KINGDOM OF CAMBODIA
NATION RELIGION KING

CAMBODIA 2013

POST-FLOOD EARLY RECOVERY NEED ASSESSMENT REPORT

Phnom Penh, April 08, 2014

Villagers use boats to move around the flooded community in Koh Prake Village, Kandal Province (Photo: UNDP)

The present report was prepared by the Royal Government of Cambodia with the support of the National Committee for Disaster Management (NCDM), Line Ministries and the technical and financial support of he United Nations Development Programme (UNDP) and other UN Agencies and Development Partners. In particular, the final report was consolidated and edited by NCDM and UNDP. Sectorial Reports have been elaborated by government line ministries, UN Agencies and Development Partners according to their mandate and previous participation in the humanitarian response phase.

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CDB	Commune Database
CMAA	Cambodia Mine Action and Victim Assistance Authorithy
CMAC	Cambodia Mine Action Center
CMVIS	Cambodia Mine Victim Information System
DaLA	Damage and Loss Assessment
ECLAC	Economic Commission for Latin America and Caribbean
ERW	Explosive Remnants of War
GFDRR	Global Facility for Disaster Reduction and Recovery
HCs	Health Centers
IMF	International Monetary Fund
IOM	International Organisation for Migration
MAFF	Ministry of Agriculture Forestry and Fishery
MAG	Mine Advisory Group
MEF	Ministry of Economy and Finance
MIME	Ministry of Industry, Mines and Energy
MoEYS	Ministry of Education Youth and Sport
MoH	Ministry of Health
MoP	Ministry of Planning
MoT	Ministry of Tourism
MOWRAM	Ministry of Water Resources and Meteorology
MPWT	Ministry of Public Works and Transport
MRD	Ministry of Rural Development
NCDD	National Committee for Subnational Democratic Development
NCDM	National Committee for Disaster Management
ODs	Operational Districts
PCDM	Provincial Committee for Disaster Management
PDAs	Provincial Department of Agriculture
PDRD	Provincial Department of Rural Development
PDT	Provincial Department of Tourism
PHD	Provincial Health Departments
POMZ	Stake mounted anti-personnel fragmentation mine (Russian Acronym)
RGC	Royal Government of Cambodia
RHs	Referral Hospitals
UN-ECLAC	UN Economic Commission for Latin America and the Caribbean
UN - HABITAT	United Nations Human Settlements Programme
UNDP	United Nation Development Programme
UNICEF	The United Nations Children's Fund
UNIDO	United Nations Industrial Development Organization
WATSAN	Water and Sanitation

FOREWORD

Cambodia is considered one of the most hazard-prone countries in South-East Asia. The major disasters faced by the country are, in order of prevalence, floods, droughts, typhoons, forest fires, landslides and storms. With approximately 70 percent of the population being rural and dependent on subsistence agriculture, natural disasters can have devastating consequences on the livelihoods of the majority of Cambodians. In recognition of the vulnerability of communities to the effects of natural disasters, and the expected likelihood of their continued occurrence in Cambodia, the UN has worked to assist in the improvement and streamlining of disaster response and mitigation efforts.

The 2013 rainy season (May - October 2013) saw large-scale flooding return to South-East Asia. A combination of successive typhoons, rising water levels in the Mekong River, trans-boundary flash floods in the western provinces and heavier-than average monsoon rains caused extensive flooding across Cambodia. The initial humanitarian response to the floods was led by the Royal Government of Cambodia through the National Committee for Disaster Management (NCDM), which is institutionally and operationally present at the provincial level through its Provincial Committees for Disaster Management. The NCDM was given vital support from the most relevant humanitarian actors in Cambodia such as the Humanitarian Response Forum (HRF), which brings together local and international development partners, and the Cambodian Red Cross.

In the framework of its early recovery mandate, UNDP provided technical support to NCDM to lead and coordinate a multi-sectorial Post Flood Early Recovery Needs Assessment (PFERNA).

The assessment provides an evaluation of the damage and losses and a recovery framework that consolidates the relief work done so far, and paves the way for long-term reconstruction. In assessing the damage and planning early recovery, UNDP ensured that government capacity development and policy needs were substantially addressed, and that the Government was fully capable of mobilizing the resources to carry out the necessary measures.

The PFERNA has evaluated the need for short-, medium- and long-term recovery activities adapted to local needs and conditions, as well as the resources and capacities necessary to implement them. It is hoped that these activities would complement existing support of national stakeholders, other UN partners and civil society organizations, or indeed help focus such support, thereby aiming to facilitate programme integration at the local level.

The main purpose of the present assessment report is to facilitate and guide the recovery phase. It does not aim to be exhaustive in its findings; it is rather an overarching tool that can bring together different perspectives on an organized set of sectors to inform stakeholders' present and future recovery activities and give a clear snapshot of where donor support is needed the most.

Ms. Claire Van der Vaeren
United Nations Resident Coordinator and
UNDP Resident Representative for the Kingdom of Cambodia

FOREWORD

Cambodia is considered one of the most hazard-prone countries in South-East Asia and floods are one of the major hazard, among others, that affects it. In recent years, the country has become more vulnerable to floods that occur almost every year, particularly in the areas around Tonle Sap Lake and along Mekong river watersheds. For this reason, under the leadership of Samdech Akka Moha Sena Padei Techo HUN SEN, Prime Minister of the Kingdom of Cambodia and President of the National Committee for Disaster Management (NCDM) , the Royal Government of Cambodia (RGC) has decided to guide stakeholders mitigating disaster negative impacts, through the Strategic National Action Plan for Disaster Risk Reduction (SNAP-DRR) 2008-2013 and the National Action Plan on Disaster Risk Reduction (NAP-DRR) 2014-2018.

In response to the 2013 flood, the RGC took promptly the leadership in the disaster relief and emergency response operations. In doing so, the government has successfully engaged and collaborated with a number of important stakeholders, namely: the Royal Palace, the Senate, the National of Assembly, the Cambodian Red Cross, National and International Organizations, United Nations Agencies, neighboring country governments, national and international charitable persons, the NCDM's vertical line and Cambodian central and local authorities.

In the period of the initial response, it was found that the floods had caused widespread damage and affected the lives and livelihoods of thousands of Cambodian people, the majority of whom live in rural areas and depend on agriculture as a way to make a living. Consequently, In the aftermath of the emergency response NCDM decided that a nationwide assessment on damage and loss was required as a basic guide to the recovery process. The process of this assessment was supported by the United Nations Development Programme (UNDP) in terms of technical expertise and financial support. NCDM took the responsibility of leading line ministries, United Nations Agencies, National and International Organizations to conduct the Post-Flood Early Recovery Needs Assessment (PFERNA). The assessment main goal was identifying and measuring the extent of damage and loss and developing a recovery framework that could serve as a tool to indicate the necessary steps leading to a full recovery.

In the name of the National Committee for Disaster Management, we would like to express our profound appreciations to UNDP for its timely and effective support to the Cambodia 2013 Post-Floods Early Recovery Needs Assessment (PFERNA). Moreover, we would like to extend our sincere thanks to the working teams as well as to the central and local authorities who participated in this assessment process. We are confident that the Cambodia 2013 Post-Floods Early Recovery Needs Assessment (PFERNA) will be able to engage relevant stakeholders and partners in the future recovery and contribute to inform any action focusing on climate change risk reduction and natural disaster management in Cambodia.

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2 ACKNOWLEDGMENTS

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3 EXECUTIVE SUMMARY

3.1 OVERALL IMPACT OF THE CAMBODIAN FLOODS 2013

The 2013 monsoon rainy season (May - October 2013) saw large-scale flooding return to South-East Asia after a calmer 2012. Consequently, in the third week of the last quarter of 2013, a combination of successive typhoons, a significant rise in the level of the Mekong River, trans-boundary flash floods in the western provinces and heavier-than-average monsoon rains caused extensive flooding across Cambodia. On 18 October 2013, the National Committee for Disaster Management (NCDM) reported that the floods affected 377,354 households and 1.8 million individuals living in 20 provinces. The floods killed 168 people, the majority of whom were children (HRF, 2013b).

3.2 THE HUMANITARIAN RESPONSE

Both the government and the Humanitarian Development Partners responded quickly to the need of the affected families. The Royal Government of Cambodia received generous humanitarian assistance in terms of either food and non-food stuffs or money, from countries and development partners. NCDM, the Provincial Committee for Disaster Management (PCDM) network and Cambodia Red Cross distributed the aid received in food and non-food items at local level. Humanitarian partners mobilized a total of US$1.3 million in internal and external funding. According to the information received, most of the funding was dedicated to food and to WATSAN. Out of the total amount raised by Humanitarian Partners, the UN agencies participating in the response phase distributed in kind support (shelter, WATSAN, Education, Landmine protection, Food Security and Nutrition) for a total amount of US$0.29 million. ECHO opened a call for proposals for its humanitarian partners for emergency response and recovery activities for a total of EUR 2.5 million.

3.3 DAMAGE AND LOSS

Damage and loss from the 2013 floods were concentrated in the north-west and south-east parts of the country. In some cases water flowed and receded for a protracted period, causing the administration of basic public services (education and health) to malfunction, and forcing people to relocate to safer areas. The Government acted quickly, delivering immediate emergency aid. It was assisted by its many partners in development who specialize in humanitarian aid. Recognizing the long-term effects of the floods on vulnerable people, and the affected areas' development perspectives, the NCDM, with assistance from UNDP and together with its partners in development and line ministries, carried out a Post-Flood Early Recovery Needs Assessment (PFERNA) to assess the extent of the damage and loss, and to define a comprehensive and feasible recovery plan. The PFERNA estimated the total damage and loss caused by the 2013 floods to be 356 million US$, of which 153 million US$ represented the destruction of physical assets (damage) in the affected areas, and 203 million US$ represented estimated losses in production and economic flows. Damage represented 43 percent of the total economic impact of the floods, while the remaining 57 percent was loss, as represented in the table below.

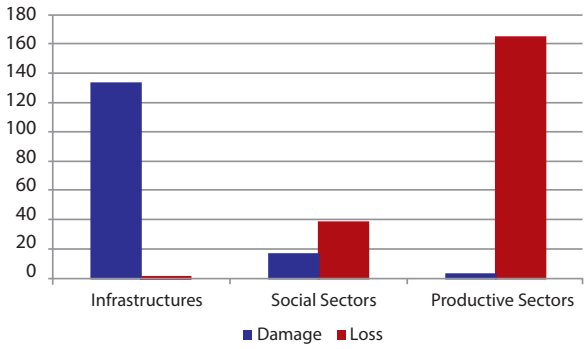
TABLE 1: 2013 FLOODS DAMAGE AND LOSS

Sector and Sub-Sectors	2013 Floods		
	Effects (US$ Million)		
	Damage	Loss	Total
Economic Sectors	**2.54**	**164.59**	**167.13**
Agriculture, Livestock and Fisheries	0.36	151.50	151.86
Industry/Commerce	2.15	11.30	13.45
Tourism	0.03	1.73	1.76
Market		0.06	0.06
Social Sectors	**16.47**	**38.36**	**54.83**
Housing and Shelter	0.65	0.55	1.20
Health	0.17	0.09	0.26
Education	15.65	0.12	15.77
Livelihoods		37.60	37.60
Infrastructure	**134.27**	**0.00**	**134.27**
National and Rural Roads	79.61	-	79.61
Electrical Network	n/a	-	0.00
WATSAN	2.66	-	2.66
Water and Irrigation System	52.00	-	52.00
TOTAL	**153.28**	**202.94**	**356.23**

Source: PFERNA Team Assessment, 2013

Economic loss represented indirect impact in terms of reduced income, increased operational costs, or extraordinary expenses that had to be faced after the disaster. While the destruction or damage to assets occurred at the time or in the aftermath of the floods, the indirect impact on daily activities lasted and will probably last much longer, at least until the assets are fully repaired and/or restored. This is one of the reasons why speed and efficiency of the post-disaster recovery and reconstruction activities are critical. Overall, while for some sectors the total effect was more equally distributed between damage and loss, such as in social sectors, in some sectors the floods caused just losses, as was the case in productive sectors. The infrastructure sector and subsectors experienced only damage.

FIGURE 1: DAMAGE AND LOSS ACROSS THE THREE MAIN SECTORS OF THE ASSESSMENT



Source: PFERNA Team Assessment, 2013

Many of the provinces affected by the 2013 floods are among the poorest in the country. While rural Cambodian people are highly vulnerable to risks and shocks, the flooding was another blow to the current livelihoods (RGC, 2011a). The loss of livelihoods incurred by the flooding could further maintain the affected communities in poverty, and nullify some of the economic and development progress made in recent years. Farmers and unskilled labourers who mainly rely on agriculture for food and income have experienced the most severe consequences. Particularly affected groups include children, people with disabilities, female-headed households and older persons. These effects have been recognized to be caused by the disruption of livelihoods but also of main social services like health and education, as they could be hampered by the dislodging of landmines.

3.4 MACROECONOMIC IMPACT

Cambodia had enjoyed strong economic performance over the decade ending 2012, with average annual Gross Domestic Product (GDP) growth of 8.0 percent per annum (ADB, 2013). The country was anticipating another year of solid economic performance in 2013 but the destructive floods that hit the country in September/ October 2013 are likely to cause a slight downward effect on its economy; mainly from the estimated decline of agricultural production growth (due to decimation of paddy production from floods). Battambang, Banteay Meanchey and Prey Veng, three of the country's top-five rice producers[1] were severely hit by the floods, depleting many hectares of their paddy fields. Taking into account the effects of the floods, overall GDP growth prospects for Cambodia in 2013 are anticipated to shrink slightly to 7.0 percent down from the pre-flood projection of 7.6 percent (MEF, 2013). This is largely caused by shrinking agriculture production

3.5 RECOVERY AND RECONSTRUCTION REQUIREMENTS

The proposed Recovery Framework aims to respond to the reconstruction needs, but also to counter-balance the losses. This should be done by laying the foundations of longer-term disaster risk reduction needs of protecting people from future disasters. For this reason, it is imperative that the recovery process be transparent, accountable and results-based. The overall Post-Flood Early Recovery programme would aim to:

- Strengthen post-disaster governance functions by reinforcing capacity at the national and local levels in planning and managing early recovery processes to address immediate post-flood needs;
- Mainstream disaster risk reduction into recovery and the nation's long-term development policy frameworks;
- Facilitate coordinated, effective `building back better' efforts by contributing to multi-stakeholder, community-based recovery processes.

Time-wise, the programme could be separated into following three phases, with inter-linked but different objectives:

1 *Top five rice producing provinces are Prey Veng, Takeo, Battambang, Kampong Cham and Banteay Meanchey.*

- **Short-term Early Recovery,** three to six months after the emergency response phase, with priorities on supporting existing recovery efforts;
- **Medium-term Recovery** that would last six to 18 months and focus on engaging multi-stakeholders in rebuilding and securing people's livelihoods and creating a regulatory and policy environment for longer-term rehabilitation;
- **Longer-term Rehabilitation,** 18 months and beyond, mainstreaming disaster risk management into national and local laws, regulations, development policies and processes.

The priority sectors identified by the PFERNA for recovery include: (i) Economic Sectors, (ii) Social Sectors (iii) Infrastructure. Priorities and needs for each sector and respective sub-sectors have been regrouped according to the short term (3-6 months), medium term (6-18months), and long term (18+ months) as detailed in the table below. The total recovery needs resources represent 86 percent of calculated damage and loss, and envisage 39 percent of the potential resources to be spent in the short term, 29 percent in the medium term, and the 32 percent in the long term.

TABLE 2: RECOVERY AND RECONSTRUCTION NEEDS SUMMARY

Sectors and Subsectors	Short term (million US$)	Medium Term(million US$)	Long Term (million US$)	Total (million US$)
Economic	**41.73**	**18.10**	**16.26**	**76.09**
Agriculture, livestock, Fisheries	41.70	17.50	15.60	74.80
Industry/ Commerce		0.10	0.10	0.20
Tourism	0.03	0.50	0.50	1.03
Market	-	0.00	0.06	0.06
Social	**23.75**	**10.13**	**15.52**	**49.39**
Livelihoods	13.33	3.33	3.33	20.00
Housing	0.06	0.95	10.00	11.01
Education	9.99	1.69	0.20	11.88
Health	0.25	4.04	1.50	5.79
Landmines	0.12	0.11	0.49	0.72
Infrastructure	**52.93**	**61.33**	**66.54**	**180.80**
National and Rural Roads and Electrical Network	43.60	52.00	30.00	125.60
WATSAN	1.33	1.33	0.54	3.20
Water and Irrigation System	8.00	8.00	36.00	52.00
Total	**118.41**	**89.56**	**98.32**	**306.28**

Source: PFERNA Team Assessment, 2013

Siem Riep flood (Photo: HRF)

4 2013 FLOODS IN THE SOCIO-ECONOMIC CONTEXT OF CAMBODIA

4.1 COUNTRY VULNERABILITY PROFILE

4.1.1 Country Social Vulnerability

Cambodia has enjoyed significant economic growth over the past decade. National data in 2004 and 2007 showed that the national poverty rate had dropped from 34.7 percent in 2004 to 30.1 percent in 2007, indicating a rate of poverty reduction of 1.2 percent per year. In 2010, the poverty rate had dropped to 25.8 percent (MoP, 2009). Despite the rapid growth, the gap between rich and poor living standards remains high, especially in rural areas (RGC, 2011a; MoP, 2009).

The country hosts a largely agrarian society with 80 percent (NIS, 2013) being rural and dependent on fishing or agriculture for their livelihoods. Rice is one of the main staple foods in Cambodia and is the backbone of its agricultural sector, occupying a large amount of cultivated land area (MAFF, 2011). Rice production in Cambodia is usually rain fed and hence, these rice-based farming systems have been characterized by low productivity due to the adverse effects of climate change (MAFF, 2011; MoP, 2009).

