

DRAFT



Climate Resilience for Provincial Road Improvement Project

Loan 2839-CAM (SF)/ 8254-CAM and Grant 0278-CAM

REINFORCING COMMUNITY FLOOD RESILIENCE

Prepared for the

**Asian Development Bank and Ministry of Public Works and Transport Royal
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ABBREVIATIONS

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TABLE OF CONTENT

| | |
|---|-----------|
| ACRONYMS AND ABBREVIATIONS..... | V |
| EXECUTIVE SUMMARY | 1 |
| I. INTRODUCTION | 2 |
| A. PROJECT BACKGROUND..... | 2 |
| B. PURPOSE OF THE DOCUMENT | 2 |
| II. PROJECT AREA- KAMPONG LEAENG DISTRICT | 2 |
| A. ADMINISTRATION AND INFRASTRUCTURE..... | 2 |
| B. LAND AREA | 4 |
| C. CLIMATOLOGY AND HYDROLOGY..... | 4 |
| D. AGRICULTURE | 6 |
| E. FISHERIES:..... | 7 |
| F. SOURCE OF INCOME AND LIVELIHOODS: | 7 |
| G. CROP CALENDAR: | 7 |
| H. FISHERMEN | 8 |
| I. NATURAL DISASTER | 8 |
| III. COMMUNITY NEED ASSESSMENT - METHODOLOGY..... | 10 |
| A. RESPONDENT SEX | 11 |
| B. JOB TYPE OF RESPONDENT | 11 |
| C. DATA ON AGE RANK OF RESPONDENT..... | 11 |
| IV. RISK ASSESSMENT IN KAMPONG LEAENG..... | 12 |
| A. TONLE SAP FLOOD IN 2013..... | 12 |
| B. DRAUGHT | 13 |
| C. LIGHTNING | 14 |
| D. RIVERINE EROSION..... | 14 |
| E. BUSH FIRE BY ANIMAL HUNTER..... | 15 |
| F. EPIDEMIC..... | 15 |
| V. FLOOD DAMAGES IN KAMPONG LEAENG DISTRICT..... | 16 |
| A. HOUSEHOLDS DAMAGE | 16 |
| B. AGRICULTURE DAMAGES..... | 17 |
| C. LIVELIHOOD DAMAGES..... | 17 |
| D. HOME GARDEN DAMAGE | 18 |
| VI. SAFE AREAS AND EVACUATION IN KAMPONG LEAENG DISTRICT | 18 |
| A. PROLAY MEAS COMMUNE SAFETY AREA..... | 22 |
| B. PLOV TUK COMMUNE SAFETY AREA | 23 |
| C. SAMRAONG SAEN COMMUNE SAFETY AREA..... | 23 |
| D. KAMPONG HAU COMMUNE SAFETY AREAS | 25 |
| VII. FERRY AND RESCUE BOATS FOR EVACUATION..... | 27 |
| VIII. WATER SUPPLY AND USES IN KAMPONG LEAENG DISTRICT | 28 |
| REFERENCES | 30 |
| ANNEX-1: ORGANIZATION CHART FOR KAMPONG LEAENG DISTRICT..... | 31 |
| ANNEX-2: DRAFT DESIGN OF FERRY BOAT | 33 |
| ANNEX-3: DESIGN OF WATER SUPPLY SCHEME | 34 |
| ANNEX-4: FIELD SURVEY REPORT OF KAMPONG CHHANG..... | 35 |
| ANNEX 5: DETAIL SAFETY AREA FOR KAMPONG LEAENG DISTRICTS..... | 44 |

ANNEX-6: QUESTIONNAIRE FOR EARLY WARNING SYSTEM AND EMERGENCY MANAGEMENT47
ANNEX- 7: LIST OF ATTENDENCE ON JUNE 27, 2014 MEETING53

ACRONYMS AND ABBREVIATIONS

| | |
|---------|---|
| ADB | Asian Development Bank |
| CR-PRIP | Climate Resilience for Provincial Road Improvement Project |
| CPB | Contingency Plan Book |
| CCDM | Commune Committee for Disaster Management |
| DHRW | Department of Hydrology and River Works |
| DOM | Department of Meteorology |
| DCCDM | District Committee for Disaster Management |
| EW | Early Warning |
| KLD | Kampong Leaing District |
| NW | North West |
| MPWT | Ministry of Public Work and Transport |
| MOO | Meteorological Observation Office |
| NCCDM | National Committee for Disaster Management |
| NGO | None Of Government Organization |
| PDWRAM | Provincial Department of Water Resource And Metrology |
| PCDM | Provincial Committee for Disaster management |
| PPCR | Pilot Program for Climate Resilience |
| PRIP | Provincial Rural Improvement Project |
| RCC | Red Cross Cambodia |
| RFFO | Flood Forecasting Office |
| RGC | Royal Government of Cambodia |
| SCF | Strategic Climate Fund |
| SOP | System Operation Procedure |
| SPCR | Strategic program for climate Resilience |
| UNESCO | United Nation Education, Scientific and Cultural Organization |
| UN/ISDR | United Nations International Strategy for Disaster Reduction |
| WFO | Weather Forecasting Office |

EXECUTIVE SUMMARY

The Ministry of Public Works and Transportation (MPWT) is increasingly focusing its attention on extreme climate events and their impact on Cambodia's road network. Under the ADB-funded "Climate Resilience for Provincial Road Improvement Project" (CR-PRIP), MPWT aims to promote climate adaptation and environmentally friendly roads. The project will ensure the robustness, safety, pass-ability, and durability of roads by setting up design standards, safety measures, and emergency plans. The CR-PRIP is piloting an emergency management system in the Kampong Leaeng District by constructing an Emergency Operation Center (EOC) which will provide ferry ferries and inflatable boats for the safe evacuation of the population in affected areas; capacity building; and other rehabilitation activities (e.g. water supply, electricity) to enhance community resilience.

Evacuation planning is a common necessary mitigation factor for a range of risks, and planning should be proportionate to the level of risk. There are a number of cross-cutting issues in evacuation and safe place planning including community perception, acceptance, planning, and include logistics, security, local resilience, infrastructure and the role of local government. Consideration of these will help in understanding the wider impacts and interdependencies that surround an evacuation.

This document describes the community capacity, their perceptions and safety and evacuation needs to manage the disaster. A series of field surveys were conducted at the household level as well as focused group discussions at District and Commune level to identify disaster risks, damages and existing early warning systems. The survey also identified community needs to increase and support their capacity for managing flood risks; safe areas and any renovations or enhancements which are required; safety routes; and other measures required for safe evacuation. Based on the consultation, it has been recommended that six shelters with proper facilities be constructed as model shelters for evacuation during floods. The project will include the provision of water, electricity, land filling, etc to ensure the shelters can accommodate flood victims and provide basic support during an emergency. This report also covers characteristics of the project area (Kampong Leaeng District), the overall risk assessment for the area, historical flood damages and existing early warning systems for Cambodia.

Evacuation effectiveness can be improved by clear communication of risks and actions to take in the event of an emergency. To this end, the 'Concept of Operation (CONOP) for Emergency Operation' describes the plan for emergency communications and early warning dissemination and the Standard Operation Procedures (SOP) document describes the operation procedures and other advice for evacuation.

I. INTRODUCTION

A. Project Background

The Royal Government of Cambodia (RGC) is one of the pilot countries participating in the Pilot Program for Climate Resilience (PPCR). The PPCR is one of the three sub-programs of the Strategic Climate Fund (SCF). The priority sectors for PPCR in Cambodia include water resources, agriculture and infrastructure. In June 2011, the PPCR sub-committee endorsed Cambodia's Strategic Program for Climate Resilience (SPCR) with a funding envelope of up to \$86 million (\$50 million in grants and up to \$36 million in concessional credit). Of this, an allocation of \$17 million (\$10 million loan and \$7 million grant) was endorsed for "Climate-proofing of Roads in Prey Veng, Svay Rieng, Kampong Chhnang and Kampong Speu Provinces" as part of the Asian Development Bank (ADB) funded Provincial Roads Improvement Project (PRIP). This project is one of eight SPCR projects in Cambodia and one of two in the transport sector. Under PRIP, a sub project the 'Climate Resilience for Provincial Road Improvement Project' (CR-PRIP) was developed. The objective of the CR-PRIP is to rehabilitate and upgrade 157 km of flood-vulnerable roads in Kampong Chhnang, Kampong Speu, Prey Veng, and Svay Rieng provinces to climate change-resilient condition thereby providing all-year access to markets, jobs, and social services in agricultural areas of project provinces and enhance emergency response services in one pilot areas (Kampong Leaeng District in Kampong Chhnang Province). The project will construct an Emergency Operation Center in the village of K Hau, provide ferry boats for quick evacuation, capacity building and other rehabilitation activities (i.e. water supply, sanitation, electricity, etc) to enhance community resilience.

B. Purpose of the Document

This document describes the community capacity, needs and their perceptions and needs to manage the disaster. A series of field survey was conducted at household level as well as focused group discussions at District and Commune level to identify disaster risk, damages and existing early warning system. The survey also identified community need assessment to reinforce their capacity to manage the flood, identify safe areas and renovation or enhancement required to use that as safe shelters, safety routes and other means of communication required for safe evacuation. Based on the consultation six shelters have been recommended to make as model shelters for evacuation during floods with proper facilities. The project will provide water supply, electricity, land filling, etc to make the shelter accommodate and provide basic support during emergency time. The report also covers characteristics of the project area (Kampong Leaeng District), overall risk assessment for the area, historical flood damages, and existing early warning system for Cambodia, safe areas and ferry boats for evacuations.

II. PROJECT AREA- KAMPONG LEAENG DISTRICT

A. Administration and Infrastructure

Kampong Leaeng District (KLD) is a district in the north east of Kampong Chhnang Province, in central Cambodia. The district capital is Kampong Leaeng district located around 4 kilometers east of the provincial capital of Kampong Chhnang in a direct line. The district shares a border with Kampong Thom province to north and east. Much of the district is low laying floodplain and the Tonle Sap River runs through the district roughly from north to south. In the south of the district are two significant mountains. Phnom Chrak Tunling and Phnom Neang Kangrei both over 1000 meters in elevation.

The district has very little road infrastructure. There is one provincial ring road that circles the small mountains in the district's south. This road is accessible from National Highway 6 in

Stueng Sen District of Kampong Thom. Settlements are located along this road or along the Tonle Sap river and various smaller tributaries. Kampong Leaeng District is the second largest district in Kampong Chhnang province by land area and only Tuek Phos is larger. However, it has the smallest district population in the province after Chol Kiri due to its flooded landscape and lack of road transport infrastructure.

The district is subdivided into 9 communes (khum) and 44 villages (phum). The following table 1 shows the villages of Kampong Leaeng district by commune (Figure 1).

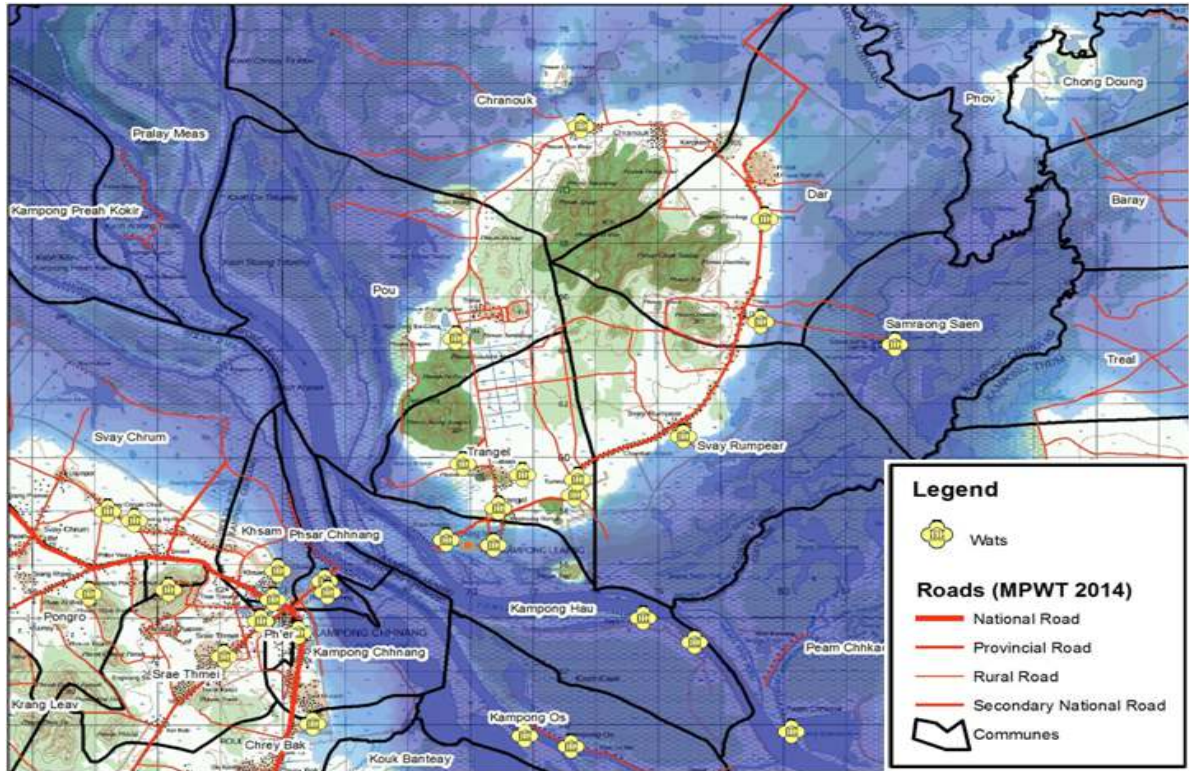


Figure 1: Kampong Leaeng District (KLD)

Table 1: Commune and Villages in Kampong Leaeng District

| Commune | Village |
|----------------------|---|
| Chranouk | Kangkaeb, Thlok, Lech, Kandal |
| Dar | Dar, Thnal, Chrolong, Prasat, Kuy |
| Kampong Hau | Kampong Boeng, Kaeng Ta Sok, T'uor Rolum, Stueng Sandaek, Kaoh K'aek, Doun Veat |
| Phlov Tuk | Thnal Chheu Teal, Peam Knong, Slat |
| Pou | Pou, Samraong, Peam Tonlea, Thmei, Damnak Kakaoh, Kampong Ba Chen |
| Pralay Meas | Pralay Meas, Krang Phtel, Kramal, Anlong Kanhchoh, Ta Daok, Kaoh Ruessei |
| <u>Samraong Saen</u> | Samraong Saen, Paprak |

| | |
|---------------------|---|
| <u>Svay Rumpear</u> | Chambak Khpos, Knong, Cheung Kraoh, Lvea, Ta Lat |
| <u>Trangel</u> | Trangel, Trabaek, Chres, Tumnob, Trapeang Meas, Andoung Ronuk, Khlaeng Poar |

Source: Contingency plan book for disaster response and report, 2013

B. Land Area

Kampong Leang district has an existing land use, indicating the cultivation, flood forestry, commercial, construction area and other land area. In Table 2 showed that total area of Kampong Leang district is 67,800 hectare which consists of flood forestry area (48%), cultivation land area accounting for 21 %, with construction land accounting each for 2% of the total area and other land area accounting for 29 %.

Table 2: existing land using in Kampong Leang district

| Land use | Existing areas (ha) | Percentage (%) |
|-----------------------|---------------------|----------------|
| Flood forestry area | 32,508 | 48 |
| Cultivation Land area | 13,960 | 21 |
| Construction area | 1,218 | 2 |
| Other land area | 20,114 | 29 |
| Total | 67,800 | 100 |

Source: District data book in 2013

C. Climatology and Hydrology

C.1 – Hydrology of Tonle Sap Lake- Flood plan system

Tonle Sap Lake has eleven principal tributaries, the largest of which is Stung Sen. The lake is connected to the Mekong River via the Tonle Sap River, and these two rivers meet at Chaktomuk confluence in Phnom Penh, splitting there into the smaller Bassac River and the larger Mekong River. Hydrology of the Tonle Sap lake–floodplain system is extraordinary. During the dry sea–son, the Tonle Sap River flows downstream, i.e. from Tonle Sap Lake to the Mekong. Monsoon floods in the Mekong make the Tonle Sap River to change its direction in May and to flow upstream towards Tonle Sap Lake during the wet season until September or October. Thus, Tonle Sap Lake functions as a natural reservoir, providing storage for the flood waters and therefore regulating floods in the downstream Mekong Delta during the wet season, and contributing to the low flows to the Delta during the dry season (Kummu et al. 2006).

