resources & Ecology;Social Development	Atsaphangthong, Atsaphone, Champhone, Khanthabouly, Nong, Outhoomphone, Phine, Sepone, Songkhone, Thapalanxay, Thapangthong, Vilabuly, Xaybuly, Xayphoothong, Xonbuly
Welthungerhilfe / German Agro Action (WHH/ GAA)	Poverty Reduction and Food Security in Muang Nong, Savanakhet province	Agriculture, Forestry & Fisheries; Community Development; Emergency and Humanitarian Relief;Human Resources Development; Income Generation & Economic Development; Natural Resources & Ecology;Social Development	Nong
	Poverty Reduction and Food Security in Muang Sepon, Savanakhet Province	Agriculture, Forestry & Fisheries; Community Development; Emergency and Humanitarian Relief;Human Resources Development; Income Generation & Economic Development; Natural Resources & Ecology;Social Development	Sepone
World Vision Lao PDR (WVL)	Savannakhet Poverty Alleviation Project	Data Collection & Analysis; Health Care;Human Resources Development	Thapalanxay, Xonbuly, Atsaphangthong
WWF-Laos (WWF-Laos)	ComFish - Community Fisheries Supporting Food Security and Aquatic Biodiversity	Agriculture, Forestry & Fisheries; Data Collection & Analysis; Education;Health Care; Human Resources Development;Natural Resources & Ecology; Social Development	Champhone, Phine, Sepone, Songkhone, Xaybuly, Xonbuly

3.13 INFORMATION NETWORK

Focus Group Discussions in Pailom village showed that sources of information are different between men and women groups. Men identified the following topics that farmers need information to help them to make decision related to their farming activities:

- Seed variety
- Fertiliser
- Rainfall measurement
- Rice production for the home consumption
- Disease and insecticide problem

The women came up with the following topics:

- Rice productivity
- Climate
- Water accessibility
- Labour
- Sources of money
- Rice variety
- Soil
- Production for home consumption
- Market
- Fertilizer

Friends and neighbors are the most significant sources of information for farmers. Among individuals (i.e., both inside and outside the village), farmers often share information with regard to market prices, crop variety, fertilizer as well as the labor availability and other activities related to their farming activities. Usual communication among farmers is through face-to-face discussion or telephone. Indigenous knowledge to predict future weather is also commonly used (i.e., farmers observe insect movements and counting season to prepare for the next planting season).

Television was introduced to Pailom village 10 years ago and now every household has a TV set. Both Lao and Thai television channels are the source of information for farmers for weather forecast, rice variety, fertilizer recommendation, and more. Thai channel is favored by the community because the language is closely similar to Laotian. This type of information network provides a variety of information useful for farming activities such as fertilizer input, soil management techniques, crop varieties, and daily weather forecast. However, farmers are hesitant to use information gathered from TV due to "complicated guidance". Meanwhile, only 50% of the households have radios and not many people listen to the radio. Getting information from the internet is rare. Only the younger generation knows how to gather information from the internet.

Organizations are also sources of information. Currently at the village level, agriculture extension and DAFO have not addressed the technical and information needs of the farmers. Projects by international partners (e.g., IRRI CCARA project) provide information to farmers beneficiaries of the project. Private companies visiting the village teach fertilizer application techniques.

3.14 SOCIAL AND GENDER DIFFERENTIATION

Access to education is more in favor of the males, especially in rural area. In 2005, the literacy rate of female and male (from 15 years old) in Savannaket province was 59% and 79%, respectively. In general, women are less l educated and prone to various forms of exploitation (Andriesse and Phommalath 2012). Estimate in 2006 (IUCN and NERI 2011) shows that the proportion of girls who have never been to school was 14.8% while the same proportion of boys was about 12.5%.