Vulnerabilities in Cambodia can be determined by a variety of internal and external factors. While climate hazards can be classified together with economic crises as the main external factors that lead people into poverty, physical, gender and health conditions, together with unexpected events connected with everyone's lifecycle, can also be held responsible for poverty (RGC, 2011a). Those factors increase the susceptibility of a community to the impacts of hazards. The main vulnerable groups affected by the 2013 floods are summarized as:

- Casual labourers– With high levels of existing vulnerability in the absence of secure income, this group is prone to migration to Thailand, particularly from Banteay Meanchey and Siem Riep. Evidence highlighted concerns around work opportunities, given expectations of high levels of crop damage, particularly in Battambang, Siem Riep and Banteay Meanchey, and implications for adding further to already high debt among households dependent on casual labour(RGC, 2011a)
- Farmers – Farmers facing high levels of crop damage in one of Cambodia's main rice-producing regions are expected to see sizeable adverse effects on their livelihoods, particularly for those districts that have experienced consecutive years of crop damage, most notably Banteay Meanchey. The most severe consequences of the floods have been experienced by marginal farmers and landless unskilled labourers who are mainly reliant on agriculture (including fishing) for food and income.
- Displaced households – According to data from NCDM, some 16,956 households were evacuated across the three provinces; 54 percent of all households evacuated across the 20 affected provinces.
- Children – With the most sizeable instances of death by drowning seen among children playing in flood waters, there is a need to raise awareness of the dangers, and related protection issues. With many parents migrating internally or to neighbouring countries to work, children are generally left in the care of grandparents or extended family, raising further concerns about their welfare during floods. During the 2013 floods, according to a UNICEF and Ministry of Social Affairs report, at least 52 percent of total deaths were children.
- The elderly – The basic needs of the elderly are generally focused on food, health, water and sanitation. During the floods, children and the elderly were reported to have fallen ill because they were relocated to evacuation sites where the facilities (toilets, clean water and shelter) were inadequate.
- Identified (ID) Poor 1 and 2 households – These households can be disproportionately affected by flooding (RGC, 2012). ID poor people tend in fact, to have their housing located in the most vulnerable areas and use the cheapest materials and construction techniques. These factors make them extremely vulnerable to this kind of climate hazards (RGC, 2011a).
- ID Poor Female-headed households – Female-headed households account for 37.6 percent of ID Poor 1 and 31.4 percent of ID Poor 2 households (RGC, 2012, p. 11). Heightened vulnerability has

seen them disproportionately affected by flooding. Although many women spend more time in the house during the flood period compared to normal, due to cultural and gender constraints on mobility and reduced activities to undertake, this does not correspond to reduced responsibilities or workload. In reverse, women and girls face additional burdens in their roles at the household, agriculture and livelihood levels.

- **Pregnant women**– As reported in the Health Section, pregnant women are particularly vulnerable to the disruption of health services. Some women were reported to deliver in very critical conditions in flooded delivery rooms, or to deliver at home because it was impossible to reach the nearest hospital.

The vulnerability of communities is often worsened due to the already high level of debts of families with low income. Therefore, several communities are at high risk of being pushed further into poverty, jeopardizing previous development efforts.

4.1.2 Country Climate Vulnerability

Cambodia is one of the countries at a relatively high economic risk from multiple natural hazards, which affect people and their assets almost every year (RGC, 2011a; RGC, 2010a). The main natural hazard to which Cambodia is exposed is floods followed by drought, occasional epidemics and storms. In the last quarters of 2011 and 2013, a combination of successive typhoons and torrential rains caused extensive flooding across the country (RGC, 2010a). Cambodia's vast flood plain is one of the country's most prominent geographical features. This makes large portions of the country naturally susceptible to annual flooding, particularly along the Tonle Sap and Mekong River watersheds. The floods have both beneficial and harmful effects. They have a beneficial impact on agro-based livelihoods (e.g. improve soil moisture, fertility for agriculture, ground and surface water recharge and provide ecological benefits for fisheries). In certain years, however, flooding becomes excessive and results in the loss of human life, destruction of crops and livestock, and damages homes and the already fragile network of community infrastructure (e.g. schools, health centres, irrigation canals, local roads and bridges) (RGC, 2010a). There are two major flood types in Cambodia:

- **Mekong flood** – Cumulative rainfall in the upper catchments throughout the rainy season causes a slow but steady rise in water levels lasting for several days. This can be aggravated by two factors. First, when this combines with heavy rains around the Tonle Sap Lake, which affect the provinces around the lake and the southern provinces. Second, the most severe floods occur when heavy rains coincide with the arrival of tropical depressions and storms. Mekong river floods are common occurrences in the provinces of Stung Treng, Kratie, Kampong Cham, Prey Veng, Svay Rieng, Kandaland Takeo.
- **Flash floods** – Repeated heavy rainfall in mountainous areas, which flows to streams and tributaries of the Mekong River, often cause flash floods. These floods are swift and last only for a few days but often cause severe damage to crops and infrastructure, especially in tributaries around the Tonle Sap Lake. Trans-boundary flash floods have been reported to affect the provinces of Kandal, Kampong Speu, Kampot, Pursat, Battambang, Kampong Chhnang, Rattanakiri, Preah Vihear, Oddar Meanchey and Banteay Meancheay.

Major flooding events affecting a significant have been occurring in the last 52 years approximately every five years, namely in: 1961, 1966, 1978, 1984, 1991, 1996, 2000, 2001, 2002 and 2011 (RGC, 2010a). One of the worst floods in the country's history occurred in the year 2000, where the NCDM reported that an estimated 750,618 families representing 3,448,624 people were affected, including 85,000 families or 387,000 people who were temporarily evacuated from their homes and villages (RGC, 2010a). There were 347 deaths, 80 percent of whom were children, and total physical damage was estimated at US$150 million. In 2001, floods caused the deaths of 62 people (70 percent children) and an estimated US$20 million damage, in 2002, 29 people (40 percent children) were killed and damages were estimated at US$14 million.In2011, 350,000 households were affected and 50,000 households were displaced by flooding.

It is significant to note that drought periods have increasingly followed a destructive flood. Successions and combinations of droughts and floods have resulted in a significant number of fatalities and considerable economic losses. The provinces that are prone to both flooding and drought are Prey Veng, Kandal, Kampong Cham, Svay Rieng, Banteay Meanchey and Kampong Speu.

TABLE 3: AFFECTED AND EVACUATED FAMILIES IN 2013 AND 2011

Province	2013	2011	Comparison (#affected in 2013 - #affected in 2011)	2013	2011	Comparison (#evacuated in 2013 - #evacuated in 2011
	Affected families	Affected families		Evacuated families	Evacuated families	
Battambang	74,160	13,921	60,239	4,504	1,194	3,310
Banteay Meanchey	54,463	13,008	41,455	8,902	5,372	3,530
Kampong Cham	51,376	33,436	17,940	3,546	6,085	-2,539
Prey Veng	44,764	40,615	4,149	866	10,227	-9,361
Kandal	35,311	72,047	-36,736	235	2,180	-1,945
Siem Reap	19,022	23,198	-4,176	3,550	0	3,550
Kratie	18,552	15,601	2,951	621	1,403	-782
Kampong Thom	17,463	54,414	-36,951	1,114	2,448	-1,334
Otdar Meanchey	13,244	716	12,528	0	0	0
Steoung Treng	9,813	3,005	6,808	1,523	225	1,298
Pursat	9,271	12,982	-3,711	746	1,591	-845
Kampong Chhnang	6,667	11,534	-4,867	897	11,534	-10,637
Ratanakiri	6,524	0	6,524	2,289	0	2,289
Preah Vihear	4,609	5,199	-590	397	665	-268
Svay Rieng	3,808	17,076	-13,268	253	4,160	-3,907
Phnom Penh	3,522	17,150	-13,628	1,622	3,017	-1,397
Takeo	2,796	7,869	-5,073	10	726	-716
Pailin	1,989	258	1,731	239	0	239
Kampot	0	8,245	-8,245	0	767	-767
TOTAL	377,354	350,274	27,080	31,314	51,594	-20,280

Source (HRF, 2013b)

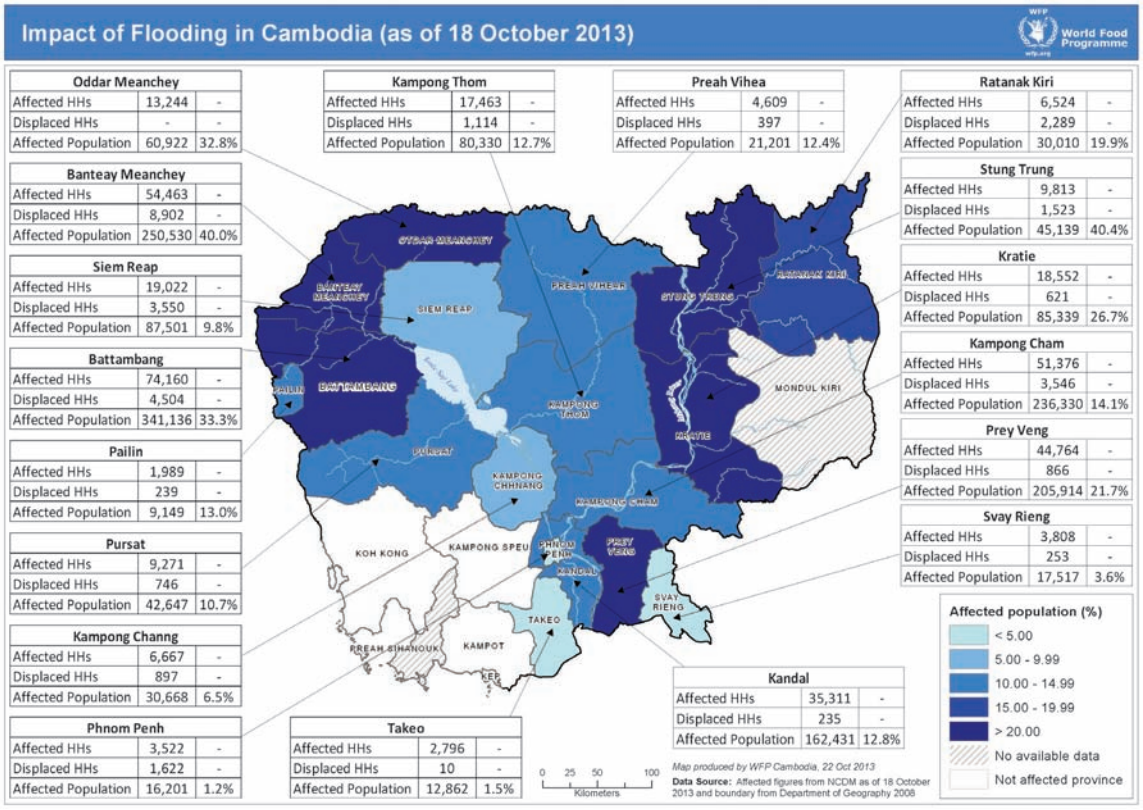
4.2 OVERVIEW OF CAMBODIA FLOODS2013

The 2013 rainy season (May - October 2013) saw large-scale flooding return to South-East Asia after a calmer 2012. Consequently, a combination of successive typhoons, rising water levels in the Mekong River, trans-boundary flash floods in the western provinces and heavier-than-average monsoon rains caused extensive flooding across the country. On 18 October 2013, the NCDM reported that floods had affected 377,354 households and 1.8 million individuals living in 20 provinces. They killed 168 people, the majority of whom were children (HRF, 2013b).

As of 23 October 2013, waters were receding across the country, though more slowly than expected in the worst-affected provinces of Battambang and Banteay Meanchey, where parts remain flooded. Some 231,484 houses, 1,242 schools, 78 health centres and hospitals, and 533 pagodas were flooded, with roads, bridges and infrastructure damaged (HRF, 2013b). An estimated 384,846 hectares of rice paddies were affected by flooding and 125,011 hectares damaged, with only 5 percent of the total cultivated, according to the most recent data from the Ministry of Agriculture, Forestry and Fisheries (MAFF, 2013).

Meteorological data confirm that the impact of natural hazards is getting progressively worse. Shifts in the regular timing and intensity of the wet and dry seasons (longer, drier dry seasons and shorter more intense wet seasons) are causing more frequent and intense natural hazards such as floods and droughts, to which 80 percent (NIS, 2013) of the rural population struggles to adapt. This data is confirmed by recent (2013) and less recent (2011) flooding events, and by seasonal droughts that affect livelihoods and make their coping strategies hardly effective.

FIGURE 2: IMPACT OF FLOODING IN CAMBODIA (AS OF 18 OCTOBER 2013)



Source(HRF, 2013b)

4.3 THE HUMANITARIAN RESPONSE

4.3.1 The Government Response

In response to the needs of flood victims, the Government received generous humanitarian assistance in terms of either food stuffs, non-food stuffs or money, from countries and development partners listed in the table below. The RGC led the immediate relief and emergency response operations through NCDM, the Provincial Committee for Disaster Management (PCDM) network and Cambodia Red Cross at local level.

TABLE 4: ASSISTANCE RECEIVED FOR THE 2013 FLOODS IN CAMBODIA

No	Source of Assistance	Amount (US$ million)	Type of Assistance	Received By	Administered By
1	Japan	0.32	Non-Food stuff: Generator and Cord Reel, Water Purifier, Water Tank and Polyester Tank	RGC	NCDM distributed to 23 provinces
2	P.R. China	1.00	Food Stuff: 2,000 tons of milled rice	RGC	CRC
3	Republic of Korea	0.10	Food Stuff: 230 tons of milled rice	RGC	NCDM distributed to six provinces
4	Kingdom of Thailand	0.19	Monetary	RGC	CRC
5	S.R. Vietnam	In-kind	Food Stuff: 1,000 tons of milled rice	National Assembly	National Assembly distributed to 14 provinces
6	Vietnam Bank of Investment and Development (BID)	0.10	Monetary	RGC	CRC
7	Asian Development Bank (ADB)	3.00	Grant	RGC	RGC: To provide rice seeds, make temporary repairs to irrigation canals and related facilities and restore connectivity of damaged rural roads through cash-for-work programmes
TOTAL		4.71			

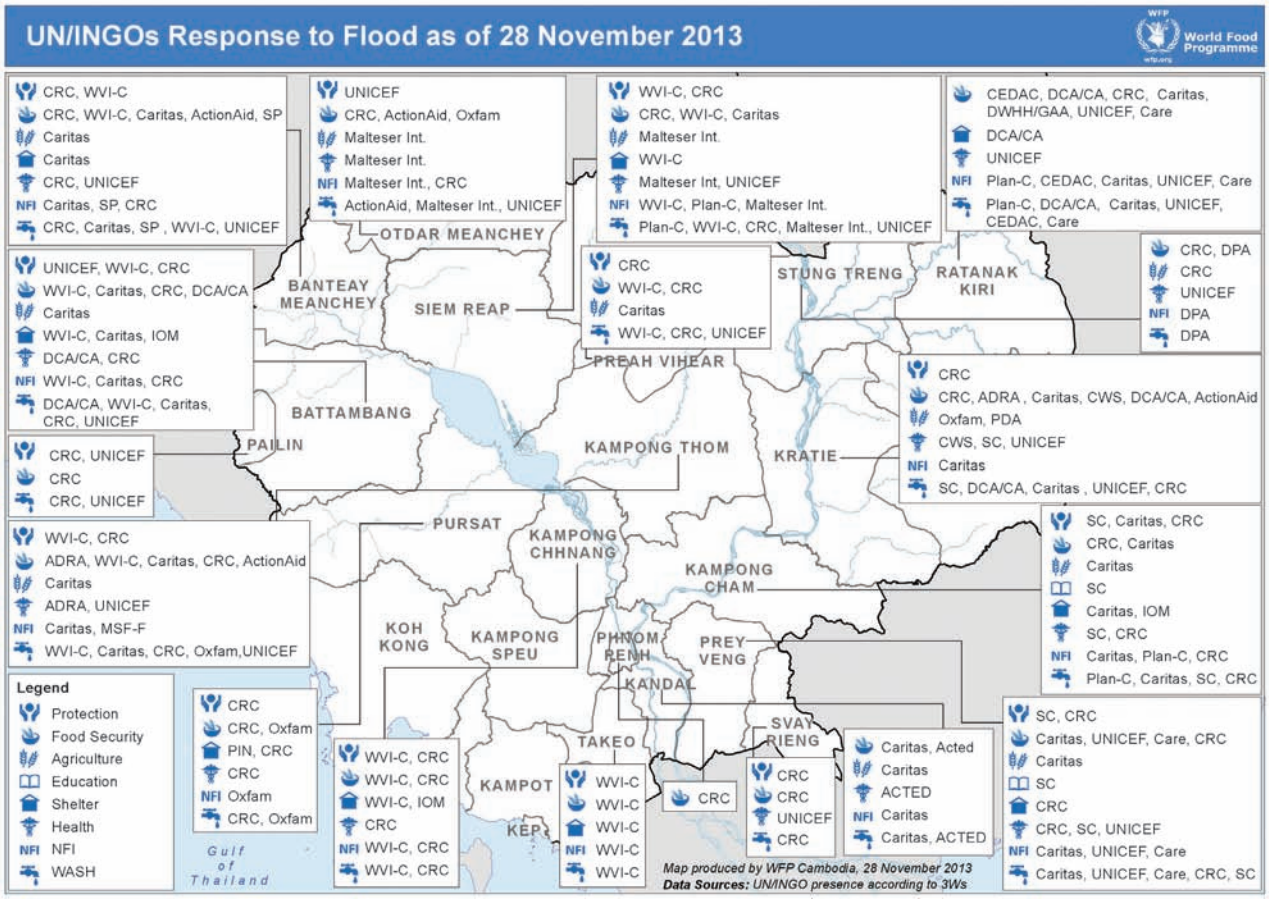
Source (NCDM, 2013)

4.3.2 The Humanitarian Partners' Response

Humanitarian partners mobilized a total of US$1.3 million in internal and external funding (HRF, 2013b). Most of the funding was dedicated to food and to WATSAN. Out of the total amount raised by Humanitarian Partners, the UN agencies participating in the response phase distributed in kind support (shelter, WATSAN, Education, Landmine protection, Food Security and Nutrition) for a total amount of US$0.29 million. ECHO opened a call for proposals for its humanitarian partners for emergency response and recovery activities for a total of EUR 2.5 million. The assistance provided by humanitarian organizations in the months following the flood comprised:

- **Food security and nutrition (FSN):** basic food assistance including rice, iodized salt, sugar, fish, noodles, oil and other food;
- **Water and sanitation (WATSAN):** water containers, water purification chemicals and water filters, soap, hygiene education and hygiene promotion;
- **Health:** post-flood outreach to provide immunization services, distribute oral rehydration salts and zinc and provide health education;
- **Shelter:** tents, tarpaulins and shelter kits;
- **Education:** education materials for teachers and students; and set up temporary learning spaces;
- **Protection:** mine risk education and mine clearing, and set-up of child-friendly spaces;
- **Other non-food items (NFIs):** additional non-food items such as toothbrush and toothpaste, Kramas and Sarongs, cooking sets, mosquito nets and others.

FIGURE 3: HUMANITARIAN PARTNERS RESPONSE AS OF 28 NOVEMBER 2013



Source (HRF, 2013b)

4.3.3 Considerations on Strengths and Weaknesses of Current and Past Response

As highlighted after the floods of 2011, through a workshop on lessons learned from the 2011 response (HRF, 2012) held in June 2012, some issues need to be addressed to make the humanitarian response more effective. These can be summarized in the three main aspects of preparedness, coordination and resource mobilization as described below:

- **PREPAREDNESS:** The post-response reflection in 2011 called for contingency planning that could include non-UN actors, sector-specific response plans, standard packages and standby agreements. This was envisaged to happen in parallel with the elaboration of standardized tools and methodologies that could be adopted by different subjects to assess the humanitarian need and with an ad hoc capacity development on the tools' use. A big part of 2011 post-action reflection focused on the need and availability of information sharing resources that could deliver assistance when it was needed most, and to reduce duplication at a minimum.
- **COORDINATION:** Noting coordination and information needs and gaps during the 2011 floods, the UN and international NGOs supporting response efforts created a Humanitarian Response Forum (HRF) in 2012. The HRF was created to ensure sound coordination and communication on emergency preparedness and humanitarian responses in Cambodia. The forum includes UN agencies, local and international non-governmental organizations (NGOs) - joining as single members or as umbrella organisations - and international organizations (IOs), working in close collaboration with NCDM. The HRF has six coordinating sectors adopted from the National Contingency Plan (NCP): (i) Shelter, (ii) Water and Sanitation, (iii) Health, (iv) Food Security and Nutrition, (v) Protection and (vi) Education.
- **RESOURCE MOBILIZATION:** The creation of structured procedures, larger and more effective forums and more sophisticated tools called for timeliness of resource mobilization, with swifter interactions with donors with humanitarian dedicated budgets and programmes, and better and wider understanding of funding mechanisms among government and non-government stakeholders.