The water level, surface area and volume of the Tonle Sap lake–floodplain system vary markedly during the year due to the monsoon climate and the change in flow direction of the Tonle Sap River. The annual minimum water depth of Tonle Sap Lake is less than 1 m (Kummu & Sarkkula 2008). The average 30-day minimum water level is about 1.44 m above mean sea level (amsl) in Hatien datum, and the average maximum water level is approximately 9.17 m amsl (ibid). The Tonle Sap area is relatively flat, and the bottom of the lake lies only approximately 0.6–0.7 m amsl (ibid). Year-to-year differences in the water levels of Tonle Sap Lake are also significant, particularly regarding to the maximum and average water levels (Figure 2). This study utilizes the concept of “water year” in order to be able to represent the cycle of wet and dry seasons adequately. A water year differs from a calendar year in that

it is a period from the 1st of May of the year indicated to the 30th of April the next year, e.g. water year 2000 means the period from the 1st of May 2000 to the 30th of April 2001. The area of the permanent Tonle Sap Lake is approximately 2,200 km², and its volume measures 1.6 km³ (Kummu & Sarkkula 2008). In the wet season, the floodplains surrounding the permanent lake are inundated, and the extent of inundation depends on the intensity of the monsoon rains. The annual maximum surface area of Tonle Sap Lake and the inundated floodplains varies from 9,600 km² to 15,300 km², while the annual maximum volume of water stored in the system ranges between 33 km³ and 76 km³(ibid).

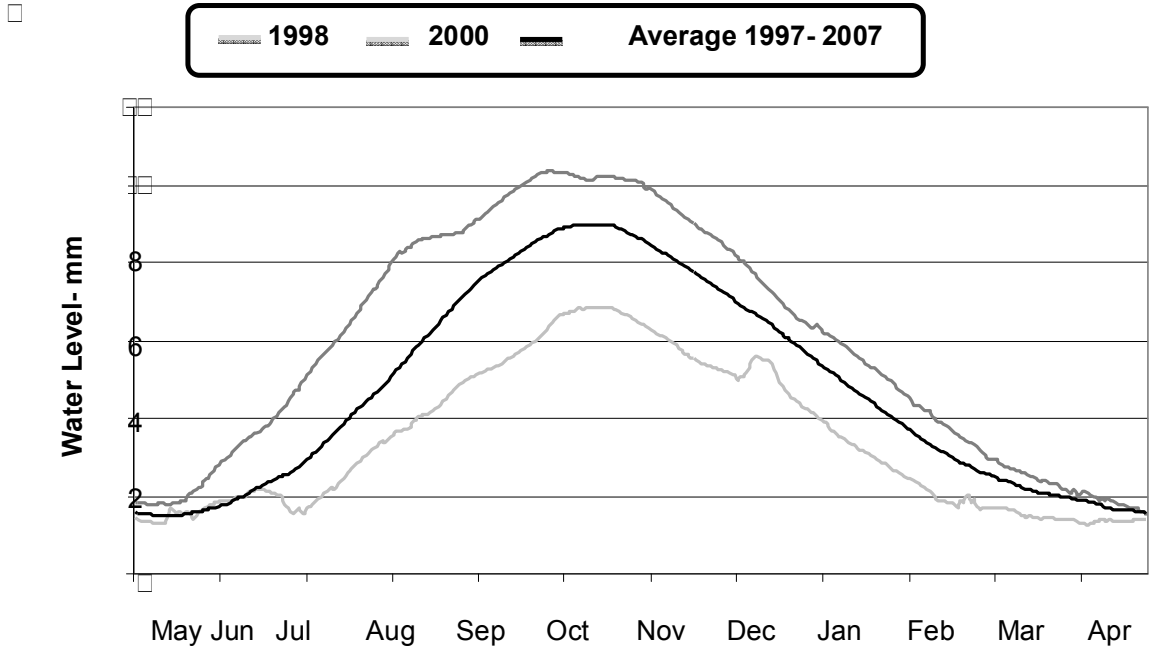


Figure 2: Average water levels in 1998–2000 and water levels in the wettest water year (2000) and driest water year (1998) of that period in Kompong Luong, Tonle Sap Lake, measured as above the mean sea level in Hatien, Vietnam (MRC 2000b). A water year refers to the period between the 1st of May of the year indicated and the 30th of April the following year.

C-2 Rainfall

Cambodia receives most of its rainfall from the South West monsoon, which occur during the period between mid-May and November (www.Foodsecurityatlas.org). According to 1996-2012 monthly rainfall data from PDWRAM in Kampong Chhnang province is shown in Figure 3, respectively. The monthly also mean historical rainfall and temperature data can be mapped to show the baseline climate and seasonality by month, for specific years, and for rainfall and temperature. The chart above shows mean historical monthly rainfall for Kampong Chhnang during the time period 1996-2012.

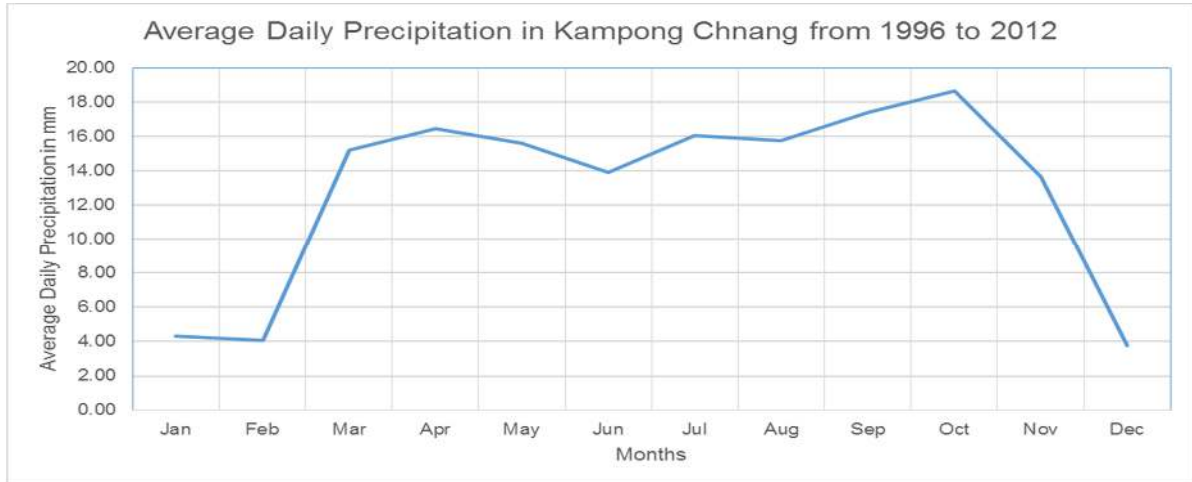


Figure 3: Average Monthly Rainfall from 1996 to 2012 (Source: PDWM, 2014)

D. Agriculture

In Cambodia, there were 2.6 million households listed in April 2013; of which, 2.2 million or 4 out of 5 households were engaged in agricultural activities. Of these households, 85 percent (1.876 million) were reported to have engaged in growing of crops in agricultural holdings as shown in Figure 4, in which 19 percent were growing crops only while 81 percent were engaged in two activities: growing of crops and raising of livestock/poultry. Most of these livestock and/or poultry were usually raised in homelots. Of the remaining 15 percent of the households with agricultural activities, the information on these will be presented in the final report.

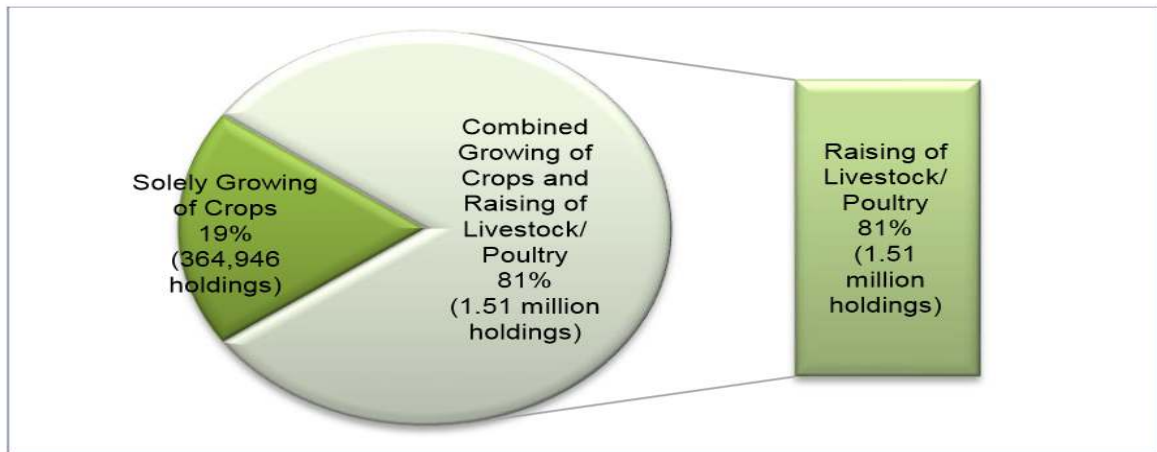


Figure 4: Agriculture activities in agriculture holdings (Source: CAC Core Module 2013)

Two of the four regions or zones in the country reported to have more than 500,000 agricultural holdings operated in 2013. These were the Plain Zone, Sharing the highest total agriculture holdings.

Table 3: Number and Portion of agricultural holdings growing crop, by zone: 2013

| Zone | Number of agricultural holding | Proportion |
|----------|--------------------------------|------------|
| Cambodia | 1,875,712 | 100.00 |

| | | |
|----------------------|---------|-------|
| Plain | 869,305 | 46.35 |
| Tonle Sap Lake | 614,369 | 32.75 |
| Coastal | 139,433 | 7.43 |
| Plateau and Mountain | 252,605 | 13.47 |

Source: NIS, CAC Core Module 2013.

E. Fisheries:

Fisheries Cambodia's preferred source of protein is freshwater fish, caught mainly from the Tonle Sap and from the Tonle Sab, the Mekong, and the Basak rivers. A fishing program, developed with Western assistance, was very successful in that it more than quadrupled the output of inland freshwater fish in three years, from 15,000 tons in 1979 to 68,700 tons in 1982, a peak year. After leveling off, output declined somewhat, dipping to 62,000 tons in 1986. The 1986 total was less than half the prewar figure of some 125,000 tons a year. Saltwater fishing was less developed, and the output was insignificant—less than 10 percent of the total catch. According to the First Plan, fisheries were projected to increase their annual output to 130,000 metric tons by 1990 (http://en.wikipedia.org/wiki/Agriculture_in_Cambodia).

F. Source of Income and Livelihoods:

An estimated 80 percent of the Cambodian population live in rural areas, and more than 60 percent of the population depend on agriculture for their livelihoods (UNDP, 2011). Agriculture is central to the economy of the Cambodian household. The sector contributes 45% of GDP: about 25% represents the production of crops and 20% the value-added of livelihood and forestry activities (World Bank, 1997). There has been a significant decline in paddy area from 2.5 million hectares in 1976 to 1.9 million today (Sophal ear personal communication). However most of Cambodia of Cambodia rural household continue to cultivate rice in one form or another over 85% of land under cultivation is lowland rice fields. Inadequate statistics exist, but it is safe to say that productivities is far lower than in neighbouring countries. Crop systems are complex and varied due to social-economic and biophysical variabilities. Farmers identify lack of water control many households have adopted higher yielding varieties and yields have increase figures of three and four tonnes were reported by Mc Andrew (1998) from a village in Prey Veng province (Cathryn Turton, 2000).

G. Crop Calendar:

The main crops grown in the early wet season (March –June) include sesame, maize soybean and peanut, while the principal crops grown in the main wet season (July-October) are maize and soybean. Cassava is grown over a 12 month period.

There is potential for drought tolerant crops such as sunflower and sorghum to be grown during the dry season (November-February) on residual soil moisture after harvest of the main wet season maize crop, especially if the dry season crop could be sown at the end of October (Table 4) The success of the dry season crops is likely to be enhanced by no-till seeding into chopped maize residual to better retain residual soil water from the main wet season rains. Inclusion of a dry season crop allows the potential for three crops per year. Rarely wet season (March-June) and main wet season (July- October) (Table. 4) the three crop option is only possible if tillage is eliminated between crops to conserve soil moisture and enable timeline of operation.

Table 4: Current upland crop calendar for NW Cambodia incorporation proposed dry season sunflower

| | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | July | Aug | Sep | Oct |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|
| Sunflower | ■ | | | | | | | | | | | |
| Sesame | | | | ■ | | | | | | | | |
| Munbean | | | | ■ | | | | | | | | |
| Maize | | | | ■ | | | | ■ | | | | |
| Soybean | | | | ■ | | | | ■ | | | | |
| Cassava | | | | | | | | | ■ | | | |

(Source: Pers comm. B. Martin.)

H. Fishermen

The Tonle Sap Lake has fed Cambodian people for thousands of years, and it also plays an important role in Cambodia's economy. The government earns important tax revenue from fishing activities, like the sale lots and fish export. The amount of fish taken from the lake is not supposed to be more than 100,000 tons per year. There are more than one million people living around the Tonle Sap Lake and about 280 different kinds of fish living in its waters. One Cambodian approximately 67 kilogram of fish per year. People who live around the lake have to be flexible: when the water declines in the dry season, they move their houseboats or floating houses near the shore of the lake. They can feed their animals from the young fresh grass growing on the shoreline, and grow vegetables too. When the water rises, people return to their fishing work as usual, letting their homes drift out in the wide waters. Being a fisherman is not a relaxing job, like growing rice. Rice-farmers only have to harvest once or twice a year, and then have enough food to live off for the whole year. Fishermen need to fish every day, since they can only catch one day's food at a time. If they don't go fishing one day, they will have nothing to eat. Fishermen have to face not only economic crises, but life-crises as well. They spend all day and all night on the sea, or lake, or river, for just a small amount of fish. Some die when big storms blow their boats over - although statistics show that work-related deaths among fishermen are not as common as among robbers or criminals (WWW.leisurecambodia.com/news/detail).

I. Natural Disaster

Base on the geography, Kampong Laeng is an island which locates in the great giant Tonle Sap Lake due the flood season. The area along the bank of the lake is generally inundated by flood annually. Its location also were affected by unique disaster occurred in previous year and present time as Tonle Sap and flash flood, thunderstorm, wind-gush, strong wind, lightning, wind-Gush, insect etc. Mainly, it also affected life of human, animals, road, bridge, people's house, agriculture, people's property and community livelihood as shown in Table below:

Table 5: Natural disaster history from 2005- 2013 in Kampong leaeng district

| Description | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---------------------------|------|------|------|------|------|------|------|------|------|
| Draught | | | | | | | | | |
| People seriously affected | | | | | | | 804 | 806 | 964 |

| | | | | | | | | | |
|---|-----|-----|------|--|-----|----|-------|------|-------|
| (person) | | | | | | | | | |
| Rice plant damaged (ha) | 542 | | | | | | 1070 | 125 | 0 |
| Mixed crop damage (ha) | 189 | | | | | | | | |
| Tonle Sap Flood | | | | | | | | | |
| Rice plant damaged (ha) | 0 | 537 | 124 | | | | | | |
| Mixed crop damage (ha) | 0 | 128 | 14.5 | | | | | | |
| Number of family were seriously affected (person) | | | | | | | 3,915 | 255 | 358 |
| Number of people were seriously affected (person) | | | | | | | | 1264 | 714 |
| Rice damaged in wet season (ha) | | | | | | | 2,440 | | 228 |
| Mixed crop plants (ha) | | | | | | | 75 | | |
| Laterite road damaged (m) | | | | | | | 1,200 | | 6,778 |
| Earth road damage (m) | | | | | | | 7,500 | | |
| Dike/stream damaged (m) | | | | | | | 500 | | |
| Evacuation of family (Family) | | | | | | | 3,914 | | |
| House damaged (back) | | | | | | | 5 | | |
| Built wooden board in house (family) | | | | | | | | | 176 |
| Death (Person) | | | | | | | 4 | 2 | 3 |
| Thunder storm | | | | | | | | | |
| Number of family were seriously affected (Person) | | | | | 89 | | 48 | | |
| Number of people were seriously affected (Person) | | | | | | | 219 | | |
| House fully damaged (unit) | | | | | 52 | 17 | | | |
| House partly damaged | | | | | 37 | 22 | | | |
| Laterice Road damage | | | | | 200 | | | | |
| Earth Road damaged (m) | | | | | 250 | | | | |
| Latrine damaged (unit) | | | | | 60 | | | | |
| Borehole damaged (unit) | | | | | 25 | | | | |
| Mixed well damaged (unit) | | | | | 15 | | | | |
| Irrigation system damaged (m) | | | | | 25 | | | | |

| | | | | | | | | | | |
|--|--|--|--|--|--|--|----|----|----|---|
| Death | | | | | | | 0 | 2 | 0 | |
| Lightning | | | | | | | | | | |
| Death (person) | | | | | | | 0 | 1 | 0 | 4 |
| House damaged (Unit) | | | | | | | 0 | 0 | 2 | 0 |
| Insect destroyed | | | | | | | | | | |
| Rice plants were fully destroyed in draught by insect (ha) | | | | | | | 21 | 35 | 10 | |

Source: Contingency plan book of KPL for disaster response and report in 2013

III. COMMUNITY NEED ASSESSMENT - METHODOLOGY

Focus Group: A method of interviewing a carefully selected local authority, who participates are to identify the number of people, number of safety area, number of evacuated people, receiving forecast of MoRAM through mass media, disaster history recorded and disaster impact to people in their commune by Tonle Sap flood or other disaster hazards. All commune chief and some commune councils were invited to join three time of meeting at Kampong Leang district.