In Pailom village, villagers define being poor as "not enough food (rice) to eat, house in the bad condition, and lack transportation: i.e. no car, no tractor". Villagers also think that the type of occupation that a person has can be used to define the poor. For example, people who have government jobs are better off than farmers. Villagers in Pailom considered themselves belonging to poor (50%) and medium (50%) classes.
Starting 2005, villagers in Pailom began to migrate to Thailand for temporary works in factories and for crop harvesting. Youth in the family tend to work in the factories and the adults tend to work in farming. On average, every household has one son or daughter in Thailand for this type of work. Similar to the results of the study of Andriesse and Phommalath (2012), these temporary migrant workers often send remittance to their family, which contributes to household income.

In the past, women in the village were not given a voice and did not have as many rights as men. For example, 40 years ago, girls were not allowed to attend school, only the boys. However, in the present time, women have the right to speak and attend village meetings, are encouraged to go to school, and are able to be a village leader. In Pailom, however, the men are the village authorities and the ones who attend most of the village meetings on community planning and development. Women in the Women's Union also attend meetings.

Both women and men are involved in rice cultivation. Men are responsible for the 'hard labour' such as ploughing and carrying the products after harvest. Women, on the other hand, are responsible for taking care of the seedling nursery, transplanting, and weeding. Additionally, women are responsible for collecting NTFPs including amphibians, wild vegetables, and herbs in the forest. They also play a key role in taking care of the household by cleaning, cooking, and taking care of the children.

3.15 HEALTH/NUTRITION PROFILES AND OTHER LIVELIHOOD OUTCOMES

Savannakhet Province has a relatively developed health care system. The province has one provincial hospital, 15 district hospitals, and 115 community health stations. This health system covers about 89% of the province's geographical area and provides population with relatively good access to health services. Vaccination for mothers and children covers about 78% of the population, which is significantly higher than that for the whole of Lao PDR. The relatively comprehensive access to health services leads consequently to relatively good health indicators in Savannakhet Province (UNDP and MAF 2012) (Table 8).

Table 8. Some health indicators of Savannakhet Province

Indicators	Value by 2009
Average life expectancy (year)	64
Mortality rate of children under 1 year old	35/1,000
Mortality rate of children under 5 years old	46/1,000
Death rate of mothers in childbirth	269/100,000
HIV/AIDS cases	1,275

However, the province has a significant number of HIV/AIDS cases, likely linked to its convenient transit routes, high migration rates, and increasing tourism flows. In 2009, Savannakhet Province had 1,275 HIV cases, representing 41% of all cases in Lao PDR. It was the highest HIV/AIDS-infected province in the country. Malnutrition is a problem in Pailom as villagers do not get enough nutrients from the food they consume. They do not consume enough fruits and vegetables and lack diversity in their diet. Under-nutrition is also a problem because they do not produce enough food to eat. In some months villagers go hungry and rely on rice or corn powder supplied by the government as emergency food aid. UNICEF in collaboration with the district health department provides information on health and nutrition to the villagers, but with low income and low agricultural production villagers are unable to fulfil their nutritional requirements. Additionally, UNICEF targets mothers and children for vaccination programs.

Illness is also a problem in Pailom. Dengue fever, cholera, malaria and other stomach problems are prevalent and exacerbated by undernutrition. The birth mortality rate is high, 3-4 children/year in the village. The health clinic is far from the village, and is a very basic health clinic that does not offer full health services. Most villagers do not see a doctor.

4. NEEDS ASSESSMENT

4.1 THE STRENGTHS AND WEAKNESS

Savannakhet province is situated in the East-West Economic Corridor of Laos, connecting Thailand and Vietnam. Investment contributes substantially to employment and income generation activities for people in Savannakhet province. It has helped the province achieve a higher economic development status than the national average. The province has a strong labor force with 63% of the population in working age (16-60 year old). However, the labor force is mainly engaged in subsistence agricultural production and has little experience with commercial agriculture or off-farm works. There is an increasing trend among villagers to move out of the village to find work, especially men. Sixty eight percent of total land area is arable, of which, 90% is considered as flat land favorable for agriculture production. Soils are suitable for several annual crops, such as rice, wheat, peanuts, beans, watermelon, cucumber, and more; and perennial crops like rubber, cassava, sugarcane, coffee, and more. However, most of agricultural lands have low soil fertility (i.e., low organic matter, total CEC, base saturation, total available P, and K2O). Forests and other natural resources play an important role in local livelihoods. Nowadays, wildlife and non-timber forest products do not contribute much to household income as before.