Ahead of the above measures being put in place, floods between September and October 2013 required further response. Experience acquired since the 2011 floods improved the response performance of the Government, Provincial Department of Agriculture (PDA) and ministries' line departments. They were better able to respond to the need, assess the damage and voice concerns to donors in terms of the needs-assessment gap for early recovery and identifying sectorial donor preferences and preferred areas of intervention.

With the same spirit of the 2011 workshop, and to keep track of the progress made, an After Action Review (AAR) was held on 25 November 2013. It reviewed the 2013 flood response (HRF, 2013a)[2] to better understand what worked well, what could be improved and how to make improvements in terms of humanitarian action in Cambodia. The stakeholders' main conclusions were:

- **PREPAREDNESS:** It was noted during the 2013 flood response that distribution of information and resource allocation had improved due to expansion of the network of humanitarian agencies, stronger support, improved engagement by local authorities and NGOs and the use of maps and Dropbox for sharing information between stakeholders. However, some areas for improvement were also noted.
  - NCDM should take the lead in terms of information management;
  - There needs to be agreement and standardization on the methods of information collection and sharing for stakeholders at the national, sub-national and local levels and capacity development provided for the relevant personnel, especially at the local level; sector focal points need to be established to ensure sufficient information management;
  - As per information collection, joint assessment methods should be finalized and agreed to be distributed among humanitarian stakeholders to provide comprehensive assessment that could serve the relief timely and efficiently;

2 *The event was attended by participants from NCDM, PCDMs, USAID, HRF and Local NGOs. The objectives of the AAR were to: 1. Reflect among participant institutions and organizations on how effective the inter-institutional and inter-agency communication and collaboration has been; 2. Identify strengths and weaknesses in the areas of coordination, assessments, information management and overall response to the floods; 3. Identify priorities and develop an action plan to sustain strengths and improve on weaknesses.*

- Both aspects above, once agreed and defined, need to be coupled with punctual training that could enable stakeholders to maximize their utilization during emergencies.

- **COORDINATION:** Stakeholders believe there are sufficient human resources for coordination within HRF and the Cambodian Red Cross. HRF coordination and information sharing has improved as they believe joint assessments have helped the humanitarian response. At the sub-national level, local authorities (PCDM) have actively participated in the response and some provincial governors were able to make quick decisions. Previous capacity development, in which personnel from Province, District and Commune personnel participated, seems to have been useful for better coordination. To increase the quality of response, NCDM needs to provide extra guidance and training to PCDMs in terms of preparedness and response plans and how to implement them. NGOs also need to be included in/made properly aware of plans and the need to coordinate with local authorities before and during emergencies.
- **RESOURCE MOBILIZATION:** NCDM needs to take leadership in ensuring that PCDMs and district committees are capable of taking over increased ownership of their functions and expand to take a more active role in response. HRF needs to conduct simulation exercises to ensure standardization of use of instruments and communication methods. Relevant training/ capacity development needs to be expanded at all levels.

Battambang, Rukhakiki district Oct 2013 (Photo: HRF)

5 PFERNA RATIONALE AND SECTORIAL REPORTS

5.1 THE POST-FLOOD EARLY RECOVERY NEEDS ASSESSMENT (PFERNA)

5.1.1 PFERNA Rationale

On 8 November 2013, on the occasion of the HRF meeting held at the Cambodian Red Cross office, the chairman of HRF encouraged UNDP to lead a Post-Flood Early Recovery Needs Assessment (PFERNA). In response to this, UNDP, in collaboration with NCDM, developed a methodology for conducting the 2013 PFERNA, which they presented to HRF members on 21 November 2013.

On 11 December 2013, UNDP, in collaboration with NCDM, organized a consultation workshop to prepare operational plans for conducting the 2013 PFERNA in Phnom Penh, with involvement of relevant stakeholders, such as NCDM, PCDMs, line ministries, UN agencies and CSOs. The Recovery Executive Team consisted of NCDM and UNDP, a core team which decided to conduct the 2013 PFERNA in three sectors:

- **Economic:** Agriculture, Livestock, and Fisheries; Markets; Industry, commerce and Tourism.
- **Social:** Demographics and Livelihoods, Education, Health, Housing and Landmines;
- **Infrastructure:** National and Rural Roads and Electrical Network, Water and Irrigation System and Water and Sanitation;

The Assessment takes inspiration from the Damage and Loss (DaLA) Methodology. Initially developed by the UN Economic Commission for Latin America and the Caribbean (UN-ECLAC) in 1972, the DaLA aims to capture the closest approximation of damage and loss due to disaster events. The DaLA Methodology bases its assessments on the overall economy of the affected country. It uses national accounts and statistics of the country's government as baseline data to assess damage and loss. It also factors in the impact of disasters on individual livelihoods and incomes to fully define the need for recovery and reconstruction (GFDRR, 2010).

All sectorial assessments were carried out between December 2013 and January 2014. The greater part of the fieldwork was carried out during a multisectorial field mission, held from 15 to 21 December 2013, which focused on five provinces: Battambang, Banteay Meanchey, Siem Reap, Kampong Cham and Prey Veng. The assessment team deployed between 15 to 21 December was made up of a cross-agency group, led by NCDM and UNDP in conjunction with UN Agencies and a wide range of line ministries, including the Ministry of Rural Development (MRD), the Ministry of Water Resources and Meteorology (MoWRAM), the Ministry of Agriculture Forestry and Fisheries (MAFF). The subsectors assessed during this mission were: Agriculture, livestock, Fisheries, Local Markets, Demographics & Livelihoods, Housing, National and Rural Roads and Electrical Network and WATSAN. The remaining sectorial Assessments (Education, Health and Landmines) took place at different times and locations, immediately preceding or following the main mission date and geographically focusing on the same provinces. Detail of sectorial missions is provided in the following chapters. The PFERNA team assessed all sectors and subsectors contained in this report, with the only exception of the Water and Irrigation System, for which the present report has used the results of ADB reconnaissance mission as reported in the bilateral MoU between ADB and MEF (ADB; MEF, 2014).

UN agencies took part in the assessment according to their relative expertise and often as a consequence of their previous engagement in the humanitarian relief phase. When specialised agencies were not available due to the emergencies happening in the region (Philippines, Vietnam) NCDM and UNDP took responsibility for co-leading the subsector teams through internal and external expertise. The present report was prepared by the Royal Government of Cambodia with the support of the National Committee for Disaster Management (NCDM), Line Ministries and the technical and financial support of the United Nations Development Programme (UNDP) and other UN Agencies and Development Partners. Sectorial teams were composed as follows:

Economic Sectors

- Agriculture Livestock and Fisheries – UNDP, MAFF
- Industry, Tourism and Commerce – UNIDO,
- Market – UNDP.

Social Sectors

- Demographic & Livelihoods -International Organization for Migration (IOM) and MoP;
- Housing - UN-HABITAT, MoP;
- Education – UNDP, MoEYS;
- Health – UNDP, MoH;
- Landmines – UNDP, CMAA.

Infrastructure

- National and Rural Roads and Electrical Network – UNDP RedR (expert roster), MPWT, MRD;
- WATSAN – UNICEF, MRD,
- Water and Irrigation system – The team did not assess this sector directly, figures were provided by ADB Reconnaissance Mission and Memorandum of understanding signed between MEF and ADB (2014).

5.1.2 PFERNA METHODOLOGY

Following the DaLA methodology and according to the assessment gaps highlighted by the Humanitarian Partners, the team has found the following as the main objectives of the assessment exercise, namely:

- **Estimate** the overall human and socio-economic impact of the disaster (damages, losses, macroeconomic impact and impact on livelihoods) in the country as a whole and in the affected areas;
- **Outline** the basic recovery and reconstruction needs for the affected areas (based on the needs for each economic sector) by preparing a Damage and Loss Assessment and a recovery framework report;
- **Identify** and prioritize benchmarks, standards, outcomes and desired results to restore social, physical, institutional and economic systems in affected areas;
- **Inform** and guide the decision-making process on Early Recovery within the donor community;

According to the above objective the expected results of the 2013 PFERNA are to:

- **First,** ensure credibility in the final recovery and reconstruction assistance that Cambodia will submit to the international donor community;
- **Second,** institutionalize and spread the use of the current assessment methodology to derive standard, comparable results and to improve future disaster risk management strategic planning for the country;
- **Third**, provide credible evidence to mobilize recovery grants or loans from development partners;
- **Fourth,** improve accuracy and completeness of the assessment.

TABLE 5: TIMEFRAME AND OPERATIONAL ARRANGEMENTS

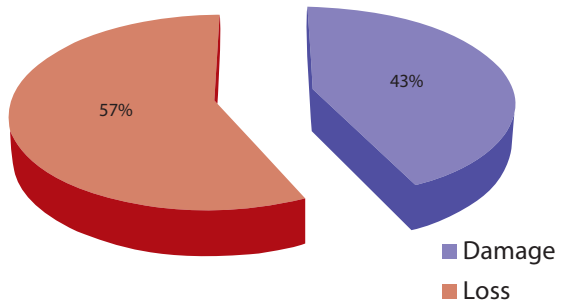
STEPS	ACTIVITIES	TIMELINE
Phase 1 Preparation for the consultation workshop		
Step 1	Setup sector teams, identifying participants from concerned government agencies, international organization and experts.	26 Nov.–6 Dec. 2013
Step 2	Planning and orientation workshop – development of detailed sector work plans and formulation of the overall operational plan.	11 Dec. 2013
Phase 2 Review existing PFERNA reports		
Step 3	Collection and analysis of baseline data from reports and assessment done earlier; and other logistical preparations for field visits.	10-14 Dec. 2013
Phase 3 Conduct the 2013 PFERNA in five provinces		
Step 4	Sector-by-sector assessment including field survey for primary data collection in five affected provinces.	15-21 Dec. 2013
Phase 4 Consolidation and consultation		
Step 5	Submission of draft sector assessment reports, estimation of recovery and reconstruction needs.	10 - 15 Jan. 2014
Step 6	Consolidation and aggregation of damage and loss, and overall report writing.	15 -30 Jan. 2014
Step 7	Share draft assessment report as well as proposed recovery framework to the Government for comments and feedback.	30 Jan. - 1 Feb. 2014
Step 8	Finalize the assessment and recovery framework report and consult NCDM and line ministries before final submission.	2 - 10 Feb. 2014
Phase 5 Publication and dissemination of the 2013 PFERNA report		
Step 9	Copy editing	10 - 18 Feb. 2014
Step 10	Designing the report and publication	18 - 28 Feb. 2014
Step 11	Printing the final assessment report and organize a workshop for dissemination	28 Feb. - 5 Mar. 2014

Source: PFERNA Team Assessment 2013

5.2 SUMMARY OF DAMAGE AND LOSS

The total value of damage and loss amounts to US$356 million, of which US$153 million represents the destruction of physical assets in the affected areas and US$203 million, represents estimated losses in production and economic flows. Damage represents 43 percent of the total economic impact of the floods, the remaining 57 percent is loss.

FIGURE 4: DAMAGE AND LOSS PROPORTION FOR FLOODS 2013



Source: PFERNA Team Assessment,2013

Economic loss represents indirect impact in terms of reduced income, increased operational costs, or extraordinary expenses that had to be faced after the disaster. While the destruction or damage to assets occurred at the time or in the aftermath of the floods, the indirect impact on daily activities unfortunately will last well beyond it, at least until the assets are fully repaired and/or restored. This is one of the reasons why speed and efficiency of the post-disaster recovery and reconstruction activities are critical.

Rice is the backbone of the local economy and rural livelihoods, as it is the staple food and a typical exchange commodity in rural areas (MAFF, 2012) and has been badly affected. In fact, about half the total damage and loss across all sectors occurred in agriculture, livestock and fisheries. Damage and loss for the mentioned sectors accounted for US$151.9 million and represents 43 percent of total. This high damage and loss estimation is due to the substantial loss suffered by the floods affecting vast extensions of rice paddies close to the harvest season. Of all possible agricultural losses, destruction of crops near to harvest is the most devastating, as it means a complete loss of the crop value once all costs (e.g., upfront investment, labour and opportunity costs) have been incurred.

Infrastructure (transport, WATSAN and water management and irrigation), education and industry/commerce were also severely affected by the floods. The rural laterite roads, given their vulnerability, were particularly hard hit. Repairing the most critical road segments will be crucial to restoring access to services in the most isolated areas. The total impact on the transport sector is estimated at US$79.6 million, or 22 percent of the total damage and loss.

In the education sector, 1,280 schools were flooded (mostly in 12 provinces where floods impacted from 10 percent to 40 percent of the total schools in each of those provinces). The estimated damage and loss figure for education is US$15.7 million, or 4.4 percent of total damage and loss. Finally, the damage and loss of the industry/commerce sector is estimated at US$13.5 million, accounting for 4 percent of the total. Markets have been modestly affected but prices might soar in the following months.

Damage and loss in water and sanitation is roughly estimated at US$2.7 million, but still significant. Water and irrigation damage added up to US$52 million, a considerable result representing 15 percent of total damage and loss. The impact on the energy and health sectors can be considered almost negligible. However, the floods exposed significant vulnerabilities in these sectors and can be seen as useful recommendations to further improve their disaster-resilience for possible future disasters.

Impact on livelihoods appears to be very significant. About 377,354 households were affected by the disaster with 8 percent of them being relocated to safer areas. Household income loss[3] adds up to about US$36.6 million loss, around 18 percent of total losses, and appears to burden the poor and vulnerable the most.

3 *Calculated as the lost income and lost income in asset value per household.*

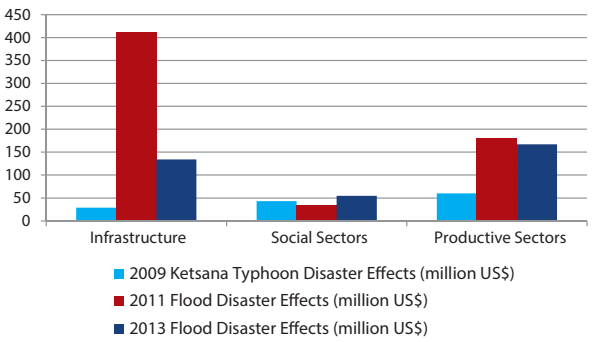
TABLE 6: SUMMARY OF DAMAGE AND LOSS (DaLA)

Sector and Sub-sectors	2009 Ketsana Typhoon			2011 Flood			2013 Flood		
	Effects (million US$)			Effects (million US$)			Effects (million US$)		
	Damage	Loss	Total	Damage	Loss	Total	Damage	Loss	Total
Economic Sectors	**1.05**	**59.01**	**60.06**	**40.80**	**138.80**	**179.60**	**2.54**	**164.59**	**167.13**
Agriculture, Livestock and Fisheries	0.09	56.42	56.51	40.80	138.80	179.60	0.36	151.50	151.86
Industry/Commerce	0.96	2.59	3.55	n/a	n/a	n/a	2.15	11.30	13.45
Tourism	n/a	n/a	n/a	n/a	n/a	n/a	0.03	1.73	1.76
Market	n/a	n/a	n/a	n/a	n/a	n/a		0.06	0.06
Social Sectors	**39.55**	**3.33**	**42.88**	**34.70**	**-**	**34.70**	**16.47**	**38.36**	**54.83**
Housing and Shelter	15.28	3.29	18.58	11.70	-	11.70	0.65	0.55	1.20
Health	0.06	0.04	0.10	3.00	-	3.00	0.17	0.09	0.26
Education	24.21	0.00	24.21	20.00	-	20.00	15.65	0.12	15.77
Livelihoods								37.60	37.60
Infrastructure	**17.26**	**11.49**	**28.75**	**375.70**	**34.70**	**410.40**	**134.27**	**0.00**	**134.27**
National and Rural Roads	14.39	11.08	25.47	328.60	23.30	351.90	79.61	-	79.61
WATSAN	0.06	0.39	0.46	20.00	11.40	31.40	2.66	-	2.66
Water and Irrigation System	2.78	0.01	2.79	27.10	0.00	27.10	52.00	-	52.00
Electrical Network	0.03	0.01	0.03	n/a	n/a	n/a	n/a	-	0.00
Cross-Cutting Sector	**0.21**	**0.10**	**0.31**	**0.00**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
Environment	0.03	0.10	0.13	n/a	n/a	n/a	n/a	n/a	n/a
Public Administration	0.17	0.00	0.18	n/a	n/a	n/a	n/a	n/a	n/a
TOTAL	**58.06**	**73.93**	**132.00**	**451.20**	**173.50**	**624.70**	**153.28**	**202.94**	**356.23**

Source: PFERNA Team Assessment,2013 (ADB, 2012; RGC, 2010a)

Comparison with previous climate hazards demonstrates that the floods of 2013 can be considered a significant disruptive event by Cambodian standards. Overall, the event caused twice the damage and loss of Ketsana in 2009, and almost half the damage and loss of the 2011 floods. However, and with regard to sectorial figures, the disaster seems to have affected more the social sectors[4], compared to the previous disasters. Infrastructure damage seems to be contained, when compared to previous disasters, and productive sector damage appears to be similar, but lower, than the 2011floods.

FIGURE 5: DAMAGE AND LOSS COMPARISON ACROSS LATEST NATURAL DISASTERS IN CAMBODIA



Source: PFERNA Team Assessment, 2013

This is a direct effect of the insertion in the Damage and Loss Assessment (DaLA) calculations for 2013 of aspects so far neglected by previous assessments such as livelihoods, market, industry and tourism.

4 *To be noted that previous methodology did not take livelihood into account when measuring Damage and loss to Social Sectors.*

5.3 ECONOMIC SECTORS

The impacts on the economic sector were evaluated as part of the PFERNA, with coordination between sub-sectors to avoid double counting. The DaLA methodology was followed to assess total damages and losses of the economic sector. Damage and loss add up as indicated in the table below and respond to the description provided in the following paragraphs.

TABLE 7: SUMMARIZED DAMAGES AND LOSSES (DaLA) OF ECONOMIC SECTORS

Sector and Sub-Sector	Disaster Effects (US$ million)		
	Damages	Losses	Total
Agriculture, Fisheries and Livestock	0.36	151.5	151.86
Tourism	0.03	1.73	1.76
Industry/Commerce	2.15	11.3	13.45
Market		0.06	0.06
Total	2.54	164.59	167.13

Source: PFERNA Team Assessment, 2013

5.3.1 Agriculture, Livestock, Fisheries

The post-flood assessment for the agriculture, livestock and fisheries sectors was carried out in during one mission in from 15th to 21st December 2013. The sector was led by NCDM and UNDP and supported, in the field, by relevant Provincial Departments of various government line ministries. The main objective of the exercise has been to measure the damages and losses inflicted by the floods in monetary terms. Damages to the agricultural sector refer to losses of capital assets, including damage to farmland, facilities, machinery and equipment (tractors, hand-tractors, etc.) and Losses refer to crops that are about to be harvested and losses of stock (livestock, fisheries, harvested products, inputs, etc.). The total damage and loss is estimated at farm prices.