Key Informant Interviews: 20 families in some communes within whole Kampong Leang district were selected to individually interview through questionnaires list consist of 33 questionnaires as shown table 6.

Table 6: Number of Respondents

| Commune name | Village | Stakeholder | No of respondent | Sex | |
|--------------|---------------|---|------------------|------|--------|
| | | | | Male | Female |
| Chhronuk | Lech | Farmer | 3 | 2 | 1 |
| Kampong Hau | Kampong Boeng | Farmer, local authority | 3 | 2 | 0 |
| | T'uor Rolum | Farmer, small trader | 4 | 3 | 1 |
| | Kaeng Ta Sok | Local authority | 2 | 1 | 1 |
| Trogil | Tumnob | Farmer | 1 | 1 | 0 |
| Svey Rumpea | Chheun Kraoch | Farmer | 2 | 1 | 1 |
| | Talat | Motor taxi | 1 | 1 | 0 |
| | Lvea | Local authority | 1 | 1 | 0 |
| Samrong Saen | Samraon Saen | Commune Police, Fishers, small business | 3 | 3 | 0 |
| 5 Communes | 9 villages | Total | 20 | 16 | 4 |

Source: Field Survey, 2014

A. Respondent sex

Base on result of table 7 showed that in among of 20 respondents, there are 80 % are male and 20 % are female through individual interview in some communes of Kampong Leaeng district as table below:

Table 7: Respondent sex

| Description | Sex (%) | |
|-------------|---------|--------|
| | Male | Female |
| Respondent | 80 | 20 |

Survey: Field Survey May, 2014

B. Job type of respondent

In Figure 5 showed that the job of respondents were interviewed have differently occupation in their family livelihood support such as farmer, small trader, motor dub and being local authority (Officer) etc. Based to survey in May, 2014 within Kampong Leaeng district there are 45% of all respondents are farmer, 30 % are local authority, 20 % are small trader in their commune and 5 % are motor dub driver.

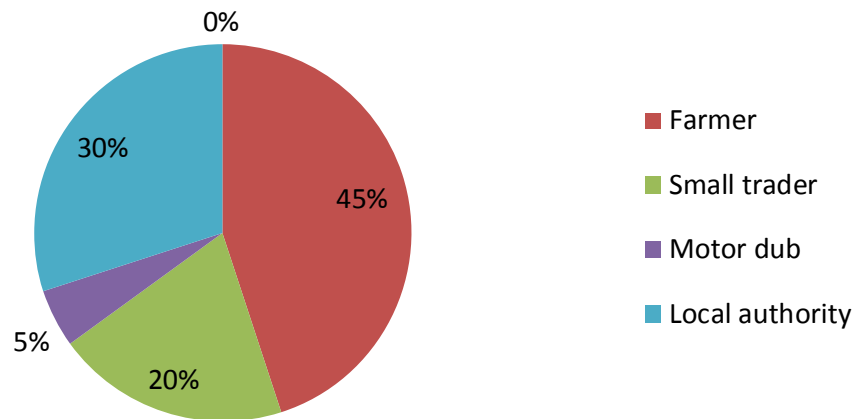


Figure 5: Type of respondent working

Source: Field Survey May, 2014

C. Data on Age rank of respondent

Based to the result of In Table 8 showed that a mong of 20 respondent interviewed, there are t of 30 % is relatively young respondent aged between 26 and 35 year old; 25 % of respondent being aged between 36 and 45 years old and 25 % are aged between 56 and 65 years old, 15 % are aged between 45 and 55 year old, and 5 % are older aged by 66 years old over.

Table 8: Age of respondent

| Description | Age Rank of Respondent | | | | |
|-------------|------------------------|-------|-------|-------|---------|
| | 26-35 | 36-45 | 46-55 | 56-65 | 66 Over |
| Age Level | | | | | |

| | | | | | |
|----------------------|-----|-----|-----|-----|----|
| No of respondent | 6 | 5 | 3 | 5 | 1 |
| Total percentage (%) | 30% | 25% | 15% | 25% | 5% |

Survey: Field Survey May, 2014

IV. RISK ASSESSMENT IN KAMPONG LEAENG

Risk assessment with the use of the hazard-exposure-vulnerability framework is useful as it enables consideration of the inherent vulnerability of infrastructure or population, rather than only focusing on impacts (Gina & Richard, 2012; Lindley et al., 2006). The risk assessment should take into account together all the previous elements: hazard, exposure and vulnerability; but, as discussed in the previous sections, it's challenging to quantify and define all these features. Furthermore, the mutual-interaction between each element is not linear and well known, and all these dimensions are emphasized in the risk management of the extreme weather because are related to low-probability events and high-consequence scenarios.

A. Tonle Sap Flood in 2013

The Tonle Sap is a shallow lake in western Cambodia which is part of the Mekong River system. It is the largest lake of Southeast Asia and is fed by numerous streams. During the dry season it drains by the Tonle Sap River southeast to the Mekong River. During the wet monsoon season of June to November, the high waters of the Mekong River reverse the flow of the Tonle Sap River and increase the size of the lake from 2,600 to 10,400 sq km (about 1,000 to 4,020 sq mi). When the high waters of the Mekong River recede, the flow reverses. This natural mechanism provides a unique and important balance to the Mekong River downstream of the lake and ensures a flow of fresh water during the dry season into the Mekong delta in Vietnam which buffers the intrusion of salt water from the South China Sea into the rich agricultural lands of the delta (WWW.mrcmekong.com).

Based on the result of survey in **Figure 6** showed in among of 20 respondents, there are 85% of respondents identified Tonle Sap flood is at risk in Kampong Leaeng district because there were 358 families with 1,407 people affected in year 2013. In among of total family in whole district, there were 6 people of deadness, 6,778 hectare of rice field damaged 6,778 meter of road was damaged and one bridge damaged while 15 % of all respondent identified that it was at some risk due to Tonle Sap flood's measurement.

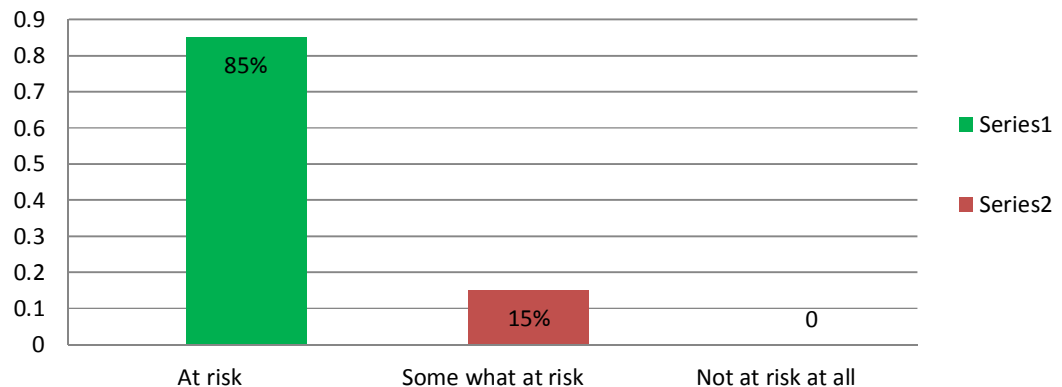


Figure 6: Tonle Sap Flood

Source: Field Survey May, 2014

In 2013, Kampong Leang district was inundated by Tonle Sap that flowed from the north and south of district and it seriously impacted to 358 families that there are 1,407 people totally. In among of total family there are 51 % were stayed in their houses through built a wooden board in house and 49 % were also evacuated to safety areas in districts, because most of their house are small and make leaf showed in Figure 7.

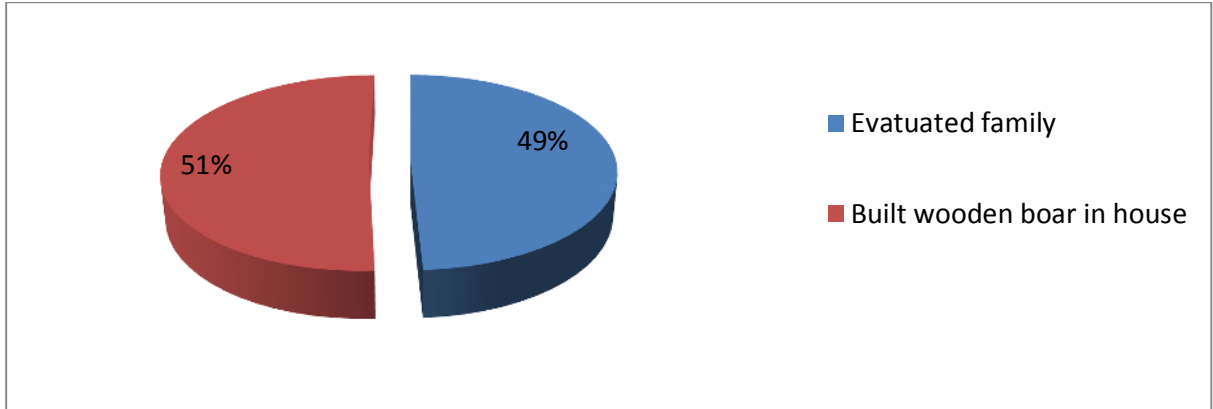


Figure 7: Family are affected by Tonle Sap Flood in 2013

Source: Field survey May, 2014 and Contingency book plan for disaster response in 2013

B. Draught

Generally, the drought of Cambodia occurred in wet season between Julys to November through none of rainy and hot weather. Based on the result of figure 8 showed that In among of 20 respondents, there are 45 % of all respondent stated that draught seriously affected for agricultural production and lack of water for using, 30 % of all respondents stated that draught is small problem affected, 20 % stated that draught is medium problem and 1 % stated that draught is not problem because they could pump river water to their crop plants. Due to group discussion with local authority on 9 May 2013 rose that draught affected to 60% crop plant of all agricultural land and 40% affected to animal is sick.

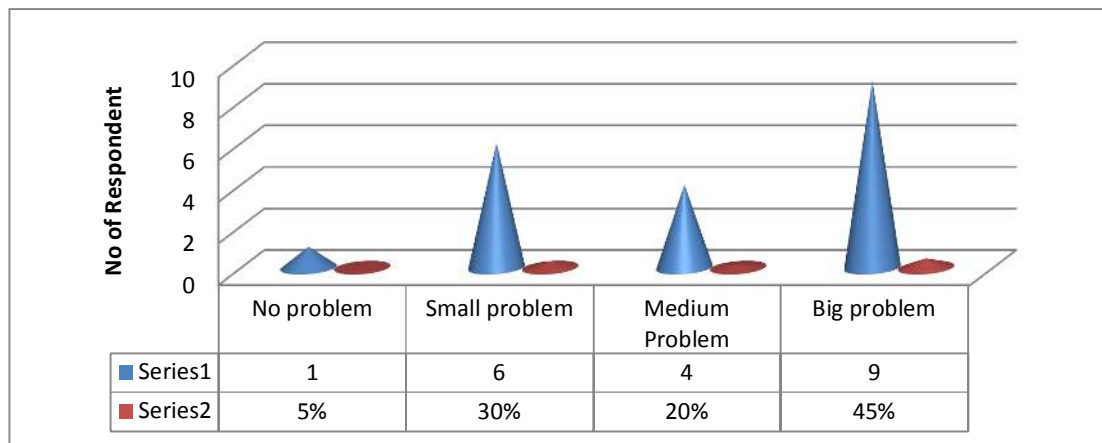


Figure 8: Draught occurred in Kampong Leang district

Source: Field Survey May, 2014

C. Lightning

Cambodia has one of the highest rates in the world of deaths by lightning. At 7.8 deaths per million people, (2007 to 2011) the measure is exceeded by only a few other countries, for example, South Africa, at 8.8. Cambodia's high number of 7.8 was the average for deaths in five years as reported by the National Committee for Disaster Management: 165 (2011), 114 (2010), 140 (2009), 95 (2008) and 45 (2007), then divided by the average population over the same years, which was 14.4 million. For 2012, no final death report has been made, although the death count for the first nine months was 100. It is important to stress that these figures are only as good as the reporting, collation, and dissemination thereof. The wet season is once again approaching and there will be preventable lightning deaths and injuries occurring in Cambodia. It is time for the NCDM and the government to put more effort toward effectively reducing these avoidable tragedies (Cambodia daily, 2013).

Based on the result of figure 9 showed the among of 20 respondents, there are 10% of all respondent stated that lightning is a big problem frequently occurred yearly in wet season and it killed 2 people and injured 1 person in year 2012 (CPB of KL,2013) , 15% of all respondent stated that lightning is a medium problem that affected to people, animal and some tries in district, 50% of all respondent stated that lightning is small problem if comparison of other disaster hazard and 25 % of respondents stated that lightning is not problem.

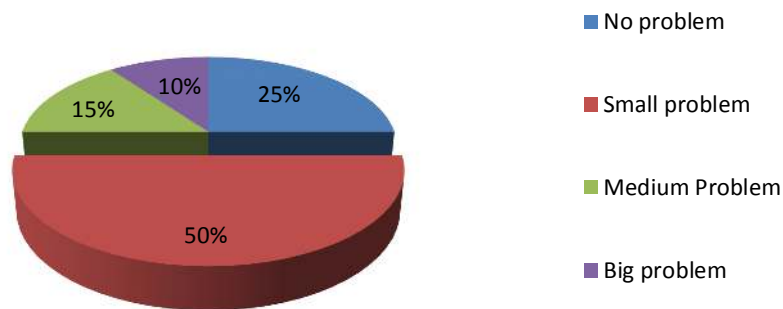


Figure 9: Lightning occurred in Kampong Leang district

Source: Field Survey May, 2014

D. Riverine Erosion

The Great Lake of Tonle Sap is the largest freshwater lake in South East Asia. It is a natural wonder of Cambodia, one of the unique geographical wonders of the world, and an ecological hot spot that was designated as a UNESCO biosphere in 1997. It is located at the central part of Cambodia and surrounded by five provinces: Kampong Chhnang, Pursat, Battambang, Siem Reap, Kampong Thom (Conservation Project of the Century, Miami Herald July 13, 1997). Kampong Chhnang district is low laying floodplain and the Tonle Sap River runs through the district roughly from north to south. According to result of Figure 10 showed that in among of 20 respondents, there are 55% of all respondent stated that it is not problem because they lived the temporary house in their farm (Chamkar) in dry season nearby riverside in order to do crop plant, but they also replaced to live their village at upper land during Tonle Sap flood inundation. While 45 % of all respondents did not know consist of riverine erosion.