In Laos, rice is the staple food. Savannakhet is one of top six provinces in rice production in Laos. Pailom is an agricultural-based community with 90% of the population mainly engaged in rice production. According to the farmers, although the area planted to rice is increasing, rice yield has been decreasing due to pests and diseases, monoculture production, and soil degradation. In addition, hotter and longer dry season and more frequent and extreme droughts contribute to the decline of rice production. Villagers have an insufficient amount of food for consumption, especially rice, during the months of September and October.

The province has various rivers that can be sources of water supply for domestic and agriculture use. However, irrigation system in the province is not developed as a large percentage of rice area is rain-fed. In Pailom village, water resource is scarce in certain parts of the village. This is exacerbated by frequent drought. Rainwater harvesting was introduced to the village, but was abandoned by the community due to the introduction of a water pipeline by a private company. Rainfall in the province is rather high, but the temporal distribution of rain is unequal. Most of the annual rainfall is during in the rainy season from May to October. The majority of the present agricultural production system in Savannakhet is a single cropping during the wet season.

Savannakhet faces significant impacts of climate variability as well as extreme climate events. People suffer from seasonal flooding every year. Extreme floods damaged almost agricultural products in the area. Pest and disease outbreaks during the wet and dry seasons are common problems for crops, livestock and fishery production. The farmers in Champhone have developed their own adaptation practices and measures such as using native crop variety, changing cropping calendar, improving storage, and grazing livestock in elevated areas.

The Provincial Agriculture and Forestry Office (PAFO) and its representative offices in districts (DAFO), Provincial Water Resources and Environment Office (WREO) and Provincial Land Management Office (PLMO) are important agencies. They are responsible for agriculture and forestry production and natural resources management in the province. However, the main limitations of these organizations relate to their human capacity, coordination network, equipment and budget.

There are various sources of information that farmers can gather to support their farming practices, such as television, radio, organization and organizations. However, individual communication (i.e. via face to face meetings or telephone calls) seems to be the most popular way in Pailom village. Therefore, wide dissemination of farming techniques and information is limited.

4.2 PRIORITY NEED

The following issues are prioritized by farmers during FGDs conducted at Pailom village:

- ***Water and drought management*** - Rice fields are mostly rainfed and droughts occur very often during the growing season. It is well acknowledged that the current lack of water significantly reduces crop yields and also reduces the cultivation area. Although there is an irrigation canal from Nong Souy Reservoir, it ends just outside the village border. This shows a potential for Pailom village to get irrigation water from this system. It also suggests a sustainable water management scheme that can save water and expand the irrigated area.
- ***Crop diversification*** - Rice is currently the main source of income and accounts for food security of households in Pailom village as well as in Savannakhet province. Actual practice shows that there are many risks in rice production. To deal with uncertainty of climate change and weather variability, diversifying cropping systems is one of the options, especially for small households. Developing household vegetable gardens (e.g., chilly, green bean, long bean, onion) and producing high value crops can crease resilience and household income.Soil management - Most of agricultural lands have low soil fertility and farmers lack innovative techniques to improve crop yield. Training on soil management is necessary. The trainings can focus on effective use of cover crops, green manure, animal manure, compost, and chemical fertilizer.
- ***Develop plantations*** - According to the farmers, the increase of temperature and prolong drought relate to continuous decline of the forest nearby. They proposed to increase th number of palm trees (materials for handicrafts and house construction), coconut, papaya, banana, and more on abandoned rice fields of the village.
- ***Establishment of the farmers' association*** - Currently, there is no farmer association in the village and very little extension outreach to farmers. There is a high demand on information on fertilizer use, available varieties, livestock production, pest and disease management. These suggest that the establishment of farmer groups to share experiences on farming is necessary. In addition, through these groups, climate smart agriculture practices may likely be effectively transferred to farmers. The high priority practices that can be introduced in the area include rice varieties that are drought, salinity tolerant, pest and disease resistant; exploiting groundwater, rain water harvesting; greenhouses, mulching and composting techniques, etc.