In addition to data collected from the field surveys, many good and secondary reported data/information for this productive sector assessment were obtained from government institutions such as the NCDM, PCDM, MAFF, PDA, Provincial Department of Industry and Provincial Department of Tourism. A further analysis was carried out using remote sensing data. The primary and available secondary data of livestock killed was very helpful for the study, while there was no secondary data on fisheries available. Fisheries assessment was done in consultation, and data was provided by various PDAs.

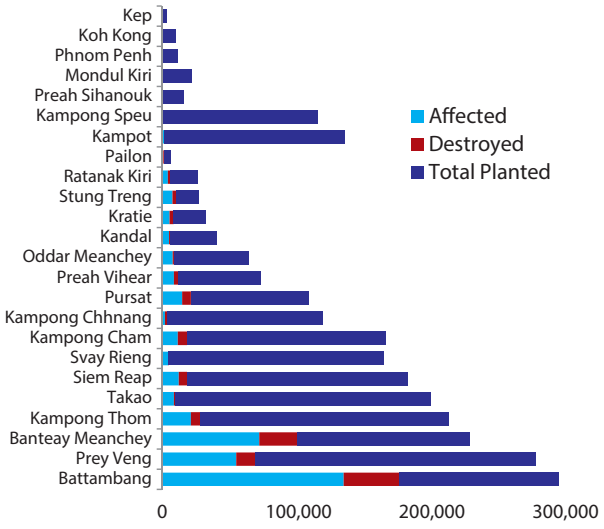
Paddy rice has long been an important source of economic income and food security for rural Cambodians, with nearly 80 percent of the population residing in rural areas (NIS, 2013). Paddy rice is paramount to the Cambodian rural household; of the total cultivated agricultural land, some 70 percent is devoted to paddy rice fields, with the remainder being used for subsidiary and other industrial crops (such as cassava, maize, sesame, soya bean and rubber) (MAFF, 2012).

The floods in 2013 caused severe loss to paddy rice production, which is likely driving its production growth down to just 1.7 percent in 2013 (down from 5.8 percent annual growth in 2012). Because the paddy production is the main component of the economic impact assessment, the DaLA methodology is focused on rice production, as well as losses of other agricultural crops such as cassava, maize and sesame, etc.

During the field assessment, paddy rice was reported as suffering immense losses (with insignificant damage on agricultural assets). Loss of paddy rice production due to the floods is estimated at US$101.3 million, with the loss of production costs of paddy fields projected at US$18.4 million. At the same time, loss of other agricultural crops is evaluated to be around US$28.1 million. According to MAFF, the two hardest hit provinces were Battambang and Banteay Meanchey, with losses accounting for 14 percent and 12 percent respectively, of their planted paddy rice areas (by the time the floods hit) (MAFF, 2013). However, local authorities did not expect to face food insecurity issues, as some paddy rice plantations had been saved.

Damage and loss of livestock stand at US$3.33 million, and fisheries are estimated at US$0.73 million. Overall damage and losses of the agricultural sector, in economic terms, are estimated at US$151.9 million. The table below illustrates the affected provinces in terms of destruction of paddy fields (in hectares), relative to their total paddy plantation at the time of the floods (based on data from MAFF).

FIGURE 6: LEVEL OF AFFECT BY PROVINCE



Source: PFERNA Team Assessment, 2013

A few most-affected provinces were visited and potential short, medium and long-term impacts were analysed. The loss in Battambang was found significant, especially on paddy rice production.

DaLA for Rice Crops (including non-rice crops) - Baseline

- The floods hit when paddy was in the middle of its production cycle or near harvesting in some areas.
- This caused maximum impact on wet-season rice production, where it normally accounted for 78 percent of the country's total paddy outputs, and had some impact on other non-rice agriculture crops (such as cassava, maize, etc.).
- Damage of agricultural assets, as reported by provincial authorities and observed in the field, is minimal.
- The total lost value is considerable. This might require food aid and other short to medium-term recovery measures to rebuild the affected communities.

Step I: Damage to Agricultural Assets
(Damage not significant)

Step II: Loss of Rice Production
(Affected/destroyed areas*productivity)
US$101.3 million

Step III: Loss of Production Cost
(Production cost of paddy US$200)
US$18.4 million

Step IV: Loss of other crops (Other non-rice crops)
US$28.1 million

Step V: Impacts on Rice Crop
(Production loss + Production cost)
US$147.8 million

Sources: MAFF, NCDM, Provincial Department of Agriculture and Field Data.[5]

Damage and loss of livestock is estimated to be minimal, at US$3.33 million. Likewise, fisheries damage and loss is projected at US$0.73 million.

DaLA for Livestock (Baseline)

- Primary data collected from Battambang, Banteay Meanchey and Siem Reap, with secondary data obtained from NCDM and a simulation of impacts on other provinces.
- Livestock represents nearly 4 percent of the economy and the damage to livestock is found to be not significant, relative to agricultural crops.

5 *Cost of paddy production/land plough is estimated at US$200 per ha due to growing use of machinery such as hand tractors/ tractors for paddy field ploughing. However, the practice may vary by region (the cost of production would have been more expensive if more labour/fertilizers were used). By the end of 2012, growing use of agricultural machinery was replacing the use of animals (in 2012, 65 percent of total agricultural land areas ploughed was done by tractors and this number has reportedly grown to 70 percent in 2013 as farmers are using various types of machinery for plough/cultivation of their paddy fields.*

Step I: Damage – Dead Livestock
(Replacement cost = US$0.36 million)

Step II: Loss to Production Cost
(Carcass at slaughter house)
US$0.02 million

Step III: Loss of an estimated 20 percent Reduced Meat Production (for a one-month period due to stressed market conditions) US$2.95 million

Step IV: Impacts on livestock
US$3.33 million

Sources: MAFF, NCDM, Provincial Department of Agriculture and Field Data.

The policy of removing commercial fishing lots introduced by the Government some years ago helped farmers have better access to public water and fishing areas. By the end of 2012, 516 fishery communities had been established, with 328 communities officially registered (Ministry of Agriculture, Forestry and Fisheries, 2012). The 2012 MAFF Annual Report (2012) pointed out that removing commercial fishing lots has largely contributed to improving local people's livelihood and mainly contributed to a reduction in fluctuation.

The damage and loss in fisheries is estimated at US$0.73 million, largely due losses in fish farming/aquaculture.

DaLA for Fisheries (Baseline)

- Calculation based on primary data of field mission to Battambang, Banteay Meanchey and Siem Reap, with projected devastation effect of other provinces.
- PDA reported insignificant damage to fish farms/ aquaculture and its structures. Fisheries accounted for 6.5 percent of the economy.

Step I: Damage to fish farms, structure
(fish farms, ponds and sanctuaries) is insignificant

Step II: Production loss (Marketable fish)
US$0.73 million

Step III: Loss due to higher production cost
(not observed)

Step IV: Effects on Fisheries
US$0.73 million

TABLE 8: SUMMARY OF DaLA FOR AGRICULTURE, LIVESTOCK AND FISHERIES (US$ MILLION)

	Damage	Loss	Sub-total
Agriculture[6] (incl. other crops)	…	147.80	147.80
Livestock	0.36	2.97	3.33
Fisheries	…	0.73	0.73
Total	**0.36**	**151.50**	**151.86**

Sources: PFERNA team Assessment2013,based on information from MAFF, NCDM, PDA and Field Assessment Data

Damage to crops was further analysed using remote sensing data, a common practice in the Disaster Assessments. Crop production decline is one of the representative indicators of crop loss. In some methodologies, such as DaLA, there are a variety of remote sensing datasets that can be used to detect crop loss with various resolutions, and the method of assessment can vary according to its nature from simple index to very complicated.

In this study, a simple index is used to detect the rice yield decline after the 2013 floods in Cambodia at macro-scale, by using MODIS EVI data to provide a rapid reference for post-disaster needs assessment. Following a multi-purpose field visit, a rapid assessment is done in two days, including remote sensing data collection, method development, and data analysis, mapping and writing.

6 *Direct physical damage to agriculture is insignificant according to the PFERNA team field survey interview.*

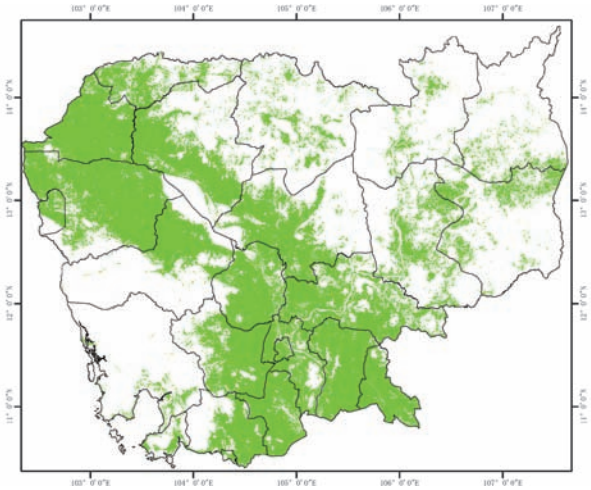
The type of data used was MODIS EVI:

The data used for detecting crop loss in this analysis is Enhanced Vegetation Index (EVI). One EVI product is MOD13Q1-EVI, composed of 16-day EVI with spatial resolution of 250m×250meters, based on data derived from moderate-resolution imaging Spectroradiometer (MODIS).

In this analysis, the MOD13Q1-EVI dataset covering Cambodia from June 2000 to October 2013 was obtained and then smoothed with Savitzky–Golay filter, to remove the influence of cloud, aerosol and sensor bias, etc.

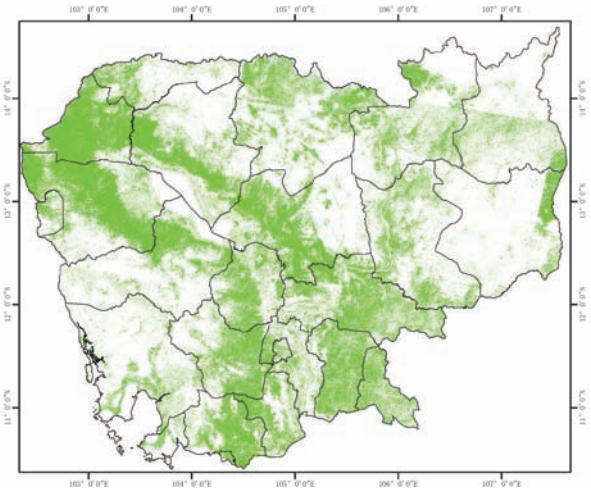
- **Land use:** There are some global land use and land cover datasets. For example, the Global Land Cover Map (GlobCover) by European Space Agency (ionia1.esrin.esa.int), the Finer Resolution Observation and Monitoring of Global Land Cover (FROM-GLC) by China (data.ess.tsinghua.edu.cn) and Global Cropland Extent (GCE) data from (globalmonitoring.sdstate.edu) with spatial resolutions of 300m×300m, 30m×30m and 250m×250m, available for public use, seen in the figures below.

FIGURE 7: CROPLAND DISTRIBUTION OF CAMBODIA FROM GLOB COVER 2009 DATA



Source: PFERNA Team Assessment, 2013

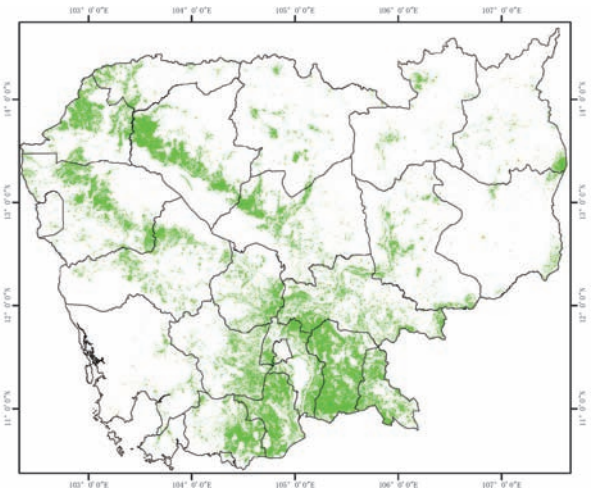
FIGURE 8: CROPLAND DISTRIBUTION OF CAMBODIA FROM FROM-GLC DATA



Source: PFERNA Team Assessment, 2013

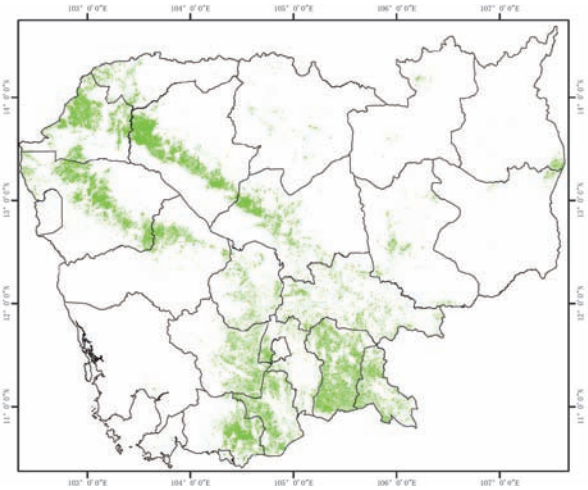
As displayed, there are discrepancies among the three aforementioned datasets. Since the availability of land use products specifically developed for Cambodia with fine resolution is not surveyed in this study, the three global land use datasets were re-projected to UTM-WGS84 and resampled to 250m×250m, then merged as the final cropland distribution map of Cambodia, as illustrated in Figure 8b.

FIGURE 9: CROPLAND DISTRIBUTION OF CAMBODIA FROM SDSU GCE DATA



Source: PFERNA Team Assessment, 2013

FIGURE 10: CROPLAND DISTRIBUTION OF CAMBODIA MERGED FROM GLOBCOVER2009, SDSU GCE AND FROM-GLC



Source: PFERNA Team Assessment, 2013

- **FIELD SURVEY DATA:** The rice calendar, the 2013 flooding time and household crop loss ratios, etc. were collected around the Tonle Sap Lake area during the field survey and four household interviews from 15 – 20 December, 2013.

- **AUXILIARY DATA:** The statistics of rice loss were obtained from MAFF. The flood water areas of Cambodia, developed by UNISAT, etc. were also obtained to assist the analysis (www.unitar.org/unosat/maps/KHM).

The types of paddy field loss, according to the MAFF statistics, are 'affected' and 'destroyed'. After interviews with MAFF and PDA personnel, there was ambiguity in defining and using the two loss types. Some defined "paddy rice field destroyed by 60 percent or more is considered completely destroyed", while others defined that "destroyed by 70 percent to 100 percent is considered completely destroyed".[7]

In order to match the statistical data of MAFF, the loss types of flooded rice fields are divided into unaffected, affected and destroyed.

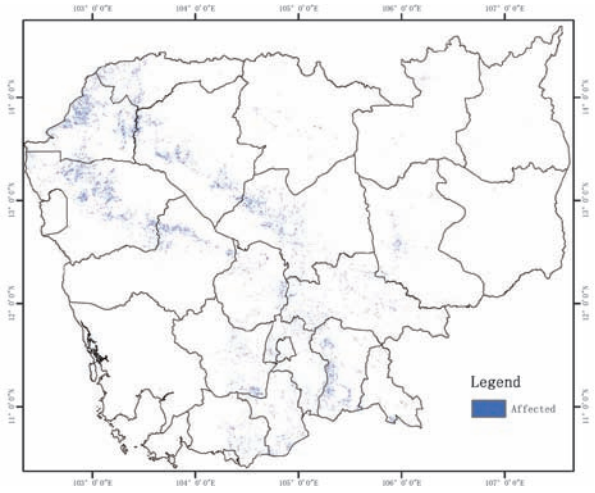
A simplified method is used in this study by defining $Z_{EVI\ post} = (EVI_{post} - \overline{EVI}_{post}) / \sigma_{EVI\ post}$ as the index to detect post-flood EVI anomaly, where EVI_{post} refers to MODIS EVI after 2013 flooding, $\overline{EVI}_{post}$ and $\sigma_{EVI\ post}$ represent the mean and standard deviation of MODIS EVI datasets from 2000 to 2012 respectively.

The paddy fields are classified into three types subjectively, with past experiences according to the following thresholds:

- Unaffected area, $Z_{EVI\ post} > -1.0$
- Affected area, $-1.75 < Z_{EVI\ post} < -1.0$
- Destroyed area, $Z_{EVI\ post} < -1.75$

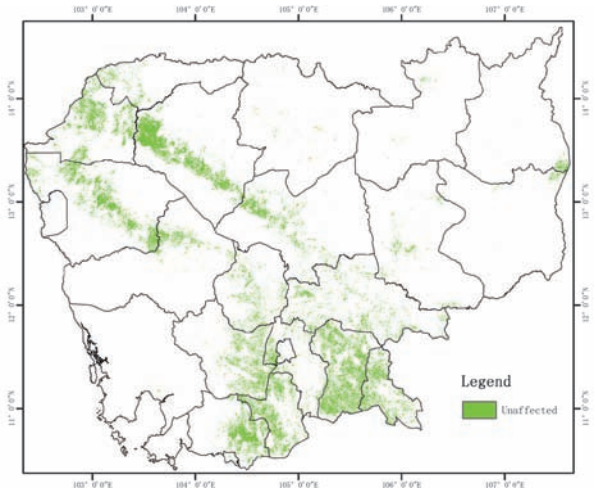
Preliminary results show that unaffected, affected and destroyed areas are displayed in Figures 9 to 11 respectively.