Riverine Erosion

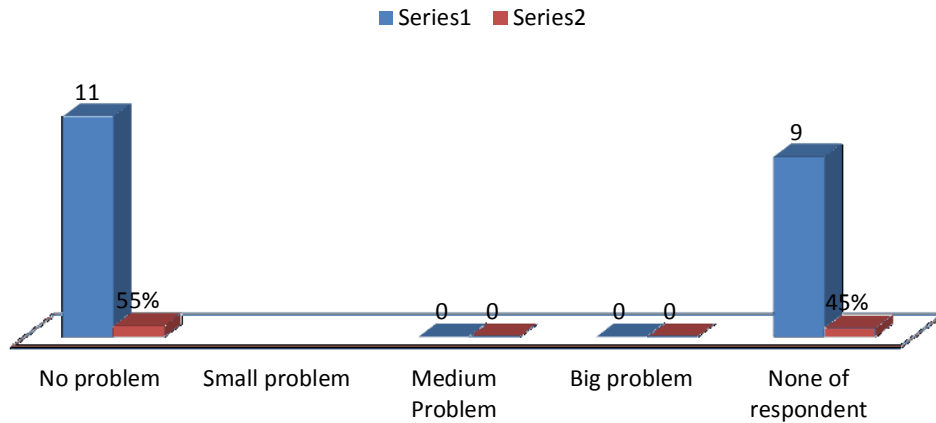


Figure 10: Riverine Erosion (Source: Field Survey May, 2014)

E. Bush Fire by animal hunter

Generally, People clearly know that the rice field closing to the hill of mountain will be yearly burned in dry season after rice harvest, mainly; in early wet season by animal hunter. Based on the result of figure 11 showed that in among of 20 respondents, there are 10 % of all respondents said that the bush and rice field burned affected to their livelihood while 45 % of all respondent said that the bush fire did not affected their family livelihood, because they already harvested and 45 % of all respondent also said that their rice field did not affected because their rice field is far way.

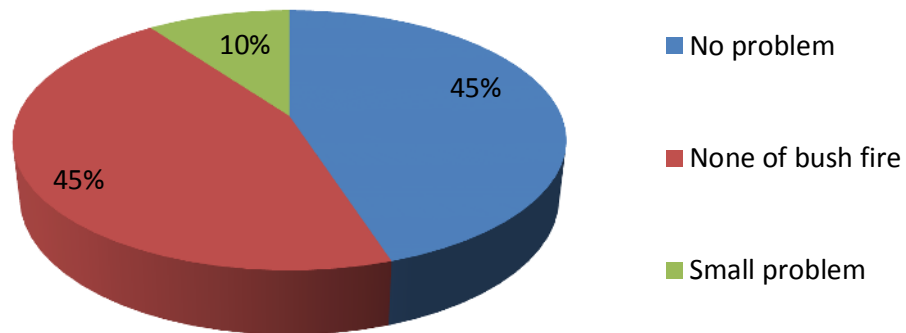


Figure 11: Bush Fire in Kampong Leang district (Source: Field Survey May, 2014)

F. Epidemic

In 2008, people who lived in Samraong Saen commune of Kampong Leang district was the site of a diarrhea epidemic that struck down over 100 people. As safe potable water sources are rare in the district people had been taking drinking water from stagnant ponds. This contaminated water was believed to have caused the epidemic. Forty six people were affected by the water in the first 24 hours and three days later the toll had risen to 113 people (http://en.wikipedia.org/wiki/Kampong_Leang_District)

Based the result of figure 11 showed in among of 20 respondents, there are 15 % of all respondents were diarrhea in six last month by didn't use boiled water or purify water while 30 % of respondents were not affected to their health because they used pure drinking water that NGOs established two places of water treatment for community's people support and 25 % of all respondent were affected their healthy is small while 30% of all respondents were not diarrhea through potable water.

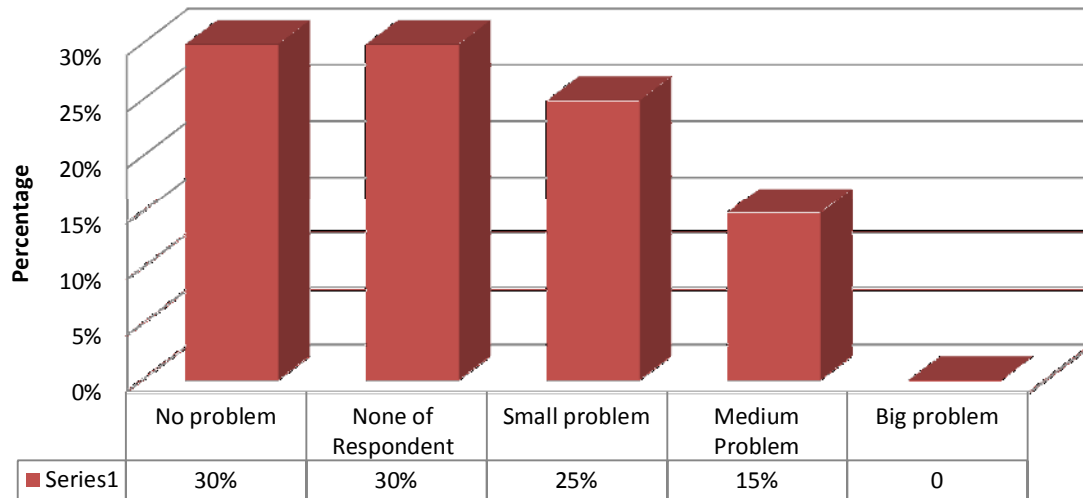


Figure 11: Epidemic (Water born, wind born disease etc.)

Source: Field Survey May, 2014

V. FLOOD DAMAGES IN KAMPONG LEAENG DISTRICT

A. Households Damage

Based on the result of figure 13 showed in among of 20 respondents of Leaeng district, there are 70 % of all respondents said that their house were damaged partly by Tonle Sap flood, while 20 % of all respondents were not damaged during Tonle Sap flood because their house was arranged before Tonle Sap flood come and some houses of respondent was upper land and 10 % of all respondents was fully damaged by Tonle Sap flood flowed toward to their houses.

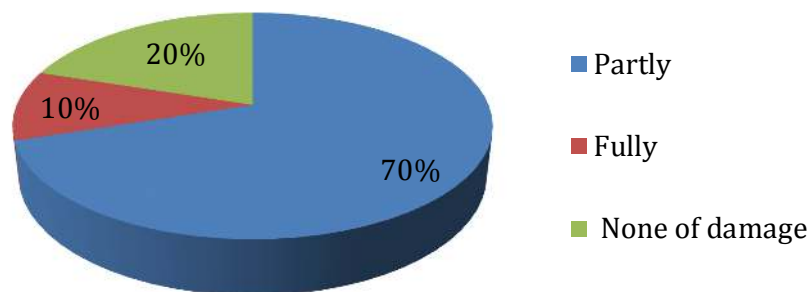


Figure 11: House damaged in 2013 (Source: Field Survey May, 2014)

B. Agriculture Damages

Generally, Community people who lived nearby riverside paid attention to prepare their preserve food yearly from Septembers to November during Tonle Sap flood in their location. Based to the result of figure 13 showed in among of 20 respondents interviewed, there are 25 % of all respondent stated that the preserve food were fully damaged by Tone Sap flood while 55 % of all respondents stated that the preserve food were not damaged during Tone Sap Flood because preserved food were arranged in upper land before come up and 20 % of all respondent stated that their preserve food were partly damaged.

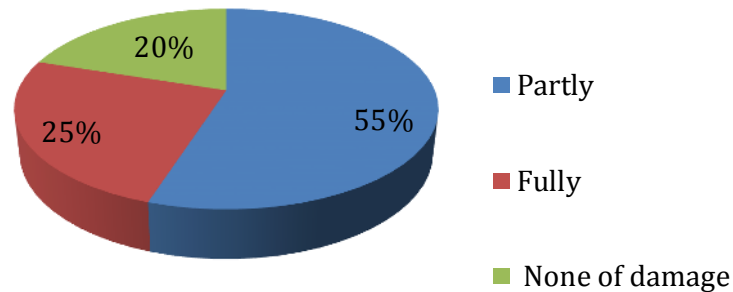


Figure 13: Agriculture Damage (Source: Field Survey May, 2014)

C. Livelihood Damages

Based on result of table 8 as below showed in among of 20 respondents, there are 60% of all respondent stated that their livelihood were partly damaged during Tonle Sap flood because their crop at lowland were already harvested and some crop plants cultivated at upper land while 30 % of all respondent stated that their livelihood were fully damaged during Tonle Sap flood by their farm of crop plants are nearby river while 10% of all respondent stated that they did not damage because they are small business.

Table 8: Livelihood was damaged by Tonle Sap Flood in 2013

| Description | None of damage | Damage | |
|----------------|----------------|--------|-------|
| | | Partly | Fully |
| Respondent | 2 | 12 | 6 |
| Percentage (%) | 10 % | 60 % | 30 % |

Source: Field Survey May, 2014.

Based on the result of table 9 showed that in among of 20 respondents, there are 70 % of all respondents stated that they were partly affected daily occupation as daily income loss and unemployment during Tonle Sap flood come while 20 % of all respondents stated that they were not affected daily occupation during Tonle Sap flood and 10 % of respondent stated that they make high family income through fishery and also cultivated crop in dry season.

Table 9: Unemployment during Tonle Sap Flood in 2013

| Description | Not affected | Affected | |
|----------------|--------------|----------|-------|
| | | Partly | Fully |
| Respondent | 4 | 14 | 2 |
| Percentage (%) | 20% | 70 % | 10 % |

Source: Field survey May, 2014

D. Home Garden Damage

Based on result of figure 14 showed in among of 20 respondents, there are 40% of all respondent stated that their crop and home gardens were partly damaged by Tonle Sap flood, 25 % of all respondent stated that their crop production were fully damaged and 35% of all respondent stated that their crop production were not damaged.

■ Partly ■ Fully ■ None of damage

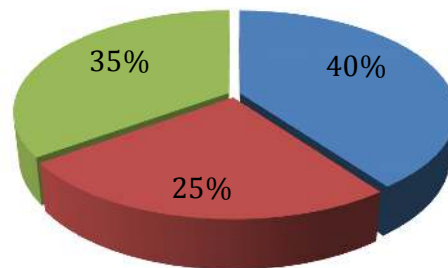


Figure 14: Crop production was damaged by Tonle Sap Flood in 2013 (Source: Field survey May, 2014)

VI. SAFE AREAS AND EVACUATION IN KAMPONG LEAENG DISTRICT

During flood emergency, the impacts on local infrastructure mostly affect evacuation decisions or plans. For identifying safe and evacuation area, infrastructure to consider when planning should include:

- Strong and higher building
- Roads
- Electricity and water supplies; and
- Telecommunications.

Plans should reflect the direct impact of the flood on infrastructure, as well as how evacuation decisions and shelter plans could be affected.

The guiding principles for evacuation and shelter planning and decision making are:

- Public safety comes first: public safety must be the over-riding priority in planning and operational decision making.
- Coordinate activity: the scale of risks associated with evacuation and shelter will require coordinated planning and response across other Commune as well as Provincial authorities.
- Prepare proportionately to local risk: evacuation and shelter planning should be relevant and proportionate to locally identified risks. A commune level risk mapping is thus essential to identify vulnerable people.
- Scale arrangements to the reasonable worst case: local planning should be generic and be geared to the consequences of the reasonable worst case scenario.
- Be flexible: flexibility and scalability are core to good practice, and mutual aid arrangements need to be considered.
- Plan for loss of essential services: plans need to take account of the potential loss or degradation of essential services and of the impact on communities, as well as of the resilience of responder organisations and individuals.
- Factor in human behaviour: the best possible understanding of behaviour is essential to avoid flawed assumptions in planning and response.
- Think broadly about public communications: planning should consider the full range of channels for communication with those affected, since speed of warning, informing and public response is critical. The loud speaker system could be the best solution for the pilot area.

On June 26-27, 2014 Emergency Management Specialist organize a meeting with local authority of Kampong Leaing district to discuss on the priority selection of safety areas in among of existing 16 safeties area that will support by climate change resilience for provincial road improvement project as additional latrines construction, water can providing, fulfill of land adding on safety area etc. In meeting, local authority selected 6 safety areas (Figure 15) namely as below:

- 1- Samraong Saen pagoda (calling Sen Sarey pagoda) is a upper land that two village people of Samraong Saen commune always evacuated to live temporarily during big Tonle Sap flood inundation.
- 2- Anlong Teuk Chors pagoda in Prolay Meas commune
- 3- Chheu Teal road in Plov Tuk commune
- 4- Prolay Meas Pagoda in Prolay Meas commune
- 5- Khors-Ka-ek Pagoda in Kampong Hou commune
- 6- Donveat Pagoda in Kampong Hou commune

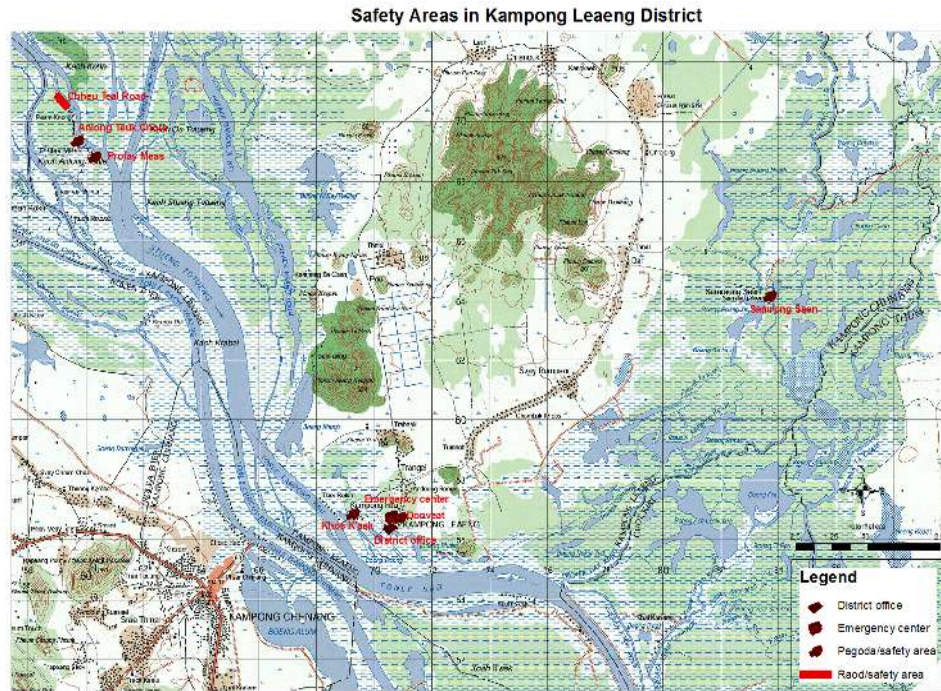


Figure 15: Safety Areas in Kampong Leang District

Detail of selected commune safety areas, their existing facilities and improvement requirements are summarized below in table 10. The detail of the nine Communes safety areas are described in [Annex-5](#).