- ***More involvement of women in agriculture extension activities*** - Women are generally responsible for cooking and caring for family. Nowadays, however, more women are responsible for farming while men migrate for off-farm jobs. Therefore, involving women in agriculture extension workshops and community development plans is one of their needs. Encouraging women to diversify their income (e.g.producing handicrafts such as rice boxes, chopsticks; engaged in weaving, etc.) also need to be considered.

4.3 INTERVENTION/PERFORMANCE RECOMMENDATIONS

In preparation for CCAFS future flagship project, preparatory activities have been formulated to strengthen the community's ability to adopt a flagship project. A series of activities were formulated in-line with farmer's demand, which prioritize the needs valuable to the overall well-being of the community in terms of climate change adaptability and resilience. These are:

- Creating partnership with local organizations such as PAFO, DAFO as well as NGOs.
- Building capacity of local community through the establishment of farmer groups (i.e., livestock group, irrigation group); organizing training on water management, handicraft, pig raising, gardening, and food processing; and conducting field visits for a small group of farmers.
- Characterizing natural resources that relate to farming. It is necessary to build community-based soil map, land use and land use planning maps. Participatory approach can be applied to develop climate-related risks for the community.
- Providing information on climate and existing practices that can enhance resilience of households in the face of climate change and extreme weather events.

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Annex

Guideline for desk review and key informant interview at provincial level

	Topic	Key information needed	Suggested Method of Data Collection
1	Natural Resource utilization	Availability, access, utilization and stability of natural resources Issues and actions (if any) being taken to address such issues; Drivers of change	Desk review
2	Organizational Landscape	Development partners/ organizations present in the area and their activities, particularly on climate change, agriculture , and food security	Desk Review
3	Information Network	Information available, shared Presence/operation of quad -media (radio, TV, print, internet) Projects conducted in the area	KI (Find a KI who is knowledgeable on this, probably the information officer of the province, or head of the office)
4	Mitigation Measures	Projects related to mitigation measures	Desk Review
5	Production and livelihood systems (including markets)	Major and minor livelihood strategies livelihood profiles and categories, levels poverty	Desk Review
6	Current and past NRM initiatives	Trends in changes in resource (land and water) use, pressures, forces driving the change in agriculture.	Desk Review, KI
7	Food security status and trends	Experience with food shortage Food security trend (10 years) Issues, drivers of change Past and current programs, projects and activities related to food security	Desk Review; KI
8	Demographics	Current Population, population density, Population trend, Population growth rate, drivers of change	Desk Review
9	Institutional landscape and Governance	Policies and other statutory issuances ; Local leadership and authority; historical trends; Issues, pressures, driving forces; interactions of institutions	Desk review
10	Social and Gender Differentiation	Distribution of benefits and burdens between men and women, households and other social division Access to education, health services, employment, and political position	Desk Review, KI

	Topic	Key information needed	Suggested Method of Data Collection
11	Hazards and vulnerability	History of natural disasters, shocks and stresses (what, year, impact, damage), Traditional coping strategies, Mechanisms normally available to target food assistance to the most vulnerable/ food insecure) during disasters Vulnerable population Vulnerable sectors	Desk Review
12	Local climatic information	Historical trend of rainfall, temperature pronounced seasons	Desk Review
13	Health/Nutrition Profiles and other Livelihood Outcomes	Health Indicators (mortality, morbidity, mental health) Nutrition indicators (under nutrition, stunting, wasting, etc.) Projects on Health and nutrition (e.g. food supplementation, drinking water and sanitation,)	Desk Review