FIGURE 11: AFFECTED PADDY FIELDS AFTER 2013 FLOODS IN CAMBODIA



Source: PFERNA Team Assessment 2013

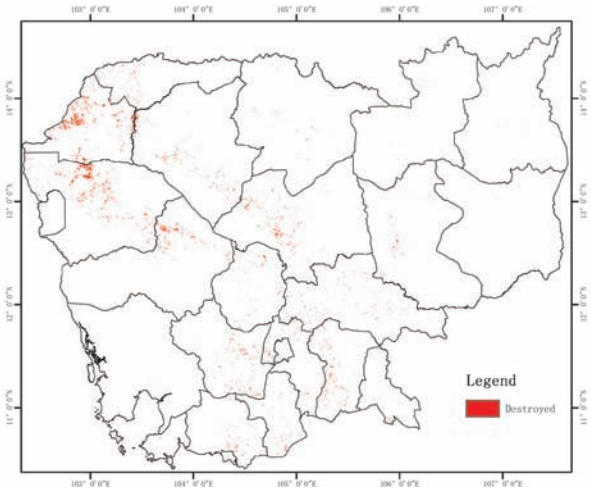
FIGURE 12: UNAFFECTED PADDY FIELDS AFTER 2013 FLOODS IN CAMBODIA



Source: PFERNA Team Assessment 2013

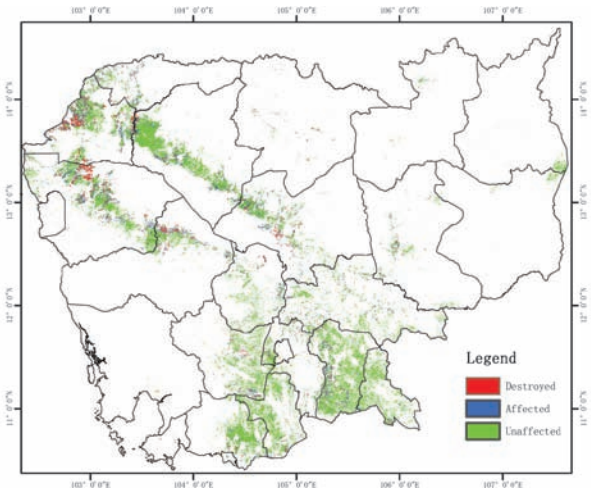
7 *According to interviews of officials in the Provincial Department of Agriculture*

FIGURE 13: DESTROYED PADDY FIELDS AFTER 2013 FLOODS IN CAMBODIA



Source: PFERNA Team Assessment 2013

FIGURE 14: UNAFFECTED, AFFECTED AND DESTROYED PADDY FIELDS AFTER 2013 FLOODS IN CAMBODIA



Source: PFERNA Team Assessment, 2013

In this study, a rapid rice loss assessment is implemented subjectively with coarse resolution remote sensing data through a simplified index. There is great potential for method improvement in the future. The preliminary result can be used for reference during post-disaster loss and needs assessment.

Remote sensing data generally has about ±5 percent variance, which is statistically regarded as appropriate. For the remote sensing data observed in the Cambodia 2013 floods, especially on the statistics of the classified rice loss areas, the data pointed to 13.3 percent of paddy fields affected and 6.1 percent destroyed, which is very close to the information/statistics reported by MAFF.

It is advised to develop and validate a loss detection method and system based on remote sensing data for daily operational use, during future capacity development. In order to achieve this, technical guidelines and standard operation procedures on loss reporting from village, commune and district to province, and MAFF, are needed.

5.2.3 Industry and Tourism

The post flood assessment on industry and tourism was led by NCDM and UNDP and co-led by UNIDO, and conducted between 15th to 21st December 2013 with the support and coordination from Provincial Departments of various government line ministries. This particular assessment was greatly assisted by the Provincial Department of Industry and Tourism. Field assessments were realised by visiting four hard-hit provinces and using DaLA methodology. All types of manufacturing and processing industries and Tourism facilities were looked at, but due to limited time the team relied on yearly and most recent national statistics, and various reports of the Provincial Department of Industry, with field visits conducted in the provinces of Siem Reap, Battambang, Banteay Meanchey and Oddar Meanchey. Extrapolation of damages and losses were done on other affected provinces.

TABLE 9: SMALL, MEDIUM AND LARGE ESTABLISHMENTS IN THE MANUFACTURING SECTOR IN THE FOUR SELECTED PROVINCES

No	Province	Rice Millers		Food Production		Brick Production		Other	
		No.	Empl.	No.	Empl.	No.	Empl.	No.	Empl.
1	Battambang	551	2935	54	332	55	770	523	2102
2	Banteay Meanchey	578	1822	26	139	21	271	320	1057
3	Oddar Meanchey	203	524	-	-	11	211	265	780
4	Siem Reap	1081	2081	27	131	55	1381	779	3253

Source: (MoP, 2011)

The assessment of the flood impact was measured with the baseline from the following reliable sources:

- The Ministry of Industry, Mines and Energy (MIME) records listing all types of manufacturing and processing industries, except timber and non-

timber forest product processing. The data only recorded those establishments that had applied for operating licenses,

- The latest economic census of 2011 (NIS, 2011) that classified all types of industries and recorded details of establishments, such as size of capital, stock and cost of manufacturing goods, sales, expenses and turnover. But only aggregated data are available and accessible publicly,
- The Commune Database-National Committee for Sub-National Democratic Development Program of the Ministry of Interior (MoP, 2012),
- Informal report from Provincial Departments of Tourism (PDT) in the provinces of Siem Reap, Battambang, Banteay Meanchey and Oddar Meanchey.
- The Ministry of Tourism Statistics, where there are good records of all types of establishments serving the tourism sector (on monthly, quarterly and annual bases), including the tourist arrival statistics report, the number of hotels, guesthouses and restaurants, and employment.

Industry plays an important role in Cambodian economic growth, accounting for 23 percent (NIS, 2011) of GDP in 2011. The census of 2011showed that 14.9 percent of total establishments were in the production and manufacturing industries, and engaged 539,134 persons (32.2 percent of the labour force)(NIS, 2011). Production and manufacturing industries generated revenue of US$57.5 million, constituting 47.9 percent of total revenues. Small- and medium-sized establishments in the manufacturing sector play a predominant role due to their important contribution to economic development (NIS, 2011).

Tourism plays an important role too in the country economy, in fact, Cambodia is famous for its cultural heritage and natural treasures. Its temples welcomed in 2012 3,584,307 international tourists in 2012 with a record increase of 24.4 percent on the 2011 figure (MoT, 2012). Some 28 percent of tourist arrivals are directly in to Siem Reap (direct flight) while 52 percent are land-border tourists, especially via Vietnam and Thailand (MoT, 2012). The remaining share is composed by visitors arriving in Cambodia through Phnom Penh International Airport. Besides Angkor Wat Temple located in Siem Riep, there are other destinations such as Phnom Penh (the capital city of Cambodia), beaches in Sihanoukville, Kampot and Kep, and other eco-tourism places located in the northern part of the country, such as Stueng Treng, Rattanakiri and Mondolkiri provinces. The tourism sector provided Cambodia withUS$1.9 billion in benefits in 2011 and US$2.2 billion in 2012. This accounted for 15.6 percent of the country's GDP (in 2012) and directly generated 782,500 jobs for Cambodian people (9.6 percent of the country's total employed population). Accommodation and restaurants play an important role in the tourism industry. In 2012, 68.5 percent of hotel rooms were occupied and the average length of stay was 6.3 days. There were 492 hotels, 2,091 guesthouses and 4,266 restaurants operating across the country, the majority of them located in Siem Reap and Phnom Penh city (MoT, 2012).

The flood significantly affected an important segment of industry in the north-west of Cambodia, namely rice, food processing and clay brick production. These industries suffered damage and heavy losses estimated at US$5.93 million, specifically damage to the stocks of unfinished goods, such as paddy and un-burned clay bricks, in addition to limited damage to milling machinery and losses through decline of production. The industry/ commerce sector suffered estimated damage and loss of around US$13.45 million. The damages were stock of unfinished goods, stock of milled-rice and paddy-rice, un-burned clay bricks and production machinery. The 2013 floods caused an estimated US$2.15 million in direct damage (mainly to unfinished products such as paddy rice and un-burned clayed bricks, premises and facilities, and machinery) and some US$11.30 million in indirect losses (such as economic opportunities being interrupted by the floods, decline of production, disrupted commercial activities, roads blocked by water, water flowing into premises, interruptions in production and shortages of raw materials).Industry and commercial activities in Battambang, Banteay Meanchey and Siem Reap accounted for a large proportion of these damages and losses. The floods halted production of large and medium industries for about two to three weeks and interrupted small and medium rice millers, brick production and food production for about two months.

The physical damage to the tourism sector reported by the private sector and provincial departments was very small, at around US$25,800. The damage was to properties and goods such as ground floors of hotels, souvenir shops and some souvenir stocks. Several hotels in Battambang, Banteay Meanchey and Siem Reap had their ground floors affected from trans-boundary flash flooding in the western provinces of Cambodia for a period of about one week. Some hotel and guesthouse owners used sandbags to prevent the flood from flowing into their premises. The floods blocked some roads, forcing tourists to change their plans from visiting sites in Battambang and Banteay Meanchey to other destinations

such as Phnom Penh and beaches in Shihanoukville. The estimated economic loss of the sector is close to US$2.0 million, mostly in the provinces of Battambang, Banteay Meanchey and partly in Siem Reap, with minor losses in other provinces. Interestingly, the number of tourist arrivals was still increasing during the time of floods in September and October 2013. Visitor arrivals in Cambodia rose by 17 percent in the month of September and by 15 percent in the month of October 2013 (compared to the same period of 2012).

TABLE 10: SUMMARIZED DAMAGE AND LOSS TO TOURISM SECTOR (US$ MILLION)

	Damage	Loss	TOTAL
Tourism	0.03	1.73	1.76

Source: PFERNA Team Assessment, 2013

TABLE 11: ESTIMATED DAMAGE AND LOSS TO TOURISM BY PROVINCE (US$ MILLION)

No	Province	Damage	Loss	Total
1	Battambang	-	0.03	0.03
2	Banteay Meanchey	-	0.02	0.02
3	Oddar Meanchey	-	0.00	0.00
4	Siem Reap	-	0.72	0.72
5	Others	-	0.96	0.96
Total		0.030	1.73	1.76

Source: PFERNA Team Assessment, 2013

TABLE 12: PERCENTAGE OF TOURIST GROWTH

No.	Month	% - Year 2012/2011	% - Year 2013/2012
1	January	27.6	15.4
2	February	26.0	19.8
3	March	30.0	18.3
4	April	24.3	17.9
5	May	22.6	25.3
6	June	29.8	20.1
7	July	18.7	19.2
8	August	17.3	16.4
9	September	15.7	16.9
10	October	24.8	14.9
11	November	25.6	
12	December	28.1	
Total		24.4%	

Source: Ministry of Tourism Reports, 2013

TABLE 13: DAMAGE TO INDUSTRY AND COMMERCIAL ACTIVITIES

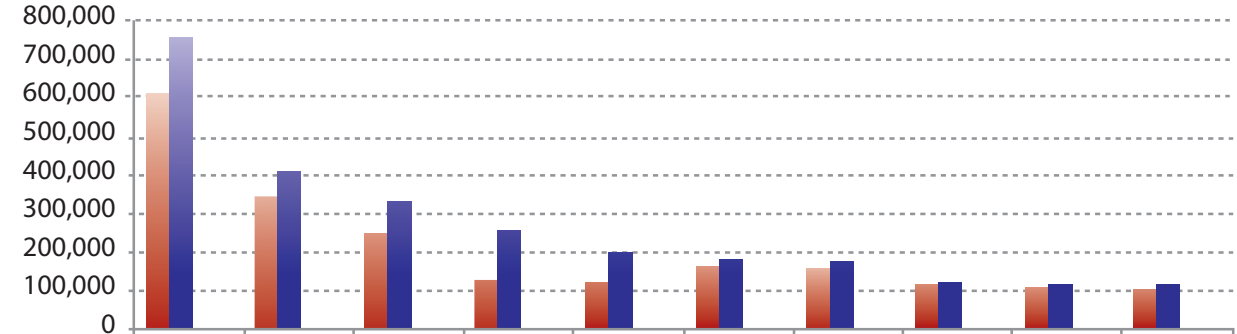
No	Province	Number of Districts	Districts hit by flood	Damage (million US$)	Loss (million US$)	Total (million US$)
1	Battambang	14	7	0.19	1.11	1.30
2	Banteay Meanchey	9	6	0.16	0.97	1.13
3	Oddar Meanchey	5	5	0.02	0.01	0.03
4	Siem Reap	12	6	0.49	2.43	2.92
5	Others	-	-	1.29	6.78	8.07
Total		40	24	2.15	11.30	13.45

Source: PFERNA Team Assessment,2013

During the assessment and from the interaction between all relevant stakeholders the team remarked that few capacity requirements were still to be addressed, namely:

- Limited capacity and resources made it difficult for local authorities to respond to the recovery needs assessment;
- Despite some assessments being done, the way damage was assessed did not meet DaLA standard criteria. Training on the assessment methodology would be useful for sub-national authorities to evaluate damage and loss in future disasters;
- Limited means and resources and lack of awareness and preparedness for disaster made it difficult for local authorities to inform people of early disaster prevention, and as a result, caused unpredictable damage and loss. Some provinces are struggling with difficulties more than others, in terms of response;
- Lack of national policy on disaster prevention and response, especially for industry/commerce and other sectors, could cause unpredicted damage and loss in future;
- Delays in rehabilitation and reparation of damaged physical infrastructure, such as roads, drainage, water canals and sanitation facilities, would have negative implications on future prospects for both industry and tourism sectors.

FIGURE 15: TOP-TEN TOURIST MARKET IN CAMBODIA



	Vietnam	Korea ROK	Chin RPC	Lao PDR	Thailand	Japan	U.S.A	France	Australia	Malaysia
2011	614,090	342,810	247,197	128,525	116,758	161,804	153,953	117,408	105,010	102,929
2012	763,136	411,491	333,894	254,022	201,422	179,327	173,076	121,175	117,729	116,764
share(%)	21,3%	11,5%	9,3%	7.1%	5,6%	5,0%	4,8%	3,4%	3,3%	3,3%
change(%)	24,3%	20,0%	35,1%	97,6%	72,5%	10,8%	12,4%	3,2%	12,1%	13,4%

Source: PFERNA Team Assessment, 2013

5.3.3 Markets

This analysis aims to assess the impact that the 2013 Cambodian floods had on Cambodian local markets. It focuses on the direct effects (physical access to markets, damage to market structure, stocks and loss in daily sales) as well as on indirect effects (prices, food availability). The local Market subsector was led by NCDM and UNDP and supported, in the field, by relevant Provincial Departments of various government line ministries, the present assessment was carried out during the main mission carried out from15th to 21st December 2013.Disaster Risk Assessment exercises are progressively recognizing that markets, together with other main services, are important units of analysis to understand the effects that natural or man-made disasters have on people's lives. Markets are an important source of revenue not only for the retailers but also for the farmers that provide the goods, and for the traders who transport them. The long cycle that connects products to consumers, which includes storage, transportation, processing and retailing, is an integral component of food price formation that influences the afford ability of food products and has consequences on the food security of many households. For all these reasons, market prices and market accessibility can be used as proxies to confirm or deny damage and loss to, among others, agriculture production, stocks and infrastructure.

The Cambodian floods of 2013 affected 20 out of 24 provinces (HRF, 2013b). Each of the 20provinces hosted one or more provincial market and each of the 133 most-affected districts hosted one market. Thanks to their more complex structures situated far from the main watercourses and on higher ground connected to better roads, provincial markets were not directly affected by the floods. The same cannot be said for district markets. Within the 133 districts, 34 percent of markets are placed in flood plains near main and secondary river stream banks. The less complex and often crumbling or non-existent structures directly in contact with the ground makes these markets more vulnerable to floods, which can cause direct and indirect problems to their normal functioning. For this reason, and taking into account their importance, district markets have been chosen as the unit of analysis, and a sample of 26 percent has been chosen to assess if floods caused direct or indirect damage.

TABLE 14: LIST OF DISTRICTS COVERED BY THE ASSESSMENT

Province	District
Banteay Meanchey	Mongkol Borei
	Preah Netr Preah
	Serei Saophoan
Battambang	Banan
	Sangkae
Kampong Cham	Srei Santhor
Prey Veng	Pea Reang
	Sithor Kandal
Siem Reap	Chi Kraeng
	Puok
	Soutr Nikom

Source: PFERNA Team Assessment

The methodology used to assess the flood impact on

markets was based on the World Food Programme (WFP) Emergency and Food Security Tool (EFSA) (World Food Programme, 2009). The questionnaire (see annex) usually administered to market chiefs and traders and/or retailers to assess prices and price changes were integrated in to questions related to losses incurred for:

- Lost sales revenues;
- Lost stocks;
- Damage to stocks;
- Damage to fixed, semi fixed and mobile stalls;
- Damage to the market structure.

To better understand the methodology of the analysis it is important to have a clear picture of how markets are structured and managed in Cambodia. There are four levels of markets in Cambodia which correspond to each administrative level: provincial, district, commune and village. At every level they sell a variety of food and non-food items retrieved locally or imported. Provincial markets are normally roofed and structurally more complex entities. District markets, normally one per district, are simple to medially complex structures, and not always roofed. Commune markets are located in commune centres and are usually more than twenty shops located alongside the main road. In many cases, there is a small, roofed area, which has stalls for more traders. Village markets are generally a less organized mass of vendors that can range from small shops situated in the same area of the village or individual multi-product shops run by one family. The goods sold by village vendors are often purchased from the commune or district markets. While province, district and commune markets can be located in fixed to flexible roofed or open-air areas containing structures that can host a number of retailers, village 'markets' show little difference from small shop units. The management of each level of market often coincides with the administrative level of the market itself: so that district markets are managed by district governors, provincial markets by provincial governors and so on. In some cases, depending on the importance of the market, it can be that the administrative hierarchy was subverted; having district governors taking care of commune markets, etc.

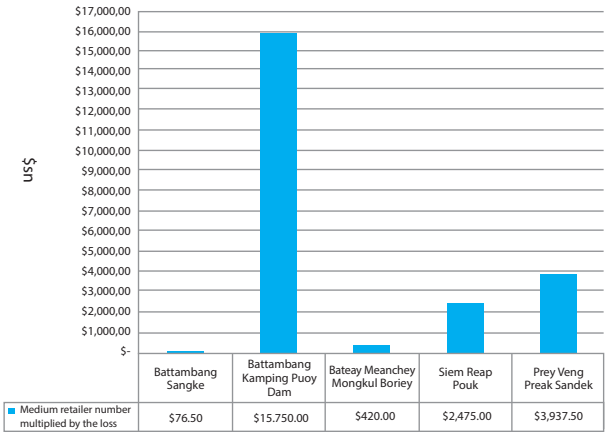
Each province or district market is composed of a variety of stalls or shops that are fixed, semi-mobile and mobile. Both fixed and semi-fixed shop structures and building materials can vary from small soft materials (metal, wood) to hard material (concrete) stalls arranged in an assigned open-air ground (paved or not), to concrete fixed stalls and soft stalls situated in an identifiable structure which has paved ground and a roof. Normally, mobile structures consist of trolleys with wheels pulled or pushed by the vendor or attached to a motorbike, but also of simple rattan baskets carried on the vendor's shoulders or head, and sometimes simply put on the ground for the duration of the market. Overall, village markets or 'shops' differ very little from private houses. They coincide often with the house of the retailer, who uses part of the Cambodian bamboo/wooden structure where people lie, sit and eat (similar to a large low table) to display the products of the day.

Markets in Cambodia are managed by the Ministry of Economy and Finance (MEF). Provincial, district and commune market retailers normally remit tax revenues to a territorial tax office (province, district) in the form of a lump sum. It is common practice that governors (province and district) subcontract the management of the market to an external manager or 'market chief' who charges each retailer (fixed and mobile) hosted by the market and its immediate surroundings a fee or '*pheasi*' to maintain the market structure. The tax amount, which can vary across the national territory, is a lump sum estimated by the tax collector for each retailer following national (but locally detailed) guidelines. The '*pheasi*' is calculated by the market chiefs and charged annually to fixed and semi-fixed stalls and daily to mobile vendors. The market infrastructure is the responsibility of the 'market chief', if the administration has been subcontracted to them, or of the respective governors, if they decide to manage the market directly.