Table 10: Selected Safety area in Kampong Leang

| No | Commune Name | No of Safe Evacuation | Location of Safe evacuation | Community Needs identified | Rehabilitation Program Under ADB project | Safety Route Identified |
|----|--------------|-----------------------|-----------------------------|---|--|-------------------------|
| 1 | Prolay Meas | 2 | Prolay Meas pagoda | <ul style="list-style-type: none"> ▪ Construct temporarily shelter for evacuation of people during Tonle Sap flood ▪ Provide two water tanks that it can contain 200 litter of water ▪ Construct newly 6 latrines ▪ Set up one of solar panel ▪ Fulfill adding soil of prolay Meas pagoda. | <ul style="list-style-type: none"> ▪ Construct temporarily shelter for evacuation of people during Tonle Sap flood ▪ Provide two water tanks that it can contain 200 litter of water ▪ Construct newly 6 latrines ▪ Set up one of solar panel ▪ Fulfill adding soil | By boat |
| | | | Anlong Teuk Chors Pagoda | <ul style="list-style-type: none"> ▪ Construct temporarily shelter for evacuation of people during Tonle Sap flood ▪ Provide two water tanks that it can contain 200 litter of water ▪ Construct newly 6 latrines | <ul style="list-style-type: none"> ▪ Construct temporarily shelter for evacuation of people during Tonle Sap flood ▪ Provide two water tanks that it can contain 200 litter of water ▪ Construct newly 6 latrines ▪ Set up one of solar | By boat |

| | | | | | | |
|---|---------------|---|-----------------------|---|--|---------|
| | | | | <ul style="list-style-type: none"> Set up one of solar panel | panel | |
| 2 | Plov Tuk | 1 | Thnal Chheu Teal road | <ul style="list-style-type: none"> Construct temporarily shelter for evacuation of people during Tonle Sap flood Provide two water tanks that it can contain 200 liter of water Construct newly 3 latrines Set up one of solar panel | <ul style="list-style-type: none"> Construct 3 latrines. Provide the temporary shelter material and food. Water Supply and solar panel. Set up the solar | By boat |
| 3 | Samraong Saen | 1 | Samraong Saen | <ul style="list-style-type: none"> Construct 3 additional latrines. Provide 2000 liter of water tank. Fulfill soil in location of pagoda which size 85 meter x 90 meter x 0.5 high. Construct additional wall of pagoda through cement concrete pavement which is 0.5 meter high. Provide temporarily shelter's material. Provide some items to local authority. Provide small water tank for the family of evacuation and food. | <ul style="list-style-type: none"> Fulfill adding 3825 m of land. Build adding three latrines with 5 canals. Construct adding 0.5 meter of the retaining pagoda wall. Provide the communication as Icom or telephone, safety clothes, floating tub, string for local authorities and evacuated family. Water supply and solar panel | By boat |
| 4 | Kampong Hou | 2 | Khos Ka-ek | <ul style="list-style-type: none"> Set up of one solar panel Construct two additional toilets. Fulfill additional soil in Koh Ka-ek pagoda. Provide the shelter's material for family of evacuation. Provide two water tanks that contain 200 liter. | <ul style="list-style-type: none"> Set up of one solar panel Construct two additional toilets. Fulfill additional soil in Koh Ka-ek pagoda. Provide the shelter's material for family of evacuation. Provide two water tanks that contain 200 liter. | By Boat |
| | | | Donveat | <ul style="list-style-type: none"> Construct additional 6 latrines. Provide temporarily shelter's material for family of evacuation. Provide two water tank that can contain 200 liters. Provide security food during Tonle Sap flood. | <ul style="list-style-type: none"> Construct additional 6 latrines. Provide temporarily shelter's material for family of evacuation. Provide two water tank that can contain 200 liters. Provide security food during Tonle Sap flood. | By boat |

| | | | | | | |
|--|--|--|--|--|--|--|
| | | | | | | |
|--|--|--|--|--|--|--|

A. Prolay Meas commune Safety area

Prolay Meas commune is a commune of 9 commune of Kampong Leaug district. The north of commune is close to Chnouk Trou of Boribo district and Plov Tuk commune, the south of commune is close to Sangkat of Kampong Chhnang, the west is close to Svy Chrum commune of Roler'bier district and Kampong Preash commune Korky of Boribo district. The east of commune is close to Poa commune and Chronuk commune. This commune, there are 2556 people (female: 1302 people) and it also consist of 4 locations include Andoung Krochors pagoda, Prolay Meas pagoda, Kanrei festival house and Mountain hill of Kanrei. In among of 4 locations of safety area were selected 2 the locations are (1) Prolay Meas pagoda and (2) Anlong Kanhchoh pagoda.

Picture: Location of Prolay Meas Pagoda



There is 60 meter x 120 meter. In disaster record with 2000 showed that there are 410 families were evacuated to safety area, 2011 consist of 350 families, and 2013 consist of 10 families. Last year, people had evacuated by motor boat/boat. People can live 100 families during Tonle Sap flood.



The size of pagoda land is 40 meter x 50 meter

In 2000, there are 50 families were evacuated to safety area of this pagoda.

In 2011, there are 49 families were evacuated to safety area

Picture: Anlong Kanhchoh Pagoda

Community Needs:

- Construct temporarily shelter for evacuation of people during Tonle Sap flood
- Provide two water tanks that it can contain 200 litter of water
- Construct newly 6 latrines
- Set up one of sola panel

➤ Prolay Meas Pagoda :

- Construct temporarily shelter for evacuation of people during Tonle Sap flood
- Provide two water tanks that it can contain 200 litter of water
- Construct newly 6 latrines
- Set up one of solar panel
- Fulfill adding soil of prolay Meas pagoda

➤ **Anlogn Kanhchoh Pagoda:**

- Construct temporarily shelter for evacuation of people during Tonle Sap flood
- Provide two water tanks that it can contain 200 litter of water
- Construct newly 6 latrines
- Set up one of solar panel

B. Plov Tuk commune Safety Area

Plov Tuk commune is a commune of 9 commune of Kampong Leang district. The north of commune is close to Phat commune of Kampong Svay commune, the south of commune is close to Chronouk commune and Prolay Meas, the east of commune is close to Chronuk commune and the west of commune is close to Prolay Meas commune. This commune, there are 1777 people (female: 859 people). In this commune also have only one safety area is Thnal Chheuteal pagoda that size 100 meter x 100 meter. In 2000, there 25 families were evacuated to safety area and 2011 consist of 59 families were evacuated to safety area and 2014 consist of 15 families evacuated by motor boat or boat.

Picture (TBD)

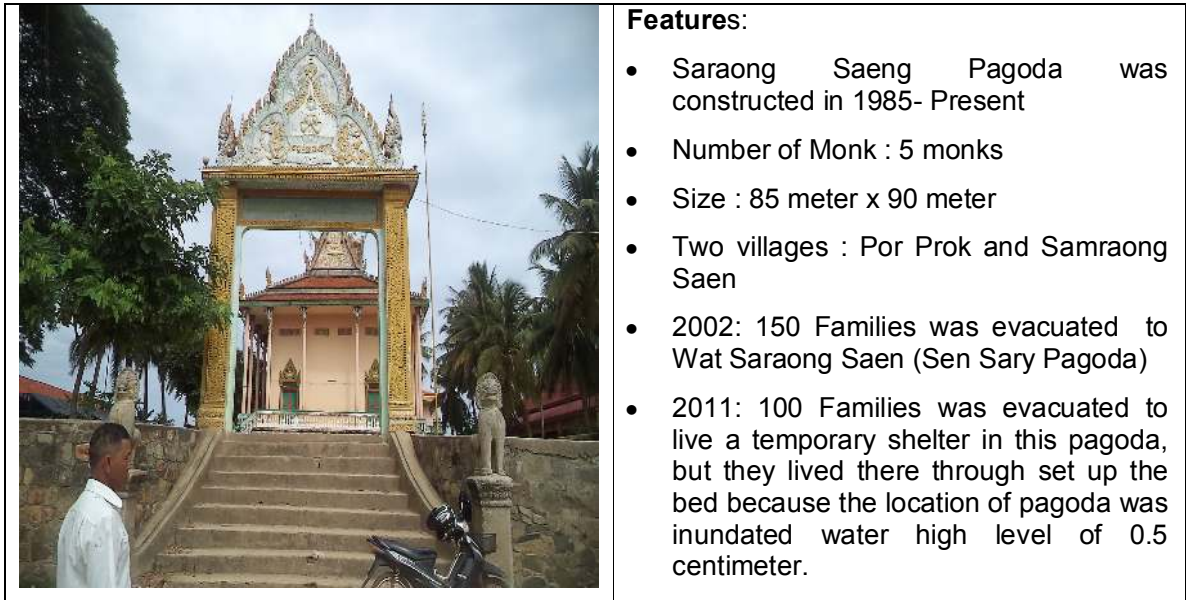
- Pagoda surface is 100 meter x 100 meter
- 50-100 families can live temporarily during Tonle Sap flood.

Community Needs:

- Construct temporarily shelter for evacuation of people during Tonle Sap flood
- Provide two water tanks that it can contain 200 litter of water
- Construct newly 3 latrines
- Set up one of solar panel

C. Samraong Saen Commune Safety Area

In Samraong Saen Commune, there are only one safety area is Wat Saraon Saen pagoda that commune kept it for evacuated family during Tonle Sap flood increased. In among of 388 families, there are 27- 40 % of all family was yearly evacuated as below:

**Features:**

- Saraong Saeng Pagoda was constructed in 1985- Present
- Number of Monk : 5 monks
- Size : 85 meter x 90 meter
- Two villages : Por Prok and Samraong Saen
- 2002: 150 Families was evacuated to Wat Saraong Saen (Sen Sary Pagoda)
- 2011: 100 Families was evacuated to live a temporary shelter in this pagoda, but they lived there through set up the bed because the location of pagoda was inundated water high level of 0.5 centimeter.

Picture : Wat Saraong Saen (Sen Sary Pagoda)

Other hand, committee prepared some places of pagoda for them lived there as 20 families can stay in pagoda school, 30 families stay food school, 10 families stay in Buddhism pagoda and other families live in the location of pagoda.

In the wet season or Tonle Sap flood, people and monk who live in Samraong Saen commune took the river water for family consumption daily through pumping machinery, but dry season; pagoda lack of well water for use it daily.

Emergency management plan of Samraong Saen Commune

Commune exist one motor boat, one tuk tuk and 20 members of emergency management that they came from different village 10 people came from Samrong Sen and 10 people came from Porprok village. In among of 20 people, commune chief established four groups include search and rescue, health and sanitation, information and incident command group and each group there are 6- 7 member. Other hand, the contingency plan of commune reserved 10 motor boats for emergency management during Tonle Sap flood, but 9 motor boats borrowed from villager through commune gasoline support when they patrol village.

Community Needs

Due to Tonle Sap flood in 2011, the location of pagoda was inundated, there is water high level of 0.5 centimeter, so commune chief, pagoda committee and people suggested to PRIP to establish higher location than Tonle Sap inundated in 2011. The project should rebuild the location of safety area as below.

- Fulfill adding land in pagoda is approximately 3825 Square meter
- Construct additional three latrines; there are 5 canals per latrine, pipe water of 4 meter etc.
- Install one water tank can contain 2000 liter
- Construct the retaining wall of pagoda is 0.50 centimeter.
- Support the material of temporary shelter
- Provide purify water cans for evacuation of family and food.

Provide the material of communication as lcom or telephone, safety clothes, floating tub, string etc.



- Wall high : 2 meter
- Latrine size : 2 meter x 2 meter
- Latrine roof : tile/Siphro Cement



Water tank Can Contain 2000 ML

Figure: Community needs assessment

The construction of temporary shelter in location of Saraong Saen pagoda

In 2011, Commune chief organized a meeting with stakeholders to establish a committee in coordination of temporary shelter construction, people's issue and people needs resolution period to they stayed the location of pagoda. Its committee consists of 6 members as commune chief, pagoda committee, monk and people. 25-40 % of all people in both villages were evacuated to safety area or pagoda after Tonle Sap flood affected their family. When family of evacuation reached pagoda, the committee hard worked to help them to construct the shelter, food support, consumption material etc.

D. Kampong Hau Commune Safety Areas

Kampong Hou commune is a commune of 9 commune of Kampong Leang district. The north of commune is close to Tragil, Poa and Svay Rumpear commune, the south of commune is close to Sangkat of Kampong Chhnang, the east is close to Peam commune of Chkork in Cholkiry district and the west of commune is close to Kampong Chhnang municipality of Kampong Chhnang province. This commune, there are 5694 people (female: 3047 people) and it also consist of 5 places include Tepy mountain, Thmey pagoda, Andet pagoda, Donveat pagoda and Khor Ka-ek pagoda. In disaster record with 2000 showed that there are 152 families were evacuated to safety area and 2011 consist of 60 families.

1- Khors Ka-ek Pagoda:

Picture - TBD

- Size of pagoda land , there are 70 m x 80 m
- In 2000, there are 85 families were evacuated to safety area
- In 2011, there are 50 families were evacuated to safety area.
- In 2013, there are 5 families were evacuated to safety area.
- Last year, people who evacuated by Motor boat

2- Donveat Pagoda:

Not Picture yet:

- Size of pagoda land, there are 65 meter x 80 meter.
- In 2000, there are 152 families were evacuated to safety area.
- In 2011, there are 60 families were evacuated to safety area.
- Means of their evacuation is family's boat/ Motor boat.

Community Needs**➤ Khors Ka-ek**

- Set up of one solar panel
- Construct two additional toilets.
- Fulfill additional soil in Koh Ka-ek pagoda.
- Provide the shelter's material for family of evacuation.
- Provide two water tanks that contain 200 liter.

➤ Donveat Pagoda :

- Construct additional 6 latrines.
- Provide temporarily shelter's material for family of evacuation.
- Provide two water tank that can contain 200 liters.
- Provide security food during Tonle Sap flood.

VII. FERRY AND RESCUE BOATS FOR EVACUATION

Two Ferry and four inflatable boats will be provided under the project to Kampong Leaeng District. The draft design of the ferry boat is shown in the **Annex 2**. There are two parking places (Plateaus) for ferry or motor boat at present. One parking place is at **T'uor Rolum** village in **Kampong Hou** commune in dry season, but in rainy season or Tonle Sap flood, it was changed from this village to Kampong Beung village which is in front of Kampong Leaeng district governor's office due to the size of Tonle Sap flood. The Inland Water Authority mentioned that due to the road inundation the plateaus need to move from one place to another place. A 5-6 km height of the road height increase could fix the plateaus in one place. The Inland Water Transportation doesn't maintain the ferry they are only responsible to maintain the Plateaus.

Plateau for Ferry Boats

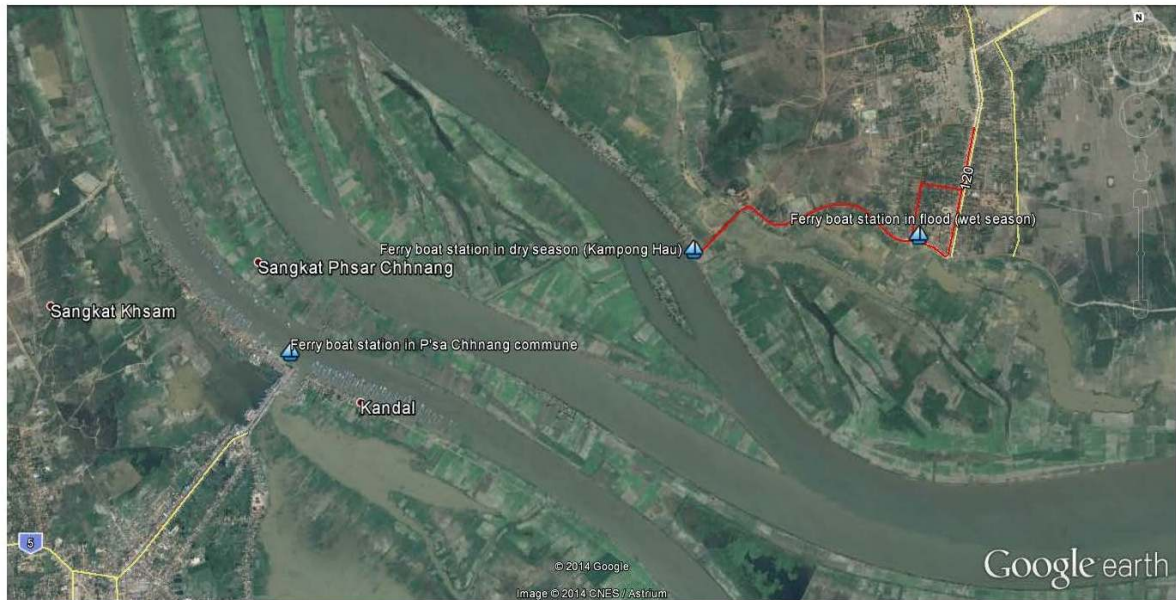


Figure 16: Plateau for the Ferry Boats and Roads

It is recommended to conduct the proper hydrological assessment for the water level of the river. Based on the water level availability round the year the ferry boat could be design accordingly. For the management of ferry is also crucial comparing to its maintenance and regular operation. The detail of the maintenance and management of ferry boat will be describes in separate report.

VIII. WATER SUPPLY AND USES IN KAMPONG LEAENG DISTRICT

The water supply and uses are quite challenging in the area. Presently, there are two water treatment facilities available. These two treatment devices which have a similar system & capacity are funded by Lien AIDs. Both are located in Kampong Hau commune, but in different village. One is located in T'uor Rolum village and another one in the Kaoh K'aek village. The water treatment device in T'uor Rolum village is able to produce clean water around 1500 liter per day. But it is sold for only about 50% of their daily production. It is retailed in one bottle with 30 L, costs 1000 Riel. This water treatment device is needed to serve for four villages Kampong Boeng, Stung Sandek, Koeng Prah and T'uor Rolum itself. And another water treatment device locates in T'uor Rolum village which is served for two villages, Dounreib and Koah K'aek itself. About 50% of the daily clean water products can be sold. This might be caused by the local people who have no money to buy that clean water and never get used to use it. With reference to the field trip interview, the storage of the water treatment device is 2000 L and it takes for around 5 hours to refine the 2000L water to process through its system. Besides these both water treatment devices, there is water selling within the commune. They pump the water from well, pond and sell this direct water without any treatment to the people in a cost of 2000 riel for 100L or 800 Riel for 30L. The water seller carries and sells this water to reach at the people's houses.



Figure 17: Location of water supply supported by Lien Aid organization

In the extreme and normal flood, most villages in the Kampong Hao commune have always been inundated. Wells and ponds have been flooded, contaminated and haven't been used. Through the field trip interviewees, they have told that almost every household have the purring water bottle with 10 L of its capacity. They have used these purring water bottles to refine the river water for their drinking and cooking. Also the people have used the whit alum to put into the water and stir it. Then they have kept that water for sometimes until the water has become clear before taking it for use. Not differently for the villages with the low flood depth in the Kampong Hao commune and the villages in the other two ones, due to the flood, infiltration and contamination in the wells and ponds, the water use is fundamentally relied on:

1. the special purring water bottle with its capacity of 10 Liter
2. putting the white alum into the water and stir it
3. water seller within the communes
4. two water treatment devices funded by Lien AIDS
5. Rain Water Tanks

By the time of the immediate post flood, most of the wells and ponds haven't been used due to the contamination. The way of using water is quite similar to the period of the extreme and normal flood. This means that the water use is still relied on the five mentioned points above. When moving into the dry season, some wells and ponds can be used. But the interviewees have told that when the wells which are deeper than 20 to 30m, those wells always contain the Arsenic substance.

The project will cover water supply with a primary distribution of 3710 meter (dia 90 mm), secondary distribution of 5350 meter and tertiary distribution coverage 5000 meters (Annex-3,

detail plan). All the safety areas under this coverage will access to safe water. Other safety areas will be supported by shallow water tube well with small storage capacity.

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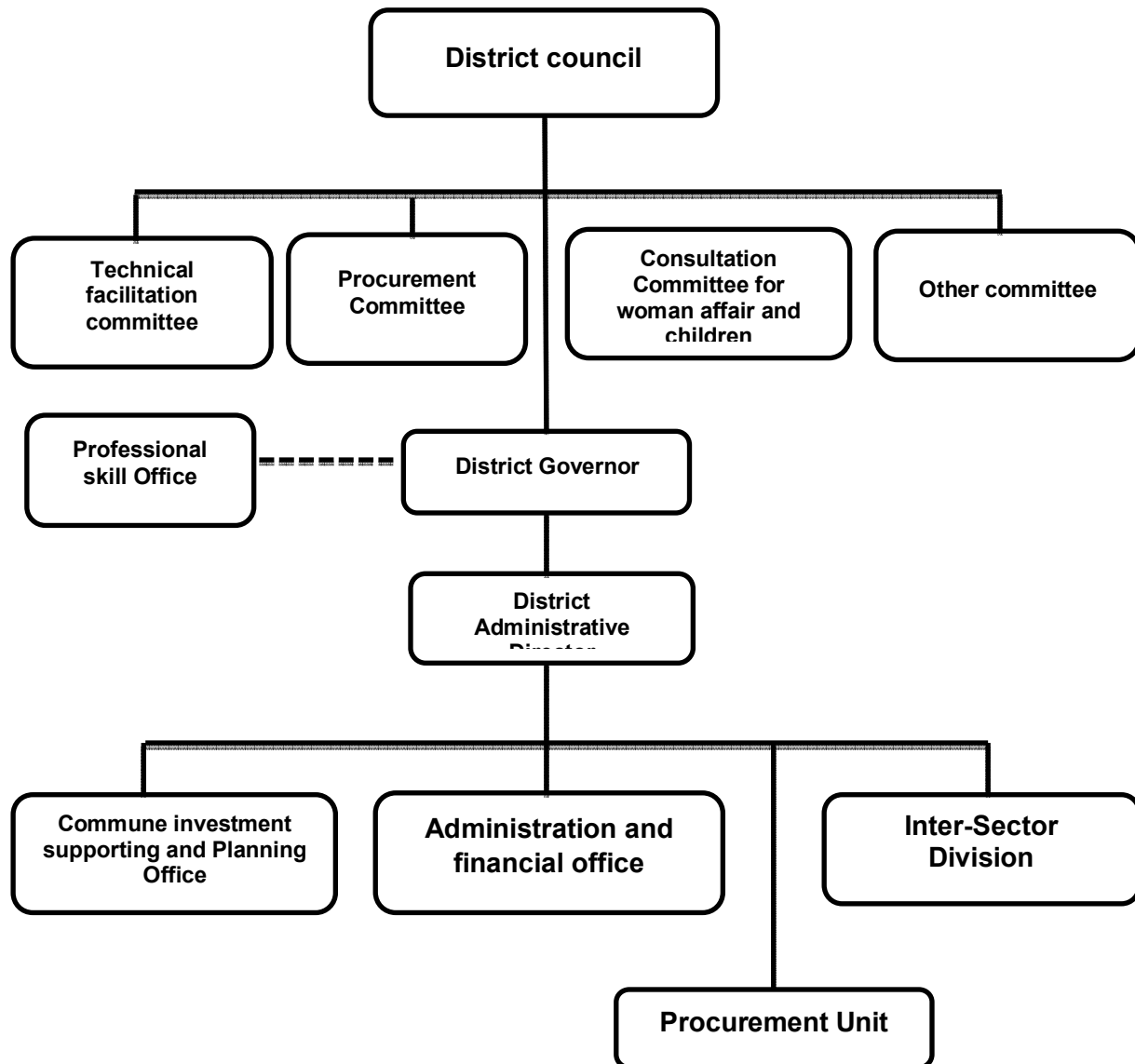
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ANNEX-1: ORGANIZATION CHART FOR KAMPONG LEAENG DISTRICT



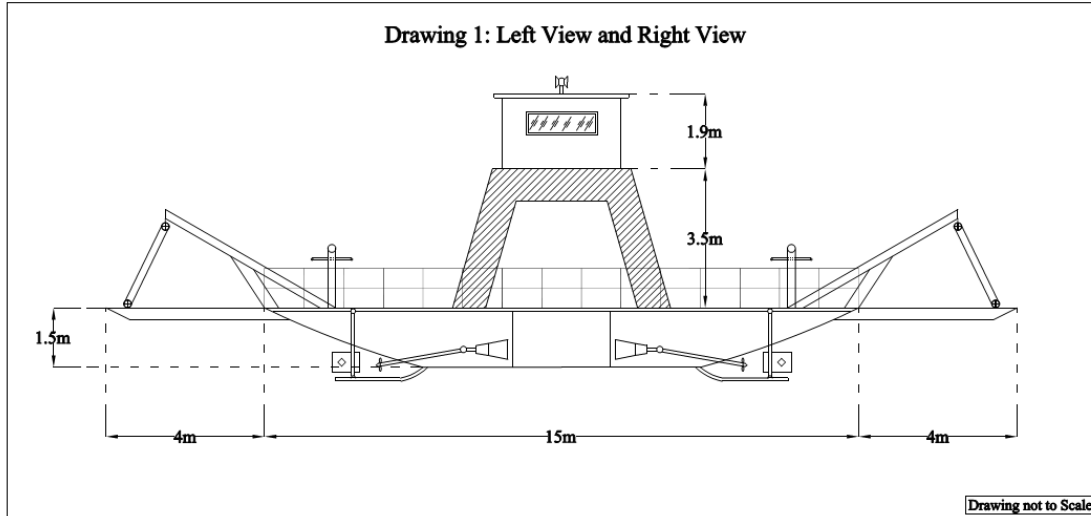
Article 33, 90, 151 of Sub-degree no 216 R.N.B.K dated on 14 December 2009 on function , duty and provincial council communication, provincial governor, municipality and district council had identified that Minister of Interior have to establish on guideline of province, municipality, district and how to implement the role and function as below :

- District governor is common lead of general work as social order, security, drug abuse rebel and administrative leader of own council.
- Deputy district governor assist district governor on economic and financial work and social affair, teenager and competency, district treasury, bank, controlling office, customer and procurement work.
- Deputy district governor assist district governor on commune investment support and rural development, planning, tourist, culture, religion, health and disaster management.

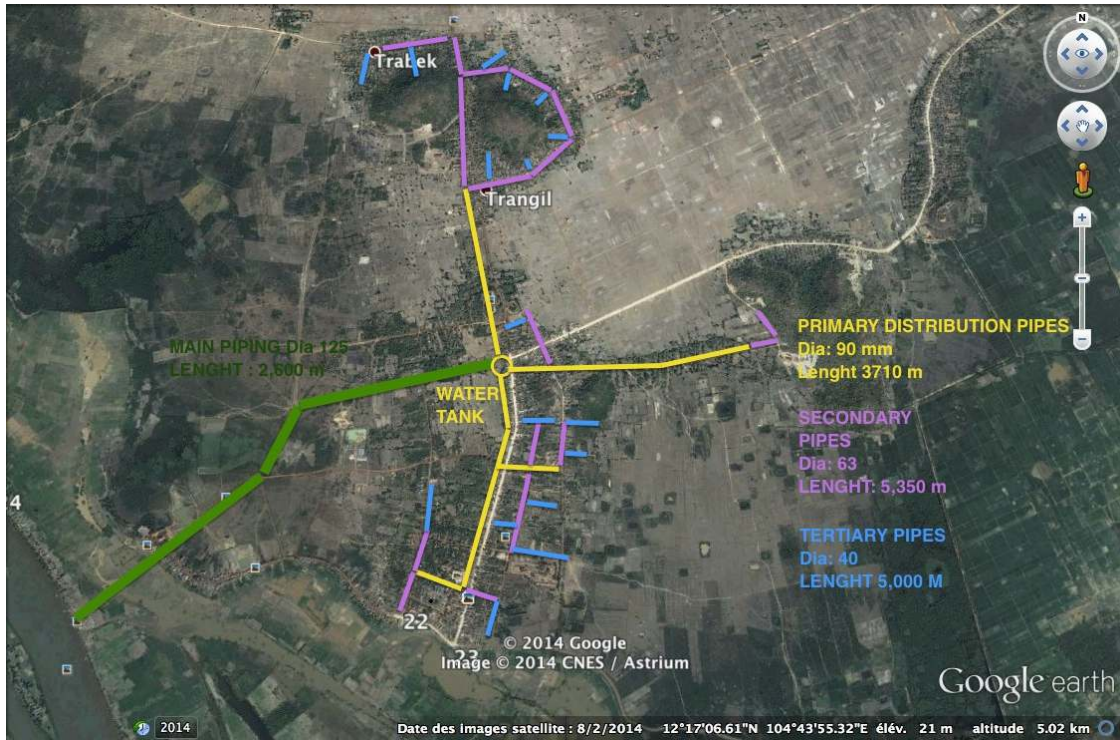
- Deputy district governor assist district governor on woman affaire and children, information, vocational training, teenager education, statistic and birth register, human right, none of government, association and political party.
- Deputy district governor assist district governor on public work and transport , environment, hard and soft something management, building construction and cadastral survey, agriculture, forestry and fishery and forestry admiration unit, business, industry, mine and power, sanitation and water resource management and irrigation, post and telecom and depute facilitate out of judge.

(MOI, guideline on provincial, municipality and district role and function, 2010)

ANNEX-2: DRAFT DESIGN OF FERRY BOAT



ANNEX-3: DESIGN OF WATER SUPPLY SCHEME



ANNEX-4: FIELD SURVEY REPORT OF KAMPONG CHHANG

Housing Adaptive Capacity of Kampong Hav and Phsar Chhnang Commune

Date: 14 and 20 August 2014

Name: PHO Sorpheara, CHEY Vanna

Objectives:

Within the term of reference of the social specialist, this field survey has a main objective is to identify the adaptive capacities of people in Kampong Laeng district and Kampong Chhnang City where is annually flooded by the Tonle Sap flood.

(1) Introduction

Base on the geography, Kampong Laeng is an island which locates in the great giant Tonle Sap Lake due the flood season. The area along the bank of the lake is generally inundated by flood annually. In contrast, the people settle their living along the bank where is the low and fertilized land for growing their crops, and easily assessing to fishery work. The district static records of 2013 flood; 6,778 meters of road and 10 bridges were damaged and 228 Ha of rice paddy were destroyed as well.

(2) Information about the interviewees

▣ Raising House Survey:

The field visit conduct with social survey on adaptive capacity on the flood. With the 5 hours in the field, 21 households are interviewed. 16 respondents are female and 5 respondents are male. The result of the survey causes the classification of respondents' age in 3 ranges:

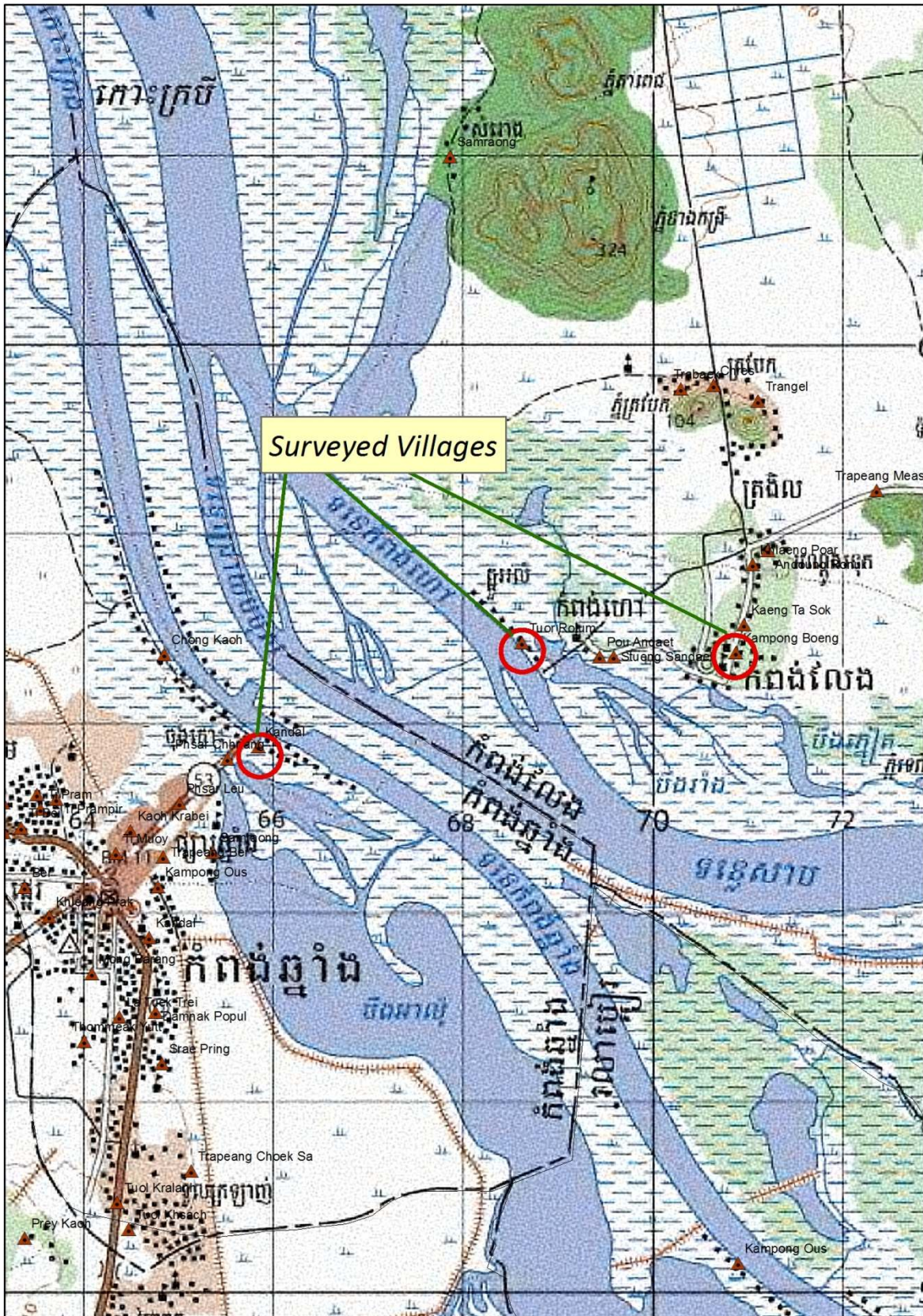
- 25-45 years old: 7 respondents
- 46-65 years old: 10 respondents
- Over 65 years old: 4 respondents

The survey covers on 2 villages in Kampong Hav commune. 9 respondents are from Kampong Boeng Village and 12 respondents are from T'oul Rolom village. At least 11 years which respondents have been living in their own resident?