Overall, 63 percent of market chiefs declared the floods had directly affected their market. The affect varied from flooding some parts of markets such as in Mongkul Borei, Preah Netr Preah, Pouk, Sithor Kandal and Pearaing, to the complete destruction of the market and its consequent relocation in another part of the district, such as in the case of Banan. Relevant differences in degrees of effect were determined by the flooding phenomenon itself, so that river flooding or rain floods could be predicted and counterbalanced, while dam flooding resulted in much more disruption. Overall structures were provided and relocation of markets was done immediately, with occasionally, but not significant, muddy ground. Some leaking was happening at the time of the field visit in some markets, but this did not cause major problems. Roads in the immediate surroundings of all district markets visited were clear and markets were accessible from main national roads. Connections from districts and villages, especially in Battambang and Banteay Meanchey were still difficult to access, but people seemed able to move slowly with motorbikes. As for lost sales revenues,

these have been estimated in average income of medium retailers multiplied for affected retailers in a specific market and for the days the market was not accessible (see table below). The market chiefs provided all the figures used for the estimation.

FIGURE 16: LOST SALES REVENUE PER MARKET

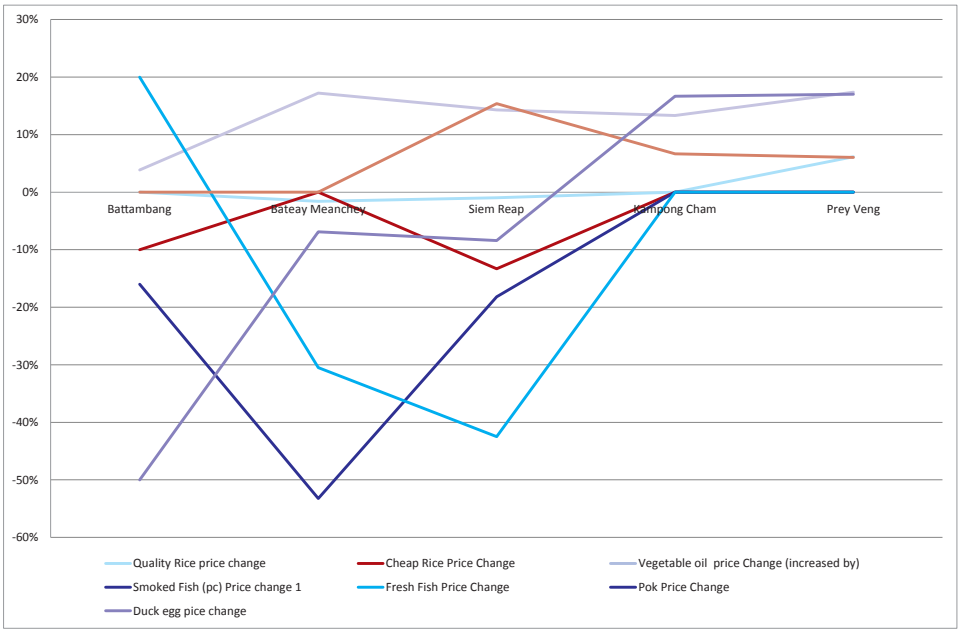


Source: PFERNA Team Assessment, 2013

The overall assessed loss in the sampled districts is equal to US$22,659. Assuming the sample chosen represents 26 percent of the affected areas, we could roughly estimate that if markets situated in proximity to flooded areas had experienced just half of this loss, the total amount of lost sales revenue for the country is estimated to add up to US$58,707. Retailers seemed to be prepared for the flood and were able to save their stock, as market chiefs seemed to be aware of the infrastructure interventions needed to protect the market structure from future events. Preventive measures could not avoid other negative effects, such as the impossibility of selling goods for a short to medium time.

As emphasized by the EFSA tool, post-disaster market analysis could reveal a lot about supply status and food security. This information is normally retrieved through the analysis of price fluctuations that act as proxies of supply quantity and status. The responses given by both traders and market chiefs on a specific basket of local commodities demonstrate that prices have not peaked.

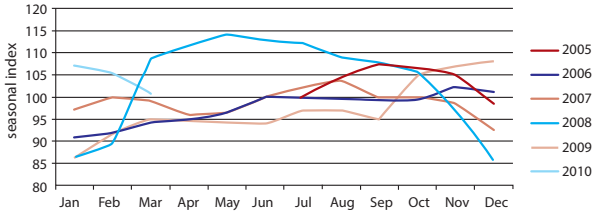
FIGURE 17: PRICE CHANGE AFTER THE FLOODS IN AFFECTED PROVINCES



Source: PFERNA Team Assessment, 2013

In line with the main livelihoods finding, that households switch to fishing as a coping strategy during the flood season, the price of fresh fish seems to be decreasing due to augmented supply. Conversely, the prices of imported commodities like vegetable oil and vegetables (from market chief interviews) seem to be increasing. This trend, according to the market chief, is due to the seasonal calendar of prices that records higher prices during the harvest season (December-April), which is when people have more money, and lower prices during the rest of the year (see table below).

FIGURE 18: RICE PRICE CALENDAR BETWEEN 2005 AND 2010



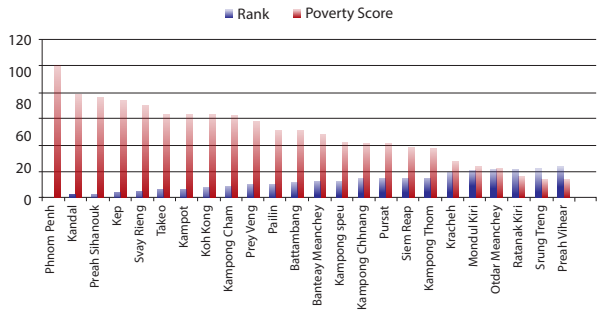
Source (WFP, 2009)

Market chiefs also report that some increases could be due to difficulty in accessing the market and trading the goods. Further follow-up questions and discussions with market chiefs revealed that rice stocks being used currently are from last year, so that any effect of damaged rice fields will be observed in the coming six months. For other products retrieved locally, such as pork or duck eggs, traders reported that the price of livestock had increased, and that they had to reduce their own mark up to continue selling.

5.4 SOCIAL SECTORS

The 2013 floods in Cambodia hit 20 provinces where the poverty levels were already relatively high (see figure below).

FIGURE 19: POVERTY SCORE BY PROVINCE[8]



Source: Cambodia Scorecards, 2012

The general profiles of households in these provinces suggested that people rely primarily on rice and other crop farming. Agriculture, particularly rice farming, is the major source of food consumption and income. For rural households, November and December represent an accelerated period of income generation, either harvesting their own crops or selling their labour to other farms. These jobs were decimated in the 2013 floods. While rural Cambodians are highly vulnerable to risks and shock, the flooding was another blow to the current livelihoods (MoP, 2011). The loss of livelihoods incurred by the flooding could further maintain the affected communities in poverty, and nullify some of the economic and development progress made in recent years. Farmers and unskilled labourers who mainly rely on agriculture for food and income have experienced the most severe consequences (RGC, 2011a). Particularly affected groups include children, people with disabilities, female-headed households and older persons. These effects have been recognized to be caused by the disruption of livelihoods, but also of main social services like health and education, as they could be hampered by the dislodging of landmines.

5.4.1 Demographics and Livelihoods

The demographic and livelihood sub-sector assessment was led by NCDM and UNDP co-led by the International Organization for Migration (IOM)and supported, in the field, by relevant Provincial Departments of various government line ministries and local NGOs[9]. All the data analysed in the present assessment were collected during the main mission carried out from 15th to 21st December 2013. The tool chosen to carry out the assessment was a household survey of around 40 questions. Respondent were identified with the help of Village chiefs and local NGOs and were selected on the basis of the damage and loss suffered and of their income status (the poorest and most vulnerable). Three teams administered the Survey comprising International and Khmer-speaking staff to two different part of the country: North West (2 teams) and South East (1 team) parts of the Country. Data were taken from the questionnaire and input into a SPSS database, and then reports were generated based on data collected in the field. IOM chose the provinces based on most affected as well as where the organisation had provided emergency assistance. The three teams interviewed a total of 228 households across 12 districts in four flood-affected provinces. Below is a chart of the field assessments that took place, in the exact geographical location with number of affected households interviewed.

8 *Poverty Scores are expressed in values that goes from 0 – 100 with 0 indicating the minimum (least virtuous – poorer) and 100 indicating the maximum (most virtuous – less poor). The rank reflects the same scale with the richest Province ranking as first and the poorest ranking as last.*

9 *Battambang: Village Support Group (VSG), Siem Reap: Vulnerability & Illiteracy Reduction (VIR), Banteay Meanchey: Tekdeysovanphum Organization (TDSP)*

TABLE 15: HOUSEHOLDS INTERVIEWED BY PROVINCE AND DISTRICT

Province	District	Households Interviewed
Battambang	Kom Reing	24
	Bavel	16
	Banan	24
	Chi Kreng	26
Siem Reap	Pouk	41
	Sot Nikum	5
	Sangke	3
Banteay Meanchey	Serey Sophorn	12
Kampong Cham	Koh Sotin	20
	Tbong Khmom	20
	Srey Santho	27
Prey Veng	Sithor Kandal	10
Total	12	228

Source: PFERNA Team Assessment, 2013

Many of the households interviewed experienced shocks after the flood, including illness (both mental and physical), crop failure, food shortages and loss of income and livelihoods. Further, an increasing level of debt taken on as a coping mechanism after the flooding made the vulnerability of flood-affected households even worse. This report details a breakdown of data collected in field assessments in affected provinces of Siem Reap, Battambang, Banteay Meanchey, Kampong Cham and Prey Veng from 16 to 20 December 2013. Below is a chart outlining the demographics of the affected households interviewed during the assessment.

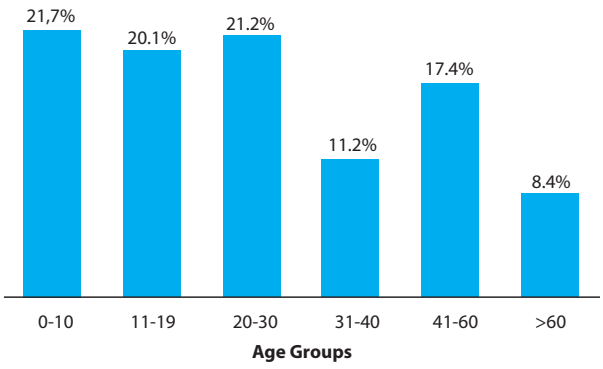
TABLE 16: BASIC DEMOGRAPHICS OF HOUSEHOLDS AFFECTED BY FLOODS

	Percentage
Number of households interviewed (total population size from households interviewed n=1149)	228
Percentage of women in household sample	51.7%
Percentage of men in household sample	48.3%
Percentage of disabled among households interviewed	18%
Percentage of female-headed households interviewed	26%

Source: PFERNA Team Assessment, 2013

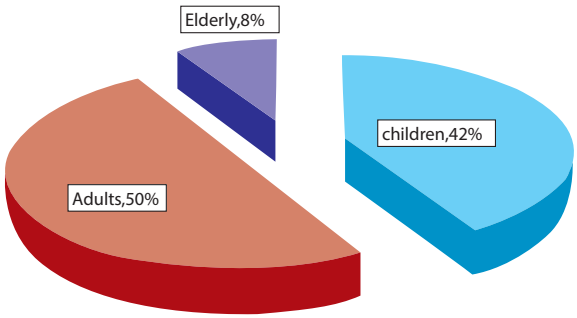
The average household size is 7.5 which is 52 percent higher than the national average size (NIS, 2013), with a significant number of children (42 percent) and adults (50 percent) of reproductive age. There were few households with elderly family members (8 percent) in the total household sample population.

FIGURE 20: AGE GROUPS DISTRIBUTION AMONG FAMILIES AFFECTED BY FLOODS



Source: PFERNA Team Assessment 2013

FIGURE 21: PERCENTAGES OF CHILDREN, ADULTS AND ELDERLY AMONG FAMILIES AFFECTED BY FLOODS



Source: PFERNA Team Assessment, 2013

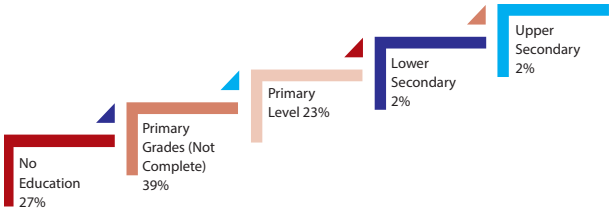
Education levels of those households interviewed were relatively low, with a significant 66 percent of household members' education levels below primary level.

TABLE 17: PERCENTAGES OF EDUCATIONAL LEVELS COMPLETE AMONG HOUSEHOLDS INTERVIEWED

Education Level	Percentage
No education	27.0%
Some primary education (Grade 1-5)	39.0%
Primary education (Grade 6)	23.0%
Lower secondary education (Grade 7-9)	9.0%
Higher secondary education (Grade 10-12)	2.0%
Total	100%

Source: PFERNA Team Assessment, 2013

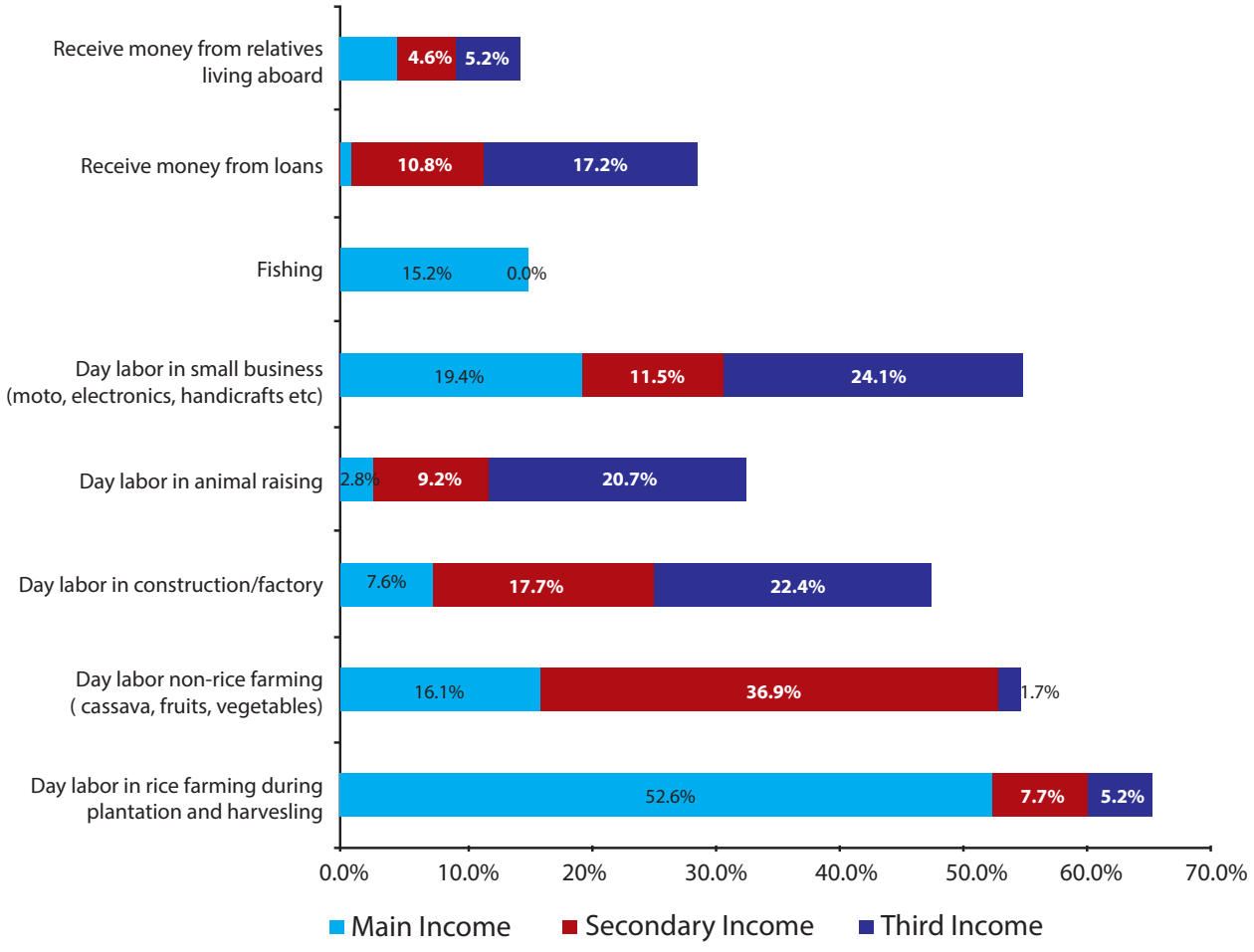
FIGURE 22: EDUCATIONAL LEVELS COMPLETE AMONG HOUSEHOLDS INTERVIEWED



Source: PFERNA Team Assessment, 2013

Before the flooding, the main economic household activities in affected areas included farming and various forms of day unskilled labour.

FIGURE 23: SOURCES OF PRIMARY, SECONDARY AND THIRD INCOME BY LIVELIHOOD

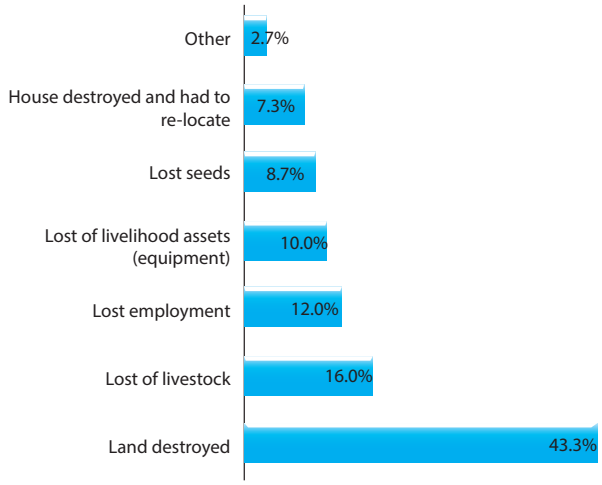


Source: PFERNA Team Assessment, 2013

The livelihoods of rural households in affected areas still rely mainly on agricultural farming and access to common property and public goods and services. Rural families have less access and lower savings to cope with unexpected shocks. The months of November and December are usually the period when rural households are busy with harvesting and selling labour for agricultural farming, and also the period when they can accumulate additional cash they can use as a safety net when there is a food shortage. The floods brought heavy additional stress to rural livelihoods by markedly affecting these job opportunities.

More than 85 percent of those interviewed stated that their livelihoods were affected by the flooding, and another 16 percent said they were forced to change their livelihoods due to the flooding. For the affected households who could not engage in the same livelihood activities after the floods, the main reasons cited included land lost, lost seeds, loss of livestock, loss of livelihood assets, and even death of a member of the household.