▣ Floating House Survey

On 20th August 2014, the field survey conducted with the people who live in the river, Kandal village, Phsar Chhnang Commune, Kampong Chhnang City. They resist against flood and their house have never inundated. They adapt to the flood by floating their house. 15 respondents are male and 5 respondents are female. The range of age can be classified as below:

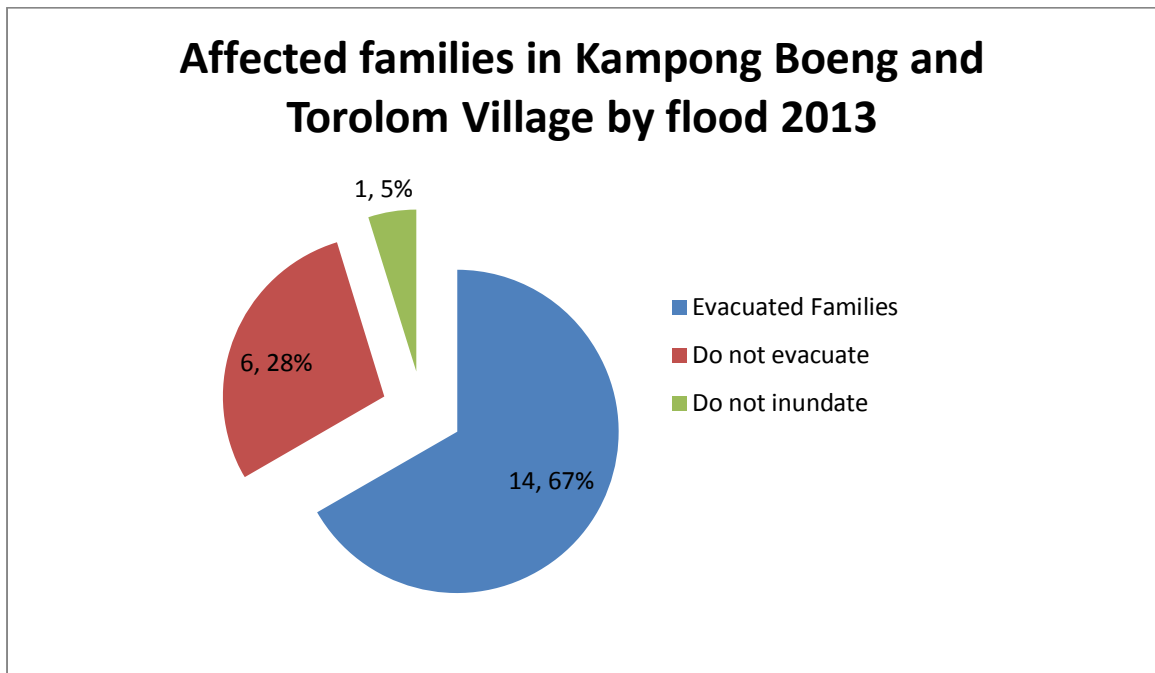
- 25-45 years old: 12 respondents
- 46-65 years old: 7 respondents
- Over 65 years old: 1 respondents



(3) Housing Adaptive Capacity

3.1 Raising House

The survey result shows that 14 families had evacuated, 6 all member and 8 some of their members to safety hill, others 6 families lived with the whole member due the flood and only 1 family which house haven't inundated since 2003.



Source: Field survey 14-08-2014

The residential people are fully experienced with housing adaptations. They build a temporary floor, it's called **Thner** in khmer language, so they can live in their house even it is inundated. The families have little children they move temporary to stay at Por Andet pagoda for Ta Oul villagers, and at the district hill land for the Kampong Boeng villagers to avoid the kids from drowning. Other adult members need to stay in the house due the flood to look after their properties and animals.

Thner is raised according to the flood level. It's not built for only people to stay, but also to keep their properties from inundation. The main materials to raise **Thner** are bamboo and wooden board. Bamboo is used to build the structure of **Thner** and wooden board is used as the floor. For interviewed household, they spent much or less money base on the size of Thner they want and the material they own. The survey indicates that among 21 households, 14 families had raised **Thner** and spent minimum 50,000Riel and up to 300,000Riel as a maximum. Other 6 families, their houses are small and they had no enough money, so they moved to safety hill when the house is inundated.

| Minimum price (Riel) | Maximum price (Riel) | Mean (Riel) |
|----------------------|----------------------|-------------|
| 50,000 | 300,000 | 200,000 |

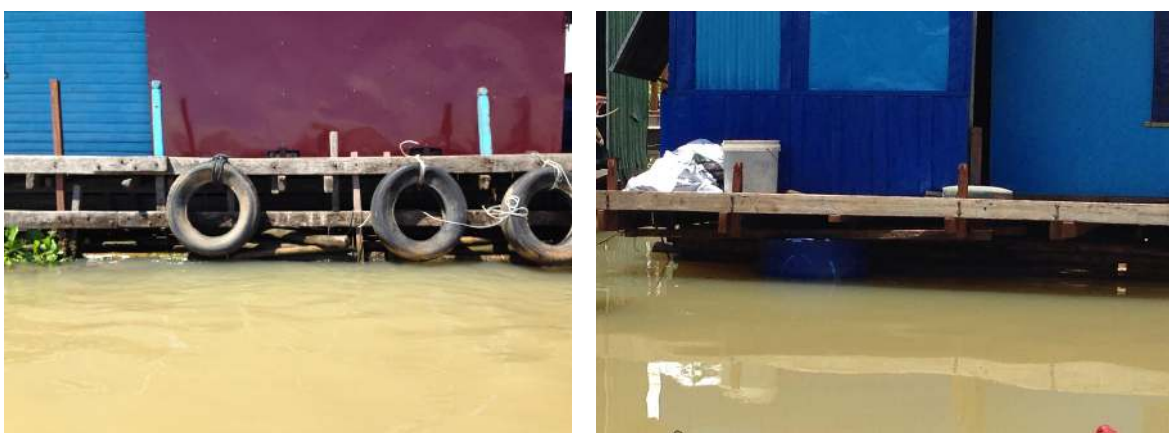
Source: Field survey 14-08-2014

Bamboo is also used to float their animal cages, pigs and chickens, and tied by string attach to the house. The animals were not evacuated to any the safety hills.

3.2 Floating House

The field survey took 20 households with floating houses as the sample and all of them are Vietnamese. They have no land because they live there illegally. The elder people and little kids cannot speak Khmer language. The main occupations are fishing and raising fish in the Tonle Sap River. The fish lots are built nearby or beneath their floating house.

The floating houses are similar in color and also material for construction which have wooden wall, zinc roof and wooden board as a floor. To float the house, the cost of expense depends on the size of the house. The survey shows that the largest one (6*17meters) costs approximately 6 million Riel (1,500 USD) and the smallest one (5*8meters) costs 1.2million Riel (300 USD).



Pictures 20-08-2014: Underneath Structure of floating house

Through the 20 samples of interviewed household, the mean of cost to float the house is about 3,114,500 Riel and the price in square meters around 57,300 Riel (Tale below). Each household need reserved money to repair the underneath structure for sustainable floating. There are main materials to make the house floating on the river. The first one is bamboo and the second is gallon plastic tank.

Table: The price and size of floating house

| Minimum price (Riel) | Maximum price (Riel) | Mean (Riel) | Min-Size of house (m ²) | Max-Size of house (m ²) | Mean Size of house (m ²) | Price/m ² (m ²) |
|----------------------|----------------------|-------------|-------------------------------------|-------------------------------------|--------------------------------------|--|
| 1,200,000 | 6,000,000 | 3,114,500 | 40 | 102 | 54.4 | 57,300 |

Source: Analyst Field survey 20-08-2014

□ Materials to float house

Bamboo play important role to make the floating house staying in balance, but the age of usage is about 2-4years only. It might be changed when its condition is not good and replaced by the one with high quality to float the house. One bamboo tree cost from 3,500Riel to 6000Riel which depend on its quality.

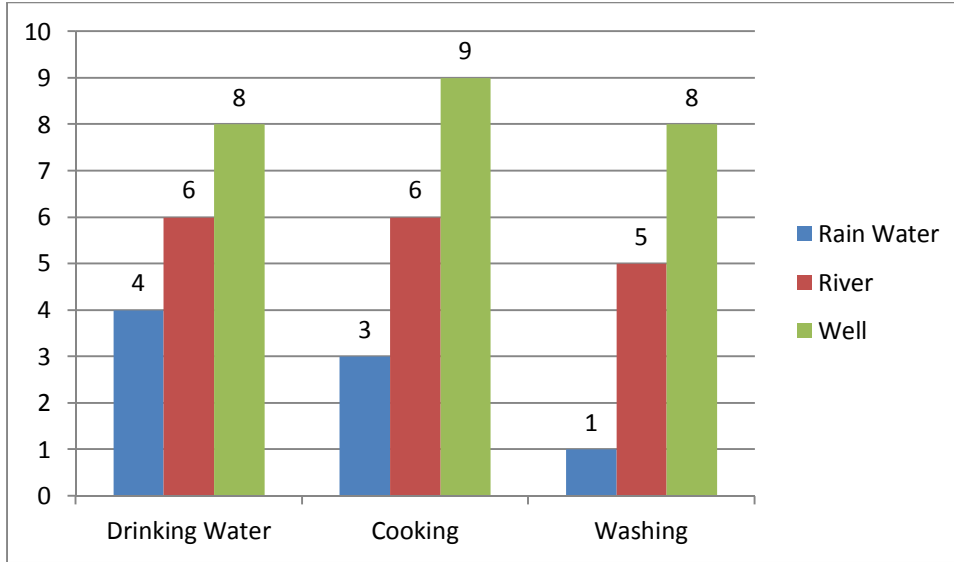


Gallon plastic tank costs highly 25 USD. Otherwise, it has a long life of usage. Gallon plastic tank is good in floating than bamboo but it cannot stand alone to float the house and against the wave of river.



(4) Ground Water

The water use is the serious challenge in this area. River, well and rain water are main sources water for people who live in Kampong Boeng village. In rainy season, they are able to access the river water and keep the rain water in their tanks, but in dry season the whole village depends on well water. Even this area is not much too far from the river, people lack of water for usage in dry season because they don't have abilities to bring or connect the river water source and there is no clean water supply for the village, commune or district too. People in the village who live nearby the well can access to the well water, but people who cannot access to the well need to buy water where its source is well. Without any treatment system, the water is sold 2000 Riel per 100liters gallon or 800 Riel per 30 liters gallon. Generally people need to buy the water 5month in dry season and spend monthly from 10000Riel (2.5USD) to 25000Riel (6.25USD).



The graphic above shows about water usage in Kampong Boeng village, where local people depends on well for daily usage. River is the second choice in flood and few households have kept rain water in their tank in rainy season. On the other hand, T'oul Rolom village and Kandal village, people basically use Tonle Sap River water in all season.



Interviewed Activities



T'uor Rolum Clean Water Supply



T'uor Rolum Village start getting flood

List of interviewees (Raising House)

| No | Code | Name | Sex | Village | Commune | District |
|----|------|--------------|--------|--------------------|-------------|---------------|
| 1 | R001 | Heun Sim | Female | Kampong Boeng | Kampong Hav | Kampong Laeng |
| 2 | R002 | Kang Yan | Female | Kampong Boeng | Kampong Hav | Kampong Laeng |
| 3 | R003 | An Sokhoun | Female | Kampong Boeng | Kampong Hav | Kampong Laeng |
| 4 | R004 | Kroch Chan | Female | Kampong Boeng | Kampong Hav | Kampong Laeng |
| 5 | R005 | Nga Vuthy | Female | Kampong Boeng | Kampong Hav | Kampong Laeng |
| 6 | R006 | Im Sopheap | Female | Kampong Boeng | Kampong Hav | Kampong Laeng |
| 7 | R007 | Chork Koun | Female | T'uor Rolum | Kampong Hav | Kampong Laeng |
| 8 | R008 | Chhoun Ke | Male | T'uor Rolum | Kampong Hav | Kampong Laeng |
| 9 | R009 | Beu Kunthea | Female | T'uor Rolum | Kampong Hav | Kampong Laeng |
| 10 | R010 | Chan Sareoun | Male | T'uor Rolum | Kampong Hav | Kampong Laeng |
| 11 | R011 | Ouk Buntheon | Male | T'uor Rolum | Kampong Hav | Kampong Laeng |
| 12 | R012 | Bean Vorn | Female | T'uor Rolum | Kampong Hav | Kampong Laeng |
| 13 | R013 | Prom Kunthea | Female | T'uor Rolum | Kampong Hav | Kampong Laeng |
| 14 | V001 | Chhoun Sina | Female | Kampong Boeng | Kampong Hav | Kampong Laeng |
| 15 | V002 | Sok Thom | Male | Kampong Boeng | Kampong Hav | Kampong Laeng |
| 16 | V003 | Chea Chantha | Female | Kampong Boeng | Kampong Hav | Kampong Laeng |
| 17 | V004 | Keo Chandoen | Female | Ta oul Rolom | Kampong Hav | Kampong Laeng |
| 18 | V005 | Keo Vibol | Female | Ta oul Rolom | Kampong Hav | Kampong Laeng |
| 19 | V006 | Sam Sun | Male | Ta oul Rolom | Kampong Hav | Kampong Laeng |
| 20 | V007 | Dy Sokhea | Female | Ta oul Rolom | Kampong Hav | Kampong Laeng |
| 21 | V008 | Beu Thy | Female | Ta oul Rolom | Kampong Hav | Kampong Laeng |

List of interviewees (Floating House)

| No | Code | Name | Sex | Village | Commune | District |
|----|------|-------------------|--------|---------|---------------|-----------------|
| 1 | R013 | Le Gna | Male | Kandal | Phsar Chhnang | Kampong Chhnang |
| 2 | R014 | Hor Vantien | Male | Kandal | Phsar Chhnang | Kampong Chhnang |
| 3 | R015 | Yor Thea Ouk | Female | Kandal | Phsar Chhnang | Kampong Chhnang |
| 4 | R016 | Thay Hou San | Female | Kandal | Phsar Chhnang | Kampong Chhnang |
| 5 | R017 | Bon | Male | Kandal | Phsar Chhnang | Kampong Chhnang |
| 6 | R018 | Van Samnat | Male | Kandal | Phsar Chhnang | Kampong Chhnang |
| 7 | R019 | Sean | Female | Kandal | Phsar Chhnang | Kampong Chhnang |
| 8 | R020 | Taing Kea | Male | Kandal | Phsar Chhnang | Kampong Chhnang |
| 9 | R021 | Le Yoeng Teu | Male | Kandal | Phsar Chhnang | Kampong Chhnang |
| 10 | R022 | Leu Yoeng Hourleu | Male | Kandal | Phsar Chhnang | Kampong Chhnang |
| 11 | V009 | Le Yongvey | Male | Kandal | Phsar Chhnang | Kampong Chhnang |
| 12 | V010 | Ming Nay | Male | Kandal | Phsar Chhnang | Kampong Chhnang |
| 13 | V011 | Thai Jong | Male | Kandal | Phsar Chhnang | Kampong Chhnang |
| 14 | V012 | Se Rey | Female | Kandal | Phsar Chhnang | Kampong Chhnang |
| 15 | V013 | Kuy Kunthea | Male | Kandal | Phsar Chhnang | Kampong Chhnang |
| 16 | V014 | Lay Min | Male | Kandal | Phsar Chhnang | Kampong Chhnang |
| 17 | V015 | Mok Fe | Female | Kandal | Phsar Chhnang | Kampong Chhnang |
| 18 | V016 | Vin Pheuk | Male | Kandal | Phsar Chhnang | Kampong Chhnang |
| 19 | V017 | Yi | Male | Kandal | Phsar Chhnang | Kampong Chhnang |
| 20 | V018 | Le Min | Male | Kandal | Phsar Chhnang | Kampong Chhnang |