FIGURE 24: MAIN REASONS FAMILIES COULD NOT ENGAGE IN THEIR LIVELIHOODS AFTER THE FLOODS



Source: PFERNA Team Assessment, 2013

Some 72 percent of households said they lost livestock as a result of the flooding. The average monthly income levels dropped by more than 25 percent among households affected by floods, comparing monthly income before the floods and income after the floods.

Ruined farmlands and damaged infrastructures as a result of floods had both immediate and on-going consequences for millions of people who depend largely on seasonal yields and employment for their livelihood. The assessment shows that the disruption to the livelihoods represents the main challenges for flood victims. The affected livelihoods can be summarized as:

- Disruption to livelihoods/income generating activities and loss of or damage to assets (agricultural land, food stocks, livestock): damages and decreased productivity of rice/crops/fish ponds due to floods resulted in a disruption to daily wage labour opportunities and loss of income;
- Adoption of ineffective and costly coping strategies that end up in over-indebtedness and loss of assets: borrowing money at high rates of interest, selling land, removing children from school and migration, especially to Thailand.

In general, the incomes of at least 35 per cent of affected households experienced a significant decrease in the months following the disaster, as dwellers were occupied by the construction of temporary shelter and the restoration of community livelihoods. However, 60 per cent of the affected households managed to maintain their average monthly incomes with alternative livelihoods and other coping mechanisms.

The total income loss suffered by affected households adds up to US$ 37.6 million and is broke down as detailed in the table below.

TABLE 18: TOTAL DAMAGE AND LOSS SUFFERED BY HOUSEHOLDS

Item	Amount in million US$
Income Loss	31,2[10]
Assets Loss	6,4[11]
Total	37.6

Source: PFERNA Team Assessment, 2013

The informal economy is critical for the survival of many people and has become more vulnerable after the flooding. Informal off-farm activities such as transplanting, harvesting, weeding, planting, clearing bush or forest, unskilled work in the construction, services and manufacturing sectors in major cities, which secondarily support their living, were already affected by the flood of

10 *Total income lost 11,692 / 102 respondents = 115 US$ on average per respondent. Then times 115 * 377,354 *0.72= 31,244,911 US$.*

11 *(average income – average loss)* (total households affected * household reporting a loss in income)=(100-50)*(377,354*0.34)= US$ 6,415,018.00*

2011, and the 2009 economic downturn (caused by the global financial crisis) (WFP; UNICEF; ACTIONAIS; ADB; Danish Red Cross; Save the Children, 2012).

Damage caused by a natural disaster, such as flooding, can push non-poor households into poverty and push poor households further into the depths of the poverty cycle (WFP; UNICEF; ACTIONAIS; ADB; Danish Red Cross; Save the Children, 2012).Many of the households assessed experienced various forms of shock after the flooding.

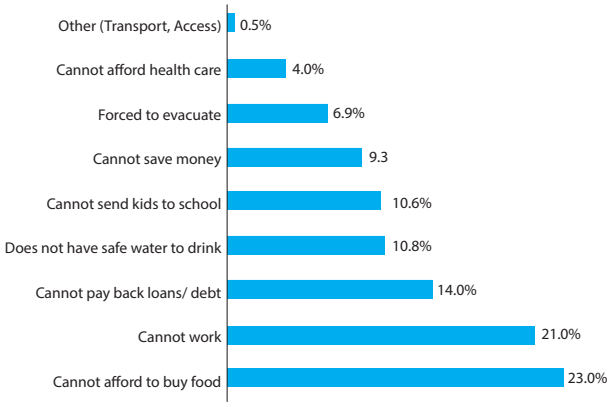
TABLE 19: SOCIAL IMPACTS OF FLOODS ON AFFECTED HOUSEHOLDS

Social Impacts of Floods	Responses	Percentage
Unemployment/ Loss of Income	128	18.1%
Crop Failure	130	18.4%
Household Debt	127	18.0%
Property Damage	79	11.2%
Death of Livestock	79	11.2%
Mental Illness (depression, anxiety)	45	6.4%
Physical Illness (respiratory, injury)	69	9.8%
Business Failure	36	5.1%
Death of Family or Community Member	7	1.0%
Other (Death, Robbery, Lack of food & Transport)	6	0.8%
Total	706	100.0%

Source: PFERNA Team Assessment, 2013

As a result of these shocks, many of the affected households could not work, afford to buy food, did not have safe water, and could not send their children to school. The chart below shows the consequences of such shocks to the households.

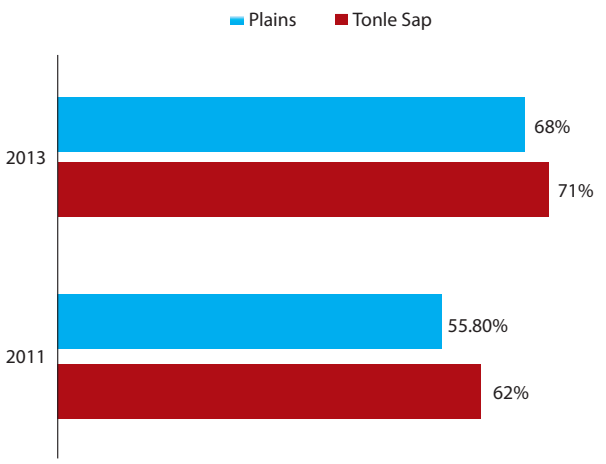
FIGURE 25: TYPES OF SHOCK AND CONSEQUENCES EXPERIENCED BY HOUSEHOLDS AFTER FLOOD



Source: PFERNA Team Assessment, 2013

In order to deal with the consequences of such shock, affected household used savings, sold assets, went further into debt and even took children out of school and migrated for work. Significantly, 71 percent of households interviewed took out a loan after the flood. A comparison with 2011 flood data shows that 7.5 percent more people decided to take a loan because of the floods in 2013 (WFP; UNICEF; ACTIONAIS; ADB; Danish Red Cross; Save the Children, 2012). The median of the loan size, US$ 275, is similar to the amount reported in 2011, whose median value was US$300 (WFP; UNICEF; ACTIONAIS; ADB; Danish Red Cross; Save the Children, 2012).In absolute terms and as it was observed in 2011, people residing in the Tonle Sap area would recur to loans to cope with the floods more often (+ 5 percent) that the people residing in Plains. In relative terms a comparison with 2011 data shows that 15 percent more people residing in the Tonle Sap area and 22 percent more people residing in Plains took a loan in 2013 (see figure below).

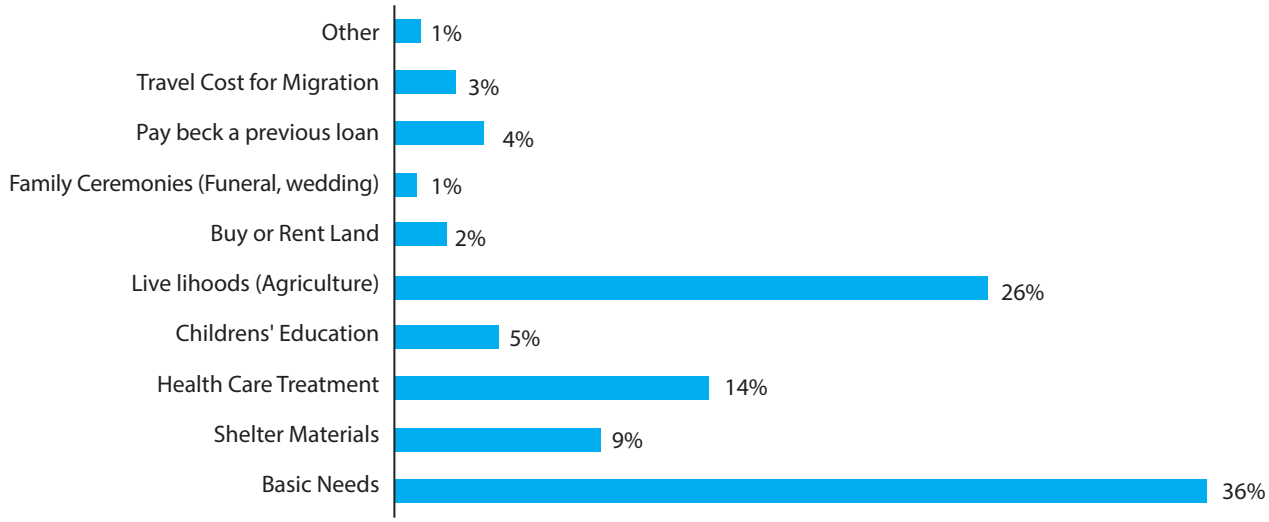
FIGURE 26: COMPARISON BETWEEN PEOPLE TAKING LOANS IN 2011 AND IN 2013 ACCORDING TO ECOLOGICAL AREAS.



Source: PFERNA Team Assessment, 2013

The main reason why household would recur to loans during or after the floods, was mainly to cover basic needs (35 percent) and to provide for livelihoods activities (26 percent), which is consistent with the finding reporting a 16 percent of people changing their livelihood strategy because of the floods (see figure below).

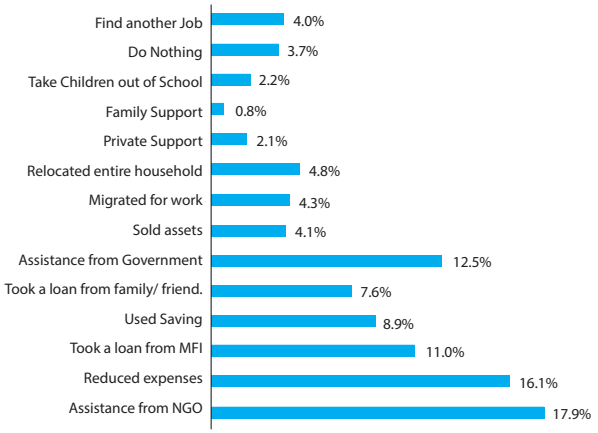
FIGURE 27: MAIN UTILIZATION OF LOANS TAKEN DURING THE FLOODS IN 2013



Source: PFERNA Team Assessment, 2013

The following chart details the main coping mechanisms used by households to deal with the shock of the flooding.

FIGURE 28: TYPES OF COPING MECHANISMS FAMILIES USED AFTER THE FLOOD



Source: PFERNA Team Assessment, 2013

Those interviewed stated the most effective coping mechanism was using savings and taking out a loan from a Micro-finance Institution (MFI). The second most effective coping mechanism was assistance from NGOs.

While there has been some initial emergency assistance, little has been done to provide support to restoration of livelihoods. The emergency assistance to date has focused on the provision of food and water, non-food items and shelter, along with some initial seed distribution.

As noted above, farmers and unskilled labourers who are mainly reliant on agriculture for food and income have experienced the most severe consequences. Particularly affected groups include children, people with disabilities, female-headed households and older persons. Many of the households assessed experienced shocks after the flood, including illness (both mental and physical), crop failure, food shortages and loss of income and livelihoods. Further, an increasing level of debt taken on as a coping mechanism after the flooding makes the vulnerability of flood-affected households even worse. Thus, affected communities are even more at risk of being pushed further in poverty.

5.4.2 Housing

The Housing sub-sector assessment was led by NCDM and UNDP co-led by UN – HABITAT and supported, in the field, by relevant Provincial Departments of various government line ministries. All the data analysed in the present assessment were collected during the main mission carried out from 15th to 21st December 2013. The methodology adopted for assessment of the housing sector was based on the information requirements of the assessment, availability of time, resources, geographical location of affected areas and extent of damage to housing stock from preliminary assessments. The tools used for the assessment were:

- **Key informant interviews:** Key informant interviews were administered at village/commune level to local officials to obtain data on the extent of damage by house type, size and location, the type and frequency of disasters affecting the area, land ownership and land use for housing, value of damage to the sector and replacement cost. The key informant interviews were administered in the locations indicated below. Semi-structured key informant interviews with officials from the Ministry of Planning (MoP), NCDM, PCDM in Battambang and Siem Reap, and the Provincial Department of Land Management in Siem Reap were effective in providing insights into the overall extent of damage, the policy and regulatory context regarding settlement planning, land use and housing.

TABLE 20: LIST OF AREAS VISITED TO ADMINISTER KEY INFORMANT INTERVIEWS

Province	District	Commune	Village
Battambang	Bavel	UmpelPreamdam	Dong KoKreuman
Battambang	Kamreang	TukReah	Kampong Chamlongleur
Battambang	Banan	Ta Kream	Tagnen
Siem Reap	Puok	Keo Por	Svay chek
Siem Reap	Chekrieng	Sangvoey	Prey Proo
Siem Reap	Puok	Prey Choruk	

Source: PFERNA Team Assessment, 2013

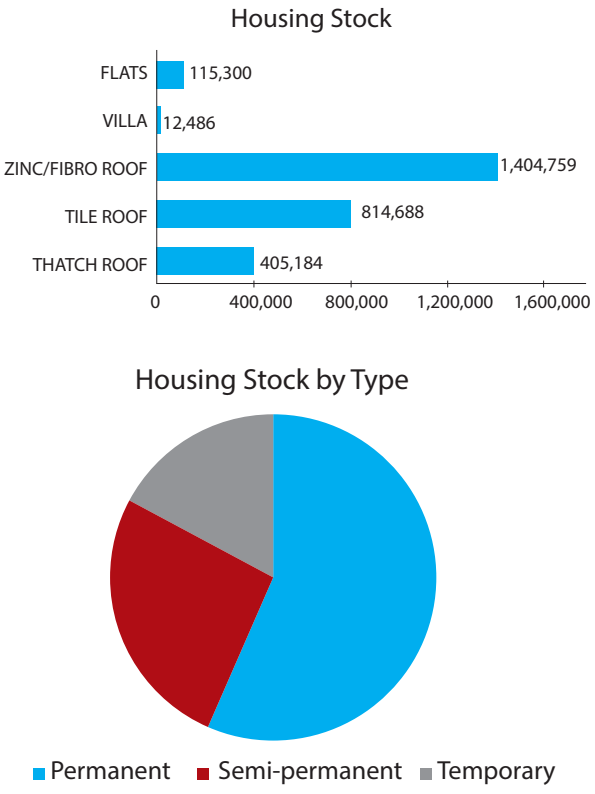
- Household survey: A household survey was administered to respondents from flood-affected households by the livelihoods and demographic sub-sectors, and included questions on shelter and housing. This was administered to 228 households from selected communes in five provinces.
- Field visits: Field visits to affected sites and damaged and destroyed houses provided first-hand experience of ground conditions. The team was accompanied by the relevant village/ commune chief who provided an explanation of the context. This was effective in providing an understanding of the land use/ settlement pattern of the affected area, technical details of construction of damaged and destroyed houses, and their vulnerability to disasters. Field visits were made to all locations where the key informant interviews were administered.

The provinces of Battambang, Siem Reap, Kampong Cham, Prey Veng and Banteay Meanchey were selected based on the severity of damage to houses, given in the initial numbers provided by NCDM and HRF assessment reports. Household interviews were carried out in all locations, while key informant interviews were carried out only in Battambang and Siem Reap provinces, due to human resource restrictions. Another basis for the selection of these locations was their representation of the different causes of damage, namely flash floods, and the Mekong flood and dam breach. Districts and communes in each province were targeted for assessments based on the above criteria.

The total housing stock of Cambodia as at the end of 2012 amounted to 2,752,417 (MoP, 2011). This housing stock categorized by roof type includes 405,184 units with thatched roofs, 814,688 with tiled roofs, 1,404,759 units with zinc or fibro roofs, 12,486 villa type houses and 115,300 flats.

The 2008 census gives the breakdown of housing stock as 57 percent permanent residential and semi-residential buildings, 25 percent semi-permanent and 18.5 percent as temporary structures (NIS, 2009).

FIGURE 29: HOUSING STOCK FEATURES



Source: PFERNA Team Assessment, 2013

The 2012 CDB (MoP, 2012) provides an inventory of houses possessing a television set while only 43 percent of all households have access to grid-connected electricity. Electricity from batteries and solar panels are the other options for generating electricity, while bio-gas provides lighting for some households. Details of other household assets and amenities have not been accounted for under household goods, as they may be accounted for under other sectors of the report. Discussions with village chiefs indicated that on average each household possessed goods to the value of US$500. It was also observed that access to water and sanitation facilities in rural areas was poor.

Traditional construction consisted of timber or bamboo piles embedded in the soil, which support timber floors and a hipped or gabled roof. Roofing was done in thatch or tile, depending on the wealth and resources of the household, while walls were of timber panelling, straw, bamboo or leaf panels with timber or bamboo frames.

Concrete and metal sheeting were relatively recent introductions for house construction. Burnt clay brick and cob are used less frequently as materials for walls. Zinc and fibro sheets are used for roofing and wall cladding, while pre-cast or in-situ concrete elements are used as foundations piles. The use of brick columns for foundations is not common. Urban areas have a combination of traditional stilt houses, villa type houses and, of late, apartments and housing estates built of brick and concrete. A house is a communal effort in many of the rural areas of Cambodia, where friends, neighbours and families contribute labour and material for construction. If the house is wholly built of temporary materials, friends and family construct the structure using locally sourced/ harvested materials. If the house is built of permanent materials, skilled construction tradesmen such as masons and carpenters are employed.

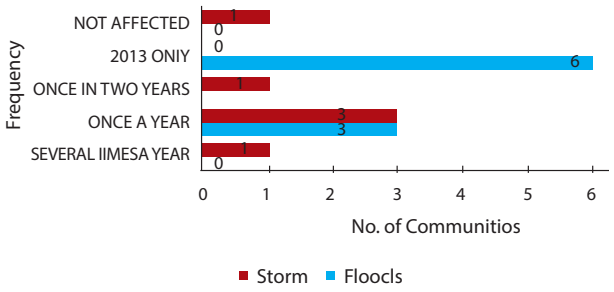
The piles of timber, bamboo or concrete are constructed first followed by the superstructure and roof. The roof is completed before the external walls and partitions are put in place. Wall cladding may be initially made of organic material such as bamboo and is often upgraded to more permanent materials as more resources become available to the family.

Households in rural Cambodia prefer to construct superstructures that are movable due to the fact that they may want to shift the house later to a different location or give part of the materials to their children to construct a house. This often results in the superstructure being detached from the foundations, especially in houses with concrete foundation columns.

Some 48.65 percent of the affected houses assessed were located below the dam in Ta Kream Commune, Banan, Battambang Province, 33.78 percent were located in a wetland river bank of the TonleSap, only 2.70 percent were located in rice paddies, and14.87 percent were located in a highland which had not experienced flooding prior to 2013. This indicates that the majority of the houses affected were located in high-risk areas, such as below dam sites and river banks.

The assessment revealed that all locations assessed except for one were vulnerable to multiplehazards of floods and storms. It also indicated that the number of communities affected by flooding increased in 2013. Three communities that had never experienced flooding before were affected by flooding in 2013. This included a highland community with cash crop cultivation of cassava and fruit and the dam breach site in Ta Kream Commune.