ANNEX 5: DETAIL SAFETY AREA FOR KAMPONG LEANENG DISTRICTS

| No | Commune name | No of Safe Evacuation | Location of Safe Evacuations | Community Needs identified | Rehabilitation Program Under Project | ADB | Safety Route Identify |
|----|--------------|-----------------------|--|---|--|-----|-----------------------|
| 1 | Chranouk | No | | | | | |
| 2 | Dar | 1 | 1. Dar Pagoda | Fulfill adding land in Pagoda location, adding three toilets. | <ul style="list-style-type: none"> ▪ Fulfill 700-m3 soil to Dar Pagoda land. ▪ Construct three toilets ▪ Water supply and solar panel | | By boat |
| 3 | Kampong Hau | 5 | 1. Wat Pagoda 2. Donviet Pagoda 3. Wat Pau Andaet 4. Khor Khaek 5. Tepy Mountain | Latrines, tanks, Temporary shelter materials | <ol style="list-style-type: none"> 1. Construct additional 5 latrines with 5 canals. 2. Install one water tank that contain 2000 liter of water 3. Support temporary shelter material and food for them during Tonsap Flood. Water supply and solar panel | | By boat |
| 4 | Phlov Tuk | 1 | 1. Thnal Chheu Tien Pagoda | Latrines, cans, material | <ol style="list-style-type: none"> 1. Construct 3 latrines. 2. Provide the temporary shelter material and food. 3. Water supply and solar panel | | By boat |
| 5 | Pou | 2 | 1. Kanrey Mountain 2. Kampong Bachin pagoda | Boreholes, toilets | <ol style="list-style-type: none"> 1. Dig 2 boreholes 2. Construct additional 2 toilets 3. Water supply and solar panel | | By boat |

| | | | | | | | |
|----------|----------------------|----------|---|------|---|--|---------|
| 6 | Pralay Meas | 4 | <ol style="list-style-type: none"> 1. Prolay Pagoda 2. Anlong Krouchas Pagoda 3. Sala Chor Tien 4. Samraong Kang rey Pagoda | Meas | 10. Fulfill toilets | land, | By boat |
| 7 | Samraong Saen | 1 | Samraong pagoda | Saen | Fulfill adding land of 0.5 m ² | <ol style="list-style-type: none"> 1. Fulfill adding 3825 m² of land. 2. Build adding three latrines with 5 canals. 3. Install one water tank of 2000 liter. 4. Construct adding 0.5 meter of the retaining pagoda wall. 5. Provide the temporary shelter material. 6. Provide purify water cans and emergency food for evacuated families. 7. Provide the communication as Icon or telephone, safety clothes, floating tub, string for local authorities and evacuated family. 8. Water supply and solar panel | By boat |
| 8 | Svay Rumpear | 1 | Svay Rumpear Pagoda | | Opening well, toilets fulfill adding land and temporary shelter material. | <ol style="list-style-type: none"> 1. Dig Two 2 opening wells and 3 toilets. 2. Construct adding 2 toilets and 1 borehole. 3. Fulfill land (50 meter x 40 meter x 0.6 meter). 4. Provide temporary shelter. 5. Water supply and solar panel | By boat |
| 9 | Trangel | 1 | 1. pagoda | | Toilets. Boreholds, | 2. Construct 5 toilets, | |

purify water and material and food

3. Dig 4 boreholes,
4. Provide some purify water cans.
5. Provide emergency food and temporary shelter material.
 - Water supply and solar panel

ANNEX-6: QUESTIONNAIRE FOR EARLY WARNING SYSTEM AND EMERGENCY MANAGEMENT

Questionnaire for adaptive measures to improve people’s capacity of climate risk and resilience to be integrated into the provincial road improvement project in Cambodia

Early Warning system and Emergency management

Questionnaire Survey

Starting time:.....hour Ending time:.....hour

Name of the respondent: _____ M () / F () Age: _____

Commune: _____ Village: _____ Date: _____

Mobile Job:.....

Organization (if any): _____ living in this locality since _____

1. In your opinion, have the major hazards listed below been a problem for your commune in the past ten years? (Please tick level of problem in table and rank priority to commune)

| No | Hazard Name | No Problem | Small Prob. | Medium Prob. | Big Prob. |
|----|--|------------|-------------|--------------|-----------|
| 1 | Storm | | | | |
| 2 | Thunder storm | | | | |
| 3 | High rainfall flood | | | | |
| 4 | Tonle Sap flood | | | | |
| 5 | Wind –Gust | | | | |
| 6 | Drought | | | | |
| 7 | Lightning | | | | |
| 8 | River bank erosion | | | | |
| 9 | Bush fires | | | | |
| 11 | Epidemic (Water born disease, Wind born disease) | | | | |
| 12 | Other:..... | | | | |

2. How do you rank the risk to your area of a major hazard occurring (Please tick in one box only)

- at risk
- Somewhat at risk
- Not at risk at all

3. Which one hazard is most difficult to communicate to commune people? (Please identify one)

hazard and disaster) name:.....) and set the score of all hazard in table as below:

| Hazard | Priority | | |
|--|------------|-----------|---------|
| | A: Extreme | B: Medium | C: Poor |
| Thunder storm | | | |
| High rainfall flood | | | |
| Tonle Sap flood | | | |
| Wind –Gust | | | |
| Drought | | | |
| Lightning | | | |
| River bank erosion | | | |
| Bush fires | | | |
| Epidemic (Water born disease, Wind born disease) | | | |
| Other:..... | | | |

4. What types of actions have been taken/are planned to prepare/ adapt to this risk (e.g. ecosystem based approaches, technical solutions, social solutions)?

.....

.....

5. Please identify what kind and the extent (part or full) of damage your household has experienced from floods in past years?
(Please tick all boxes that apply in one box only in each row)

| Damage | Part | Full |
|--|------|------|
| Household assets | | |
| Food consumption (rice, wooden, vegetable, water, fire, salt, oil) | | |
| Livelihood (income source) | | |
| Crops/Catch/Production | | |
| Unemployment | | |
| Others (specify) | | |

6. Can you describe the extent of flood damage in your locality in the last monsoon? *(If any)*

.....

.....

7. Have you ever received disaster forecast information? Yes No

- If Yes, whom, and by mean? *(Please tick the multi-boxes)*

Family member Neighboring Local authority NGOs officer MORAM NCDM
 Other:.....

By method: Community meeting TV Radio Journal Telephone Other

9. How long do you receive the disaster forecast information after the disaster occurs? *(Please tick in one box only)*

1- 3 days 4-6 days 7-9 days 10- 12 days 13-15 days

9. Do you think the Early Warning System is helping your household/community? Y: / N:

10. Please indicate in what situation your household reacts to the early warning? *(Please tick in one box only)*

| | | | | | |
|------------------------------------|---|--------------------------------------|---------------------------------|--|------------------------------------|
| When someone dies in the community | When people observe some damage to property | When the disaster occurs in the area | When officials react to warning | When the information is wide spread in community | Whenever an early warning is heard |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

11. What is the lead-time you need/prefer to prepare for your life, assets, crops and livelihoods in the event of a major disaster?

| Prepare for | Preferred or needed lead time | | | | | | | | |
|-------------|-------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | 2-4 hr | 4-6 hr | 6-12 hr | 24 hr | 2 days | 3-5 days | 5-10 days | Monthly | Seasonal |
| Life | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Assets | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Crops | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Livelihood | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

12. How frequently do you share early warning information with others? *(Please tick in one box only)*

| | | | | | |
|--------------------------|------------------------------------|--------------------------------------|--|-------------------------------------|--|
| Never | If anyone shows interest then only | In case of own household's need only | Depending on the perceived severity of the hazard/disaster | When officials react to the warning | Share all the time as and when information is received |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

13. What is the level of trust your household has in the existing early warning information? *(Please tick in one box only)*

| | |
|-----------------|--------------------------|
| No trust at all | <input type="checkbox"/> |
|-----------------|--------------------------|

| | |
|-----------------------|--|
| Very low trust (~20%) | |
| Low trust (~40%) | |
| Medium trust (~60%) | |
| High (~80%) | |
| Full trust (100%) | |

14. Whenever you hear any information on early warning do you try to validate that information from others? (Please tick in one box only)

| | |
|----------------------------------|--|
| Never validate | |
| Validate 25% of the time | |
| Validate 50% of the time | |
| Validate 75% of the time | |
| Validate always 100% of the time | |

15. Which **institution** do you think is the **most accessible, most trusted and most effective** for sharing early warning information in your community?

| Institute's Name | Most accessible | Most trusted | Most effective |
|--|-----------------|--------------|----------------|
| Ministry of Water Resource and Metrology (MORAM) | | | |
| National committee for disaster management (NCDM) | | | |
| Ministry of information (MOI) | | | |
| Ministry of interior (MOI) | | | |
| Provincial Committees for disaster management (PCDM) | | | |
| District committee for disaster management (DCDM) | | | |
| Commune Committee for disaster management (CCDM) | | | |
| Cambodia Red Cross (CRC) | | | |
| NGOs | | | |
| Others (please specify.....) | | | |

16. What activities do you carry out after receiving early warning information? (Tick all boxes that apply)

| | | | |
|--------------------------|---|--------------------------|--|
| <input type="checkbox"/> | Do nothing | <input type="checkbox"/> | Discuss and validate information from the community (etc.) |
| <input type="checkbox"/> | Move to safer locations | <input type="checkbox"/> | Discuss and validate information from family and friends |
| <input type="checkbox"/> | Organize/arrange household and livelihoods assets/crops | <input type="checkbox"/> | Discuss things within the household |
| <input type="checkbox"/> | Wait for external assistance | <input type="checkbox"/> | Check information with the UP representatives |

Others(pleasespecify) _____

11. Please rank which factors are contributing most to gaps in the early warning information system at your community?

(Please rank the most negative contributory factor as 1)

| Uncertainty and inconsistency of early warning information | No trust and experience of the early warning information system | Methods of dissemination of early warning information | Understandability and interpretation factors | Response time factors | Local level capacity factors |
|--|---|---|--|-----------------------|------------------------------|
| | | | | | |

18. Do you think the weather forecast is useful in agriculture? If yes, then how? (specify)

19. In your opinion, how does the weather forecast of last year and the current year compare to your practical observations?

| Under normal | Normal (Accurate 50%) | Better (70-80 %) | Best (Accurate 100%) |
|--------------|-------------------------|--------------------|----------------------|
| | | | |

20. What can be done (suggestions) to strengthen or improve further the EW system in your community?

- 1).....
- 2).....
- 3).....
- 4).....

21. Before a disaster flood occurring in your community, what should be done? *(Please tick all boxes that apply)*

Food reserved medicine prepared clothes prepared main documents of family (house design, land title, ID card, wedding document.etc) collected boat prepared house asset prepared Other:.....

22. In your opinion, what do you think you should do during a disaster flood? Please detail below:

.....
.....
.....

23. Has your family ever evacuated to another place when your house was deeply inundated in past years?

Yes / No

24. If yes, where did your family go to in past years? (Please tick in one box only)

- Neighbor’s house Pagoda School District office
- Commune Office Health center Did not go (made changes to house)

Other.....

25. How long did your family stay there? (Please tick in one box only)

- 1-2 weeks 3- 4 weeks 5-6 weeks 7- 8 weeks
- 9-10 weeks 10-12 weeks 13 weeks or more

26. Did your family need to evacuate in the past year? Yes / No

27. If yes, what problems caused your family to evacuate in the past year? (Please tick all boxes that apply)

- Drowning Property loss Life loss Boat sinking Strong wind Other.....

.....

28. How far is it from your house to there? (Please detail the distance)

Distance length:Meter/Kilometer

29. Which means did your family use to evacuate there? (Please tick in one box only)

- Taxi Tuktuk Cow cart Boat with machinery Walk Row boat

Other.....

31. How long did it take for your family to evacuate to temporary shelter?

Time:..... Min/Hour

32. How much did it cost for your family to evacuate to temporary shelter? (Please tick in one box)

- 5000-10000 Riel 10001- 15000 Riel 15001 – 20000 riel 20001 – 25000 Riel

- 25001- 30000 Riel over 30000 Riel

33. What circumstances do your family meet during stay temporarily shelter at upper land or safety area? (Please tick all boxes that apply)

- Poisonous snake/insect Water pollution Lack of food Lack of pure drinking water

ANNEX- 7: LIST OF ATTENDENCE ON JUNE 27, 2014 MEETING**Attendant list on June 27,2014**

| No | Sure name and Name | Sex | Role | Unit | Telephone |
|--------------------|--------------------|--------|-----------------------------------|--------------------------------|---------------|
| 09-05-2014 | | | | | |
| 1 | Mann Ann Ly | Male | Governor of district | Kampong Leaeang district | |
| 2 | Eang Hann | Male | Deputy commune Chief | Rompea | |
| 3 | Long Kim Hong | Male | Chief of commune | Samrong Sen | |
| 4 | Koa Vat | Male | Deputy commune chief | Por | |
| 5 | Vann Sourn | Male | Commune Chef | Chronuk | |
| 6 | Seum No Chhit | Male | Village Chief | Steung Sandaek village | |
| 7 | Heng Salin | Male | Village Chief | Thour Rolumn | |
| 8 | Meas Chann Thin | Female | Commune Chief | Kampong Haw | |
| 9 | El-Savooun | Female | Deputy commune chief | Trogil | |
| 10 | Cheum Chon | Male | Chief commune | Da | |
| 11 | Dy Siphon | Male | Deputy police chief | Kampong Leaeng district police | |
| 23 May 2014 | | | | | |
| 1 | Ross Lan | Female | Deputy district governor | Kampong Leaeang | 016 5629 68 |
| 2 | Chou Kimsoeun | Male | Commune council | Prolay Meas commune | 097 755 7746 |
| 3 | Meas Chancheun | Female | Chief of Kampong Haw commune | Kampong Haw | 012587018 |
| 4 | Thord Cheun | Male | Second deputy of commune | Trogil | 012 765 415 |
| 5 | Chim Chon | Male | Chief of commune | Da commune | 012 604 312 |
| 6 | Vann Sourn | Male | Chief of commune | Chronuk | 097 585 87 86 |
| 7 | Eng Hann | Male | Deputy commune chief | Svay Rompea | 088 8437100 |
| 8 | Koa Vat | Male | Deputy of commune chief | por | 097842 94 94 |
| 9 | Out Chhieng | Male | Commune council member | Samrong Seng | 017 299640 |
| 10 | Chay Pum | Male | Commune Administration assistance | Samrong Seng | 067 23 0806 |
| 11 | Leng chheu | Male | Office Chief. S.K.D.D | Kampong Haw | 012 |

| | | | | | |
|---------------------|----------------|---|---|--|--------|
| | | | | | 635440 |
| 27 June 2014 | | | | | |
| 1 | Mann Anly | M | District governor | | |
| 2 | Chim Chorn | M | Dar Commune chief | | |
| 3 | Eng Hann | M | Vice chief of Dar commune | | |
| 4 | Leng Savy | M | District office of public work and transport | | |
| 5 | Gnan Chantrea | F | Vice chief of inter sector-division office | | |
| 6 | Meas Chhan Bin | F | Commune Chief of Kampong Hou | | |
| 7 | Krouch Sothon | M | District council member | | |
| 8 | Hou Bunthorn | M | Vice Chief of district inter-sector -division | | |
| 9 | Vann Sourn | M | Commune Chief of Chrounouk | | |
| 10 | Chea Than | M | Commune Council | | |