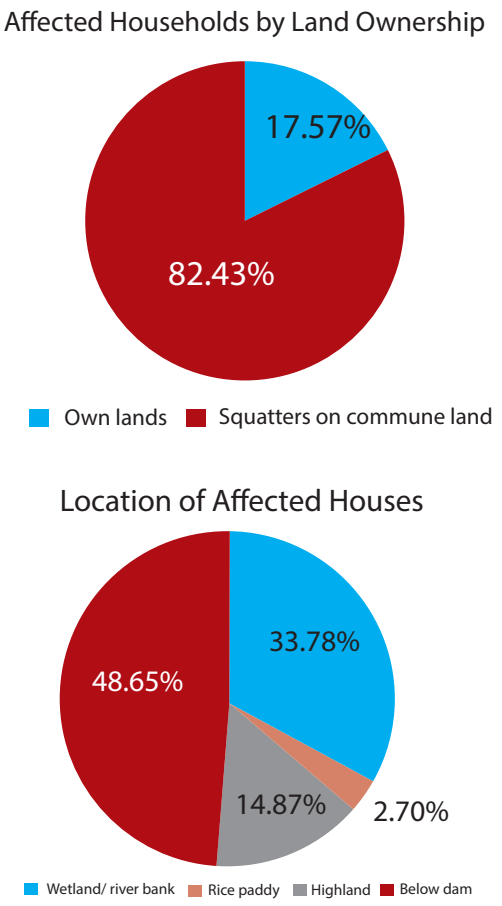
FIGURE 30: FREQUENCY OF DISASTERS AFFECTING COMMUNITIES



Source: PFERNA Team Assessment, 2013

Of the affected households, 82.43 percent were illegally residing on commune land living in these locations due to livelihood opportunities, while 17.57 percent were living on own lands. Further discussions with local officials indicated that only a few of these illegal tenants owned any land elsewhere.

FIGURE 31: AFFECTED HOUSES BY LAND OWNERSHIP



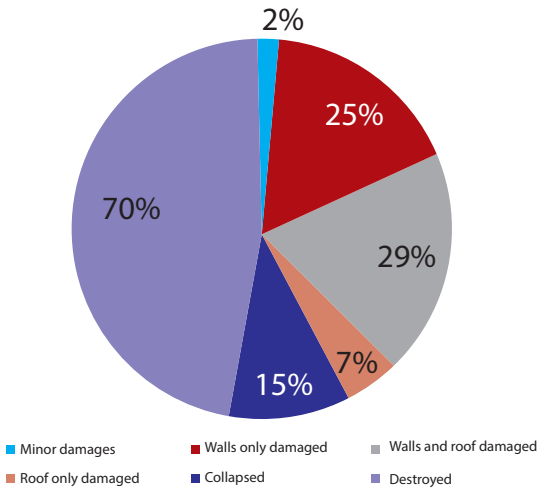
Source: PFERNA Team Assessment, 2013

The household survey revealed that 72.4 percent of the respondents were aware that they were living in flood risk areas. The main reasons for not moving to a safer area were given as owning land, not having money to move, livelihood opportunities and living in ancestral property.

Land-use planning and regulation of construction is important to reduce risk and damage to lives and property, considering the disaster risk to which many of the provinces are exposed. It was noted during interviews with officials of MoP that little or no restrictions exist on land use except in conservation or protected areas. Legislation pertaining to building regulations has not been brought into effect, thus there is no enforcement of building regulations. This has resulted in settlements being established in areas highly prone to disaster by poverty stricken vulnerable groups who do not own land elsewhere, or where livelihood opportunities are plentiful.

The initial data from the HRF assessment and NCDM give the number of damaged or destroyed houses as 287. The information gathered from the key informant interviews provides data from six villages or communes with a total of 148 damaged or destroyed houses. Of the damaged houses, 44.87 percent were of permanent construction, while 26.92 percent were constructed totally from organic materials, while 28.21 percent of the damaged houses consisted of timber or bamboo foundations, walls of organic materials and zinc roofs. This was an indicator that houses constructed out of permanent materials were not necessarily more resistant to flooding. It was also observed on field visits that many houses constructed out of traditional materials were more resistant to flood damage than those constructed out of permanent material when exposed to the same conditions.

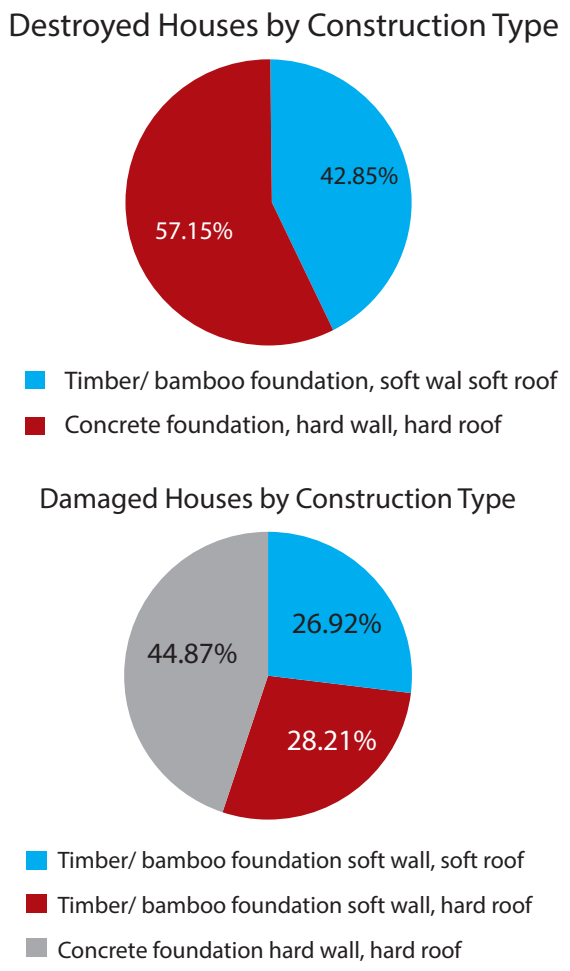
FIGURE 32: DEGREE OF DAMAGE CAUSED TO HOUSES



Source: PFERNA Team Assessment, 2013

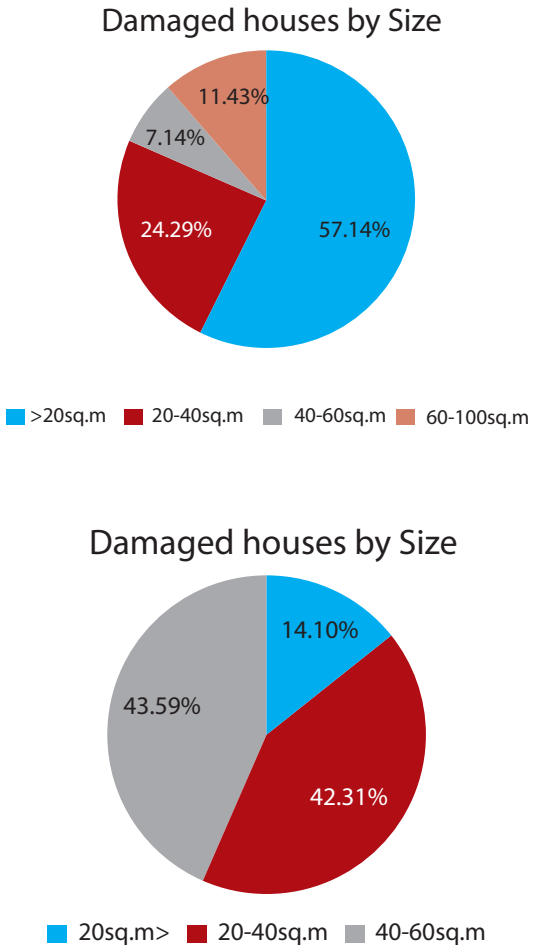
Poor anchoring of the superstructure to concrete foundation columns (stilts/piles) was the main reason for collapse and destruction of the houses that were constructed with permanent materials, when exposed to rapid onset flooding caused by the dam breach, as well as slow onset flooding caused by flash floods. Poor construction of houses with temporary materials did not have the capacity to resist flooding and were easily damaged or destroyed.

FIGURE 33: DESTROYED HOUSES AND CONSTRUCTION MATERIALS



Source: PFERNA Team Assessment, 2013

FIGURE 34: SIZE OF DESTROYED HOUSES



Source: PFERNA Team Assessment, 2013

Although 57 percent of the destroyed houses were less than 20 square metres in size, many of these houses were not accounted for in the initial numbers, as per observations of provincial data for the flood. It was observed during the assessments that around 50 affected houses of less than 20 square metres in Siem Reap and 14 houses of the same size in Battambang had been unaccounted for in the initial figures. Therefore it was estimated that the possible number of affected houses was around 400, which would form the upper ceiling for damage and loss calculations. Some 11.43 percent of the destroyed houses were between 60 and 100 square metres, indicating that larger houses were also vulnerable to destruction by floods. Some 43.59 percent of the damaged houses were between 40 and 60 square metres in size, while 42.31 percent were between 20 and 40 square metres. The rest of the damaged houses were less than 20 square metres.

A lower limit of damage and loss was calculated using 287 houses as damaged and destroyed, given as the official figure from initial needs assessments, while an upper figure of 400 houses damaged and destroyed was used based on field observations of damage, indicated to be around 40 percent higher than in the worst affected provinces.

Calculation of Damages

The following factors were built into the calculation of damages:

- The degree of damage to houses;
- Size of the damaged and destroyed houses;
- Construction materials of damaged and destroyed houses;
- Construction costs at current prices provided by local officials and communities;

- The average value of household assets owned by a family;
- The percentage of families who lost household assets.

The percentages and values of the above factors obtained from the sample survey were extrapolated into the total numbers to arrive at the value of damages and losses.

TABLE 21: DAMAGES AND LOSSES

Degree of damage	Official figures (287)	Cost of damage US$ (Lower limit)	Upper estimate (400)	Cost of damage US$ (Upper estimate)
Destroyed 20msq.m>	78	116351	108	162162
Destroyed 20-40sq.m	33	98899	46	137838
Destroyed 40-60sq.m	10	48480	14	67568
Destroyed 60-100sq.m	16	100838	22	140541
Collapsed	29	29088	41	40541
Minor	4	194	5	270
Walls	48	14544	68	20270
Walls and roof	56	33742	78	47027
Roof	14	4072	19	5676
Total Damaged or destroyed	287		400	
Loss of household assets	194	96959	270	135135
Total Value US$		543167		757027

Source: PFERNA Team Assessment, 2013

The lowest estimation of damage was US$550,000, while the upper estimate was US$750,000. **The average value of the lower and upper estimates of damage was taken as the final estimation of damage at US$0.65 million.**

Calculation of Loss

- Reconstruction cost and loss of income for repair and reconstruction;
- The cost of replacing lost household goods was not included.

The lower estimate for losses using official figures was US$450,000, while the upper estimate was US$650,000. The average of the upper and lower estimates for loss was taken as the final estimate of losses in the housing sector at US$0.55 million.

The total damage and loss to housing and household assets due to the 2013 flooding is estimated to be between US$1 million to US$1.4 million. The final estimate of damage and loss was estimated to be US$1.2 million.

At the time of the assessment, 37 families were still living with host families in Ta Kream Commune, while around 40 families had constructed temporary makeshift shelters in Keo Por Commune. A house is the foundation of a family's life in non-nomadic communities. The destruction of the house and resultant displacement disrupts the family's life in many aspects. Livelihoods, which are often centred around the house, are severely affected by displacement, asis the education of children. In addition, families face psychological trauma due to loss of housing and displacement, and health risks increase. Women face protection issues as the threat of sexual abuse and harassment increases without the safety of their homes. Overcrowding in houses of host families and economic difficulties of supporting displaced households are issues faced by host families.

Discussions with village officials in Battambang Province revealed that households were resorting to loans to repair or reconstruct houses and migrating to Thailand for employment, while in Siem Reap they were resorting to loans.

Few considerations emerge from the fieldwork carried out in December 2013:

- The lack of a systematic post-disaster bottom-up data collection system may have a negative impact on the results of the assessment, as the information available is not sufficiently detailed. For example, the number of houses damaged is given as a whole, and includes different degrees of damaged houses and those destroyed.
- The tools used for the assessment had varying degrees of effect. The household survey was time consuming to administer and enter data. The quality of data and usefulness for overall calculation of damage and loss was less than that obtained in key informant surveys at local level. Selection of a statistically significant sample of damaged and destroyed houses and administering a questionnaire specially developed for the purpose may have had more positive results. The key informant surveys were less time consuming and village officials had useful data. The only disadvantage of using key informant interviews may have been biases and deliberate manipulation

of information by the respondents.

- The low lying nature of the area assessed, being situated in the vast Mekong River basin and the catchment of the Tonle Sap area, coupled with clay soil with poor percolation rates, resulted in many of the provinces being prone to floods throughout history. This has led to most communities traditionally adopting stilt housing systems raised above the flood levels, using locally sourced materials and skills.

5.4.3 Education

The post-flood assessment for the Education Sector was carried out in during two different missions in December 2013. The first mission was undertaken by MoYES while the second was led by NCDM and UNDP with the support of the Ministry of Education, Youth and Sport (MoEYS).

The four main objectives of both education assessments were to:

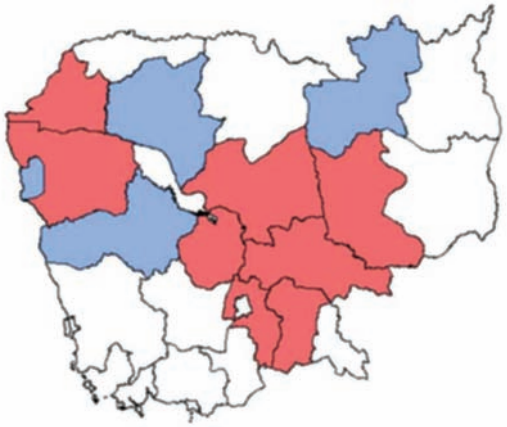
- Estimate the overall losses and damages of school infrastructure, including buildings, furniture, WATSAN facilities and teaching and learning materials that need to be rehabilitated;
- Outline the basic recovery and reconstruction needs of the affected schools based on identified needs from individual schools by designing an Early Recovery Framework report;
- Incorporate Build Back Better (BBB) principles and disaster risk management activities into the proposed early recovery and reconstruction efforts;
- Enhance the capacity of the MoEYS technical team and stakeholders to carry out similar assessment in the future and to develop the Early Recovery Framework aligned with the internationally consolidated methodologies.

The first field work mission was carried out by MoYES[12], from 4 to 10 December 2013, in 128 of the most severely affected schools in the eight worst-affected provinces: Battambang, Banteay Meanchey, Kandal, Kampong Thom, Kampong Chhnang, Prey Veng, Kampong Cham and Kratie. The first assessment aimed to gauge:

1) Estimated losses and damage of school buildings, infrastructure and furniture, and WATSAN facilities;
2) Loss of teaching and learning hours;
3) Loss of teaching and learning materials (textbooks);
4) Demographic change of students and teachers (e.g. drop-out, migration, absenteeism);
5) Preparedness capacity of school teachers.

As the sample size of only 10 percent of the total 1,280 affected schools represented the most severely affected schools, the results from the first assessment did not provide an accurate representation of all affected schools across the country.

FIGURE 35: MOEYS ASSESSMENT OF SCHOOLS AFFECTED BY 2013 FLOODS



- ***First assessment1:*** *MoEYS selected the 128 most severely affected schools (10%)*
- ***Second assessment2:*** *MoEYS selected 124 schools to represent all schools less severely affected and slightly affected by the 2013 floods*

Source: PFERNA Team and MoEYS Assessment, 2013

For this reason and with the leading support of UNDP and NCDM a second round of assessments was conducted from 19 to 28 December 2013. For this second assessment the team randomly selected 124 schools from among the 1,152 remaining from the initial assessment which were considered not as severely affected or partially damaged by the floods. The aim was to complement and integrate the first rapid assessment (done in eight provinces: Banteay Meanchey, Batambang, Prey Veng, Kampong Chhnang, Kratie, Kampong Cham, Kampong Thom and Kandal) and cover a sample that could be more representative of different levels of affect with a second assessment (carried out in four provinces: Stung Treng, representing the upper Mekong stream, Siem Reap, located next to the Tonle Sap lake, Pursat and Palin as mountainous areas located next to the Tonle Sap lake in the first case and near the Battambang big dam of

12 *First assessment Funded by Finn Church Aid*

Kompingpui in the second case). The sampling of 124 schools was divided into three categories: urban, rural and remote areas. The assessment focused on damage and loss, for example, school infrastructure (furniture and WATSAN facilities). It was calculated at current market price. To carry it out, MoEYS deployed 16 technical team members from the Department of Curriculum, the Department of Primary Education, the Department of Planning and the Department of Construction.

The fieldwork highlighted the poor condition of many of the schools buildings in the area. The damage done by the storm itself was limited. The concrete buildings stood up well to the high winds, and short-term flooding did little damage. However, the older buildings, particularly timber buildings with decaying roofs or buildings with broken floors proved to be an issue. These buildings were not only more vulnerable to wind and floods, but were already in dangerous states of disrepair before the storm.

Twenty out of the 24 provinces and municipalities of Cambodia reported some disruption of services to schools as a result of the floods. The heavy rain caused flash floods in the more remote northeast provinces, and the Mekong River rose at a rate of half to one metre per day, while rapid flash floods in northwest provinces rose up one metre per hour, leaving little chance to evacuate school books and furniture from schools constructed along the river valleys. Simultaneously, high winds damaged roof tiles in several schools, as the tiles were not normally constructed with resistance to strong winds and were held in place only by their own weight. In other cases, the floods were longer lasting, disrupting access to schools which resulted in schools being closed[13].

While the impact of the floods was felt throughout 20 provinces in Cambodia, a comparison of the total number of affected schools shows that some north-west provinces, such as Banteay Meanchey and Battambang, were the worst hit by the flash floods (from 10 percent to 42 percent of the total number of schools). Several provinces located along the Mekong River, such as Kratie, Kampong Cham and Prey Veng, were also severely affected by the Mekong flood.

Damage and Loss Evaluation

A total of 1,280 schools were reported by 18 provincial education offices to have been affected, as shown in the table below.

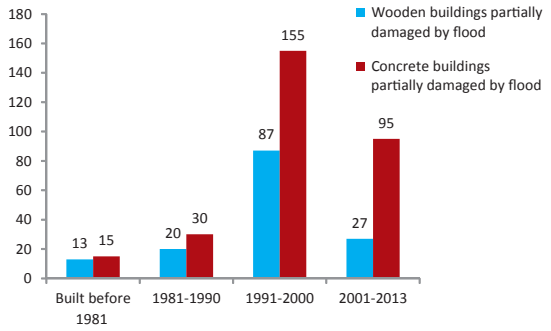
13 *Official opening of new academic year is 1October.*

TABLE 22: LIST OF AFFECTED SCHOOLS[14]

No.	Affected Provinces	Total number of schools	# schools affected	% affected	# schools surveyed found damaged over $10k/ school	# schools surveyed found damaged below $10k/ school
1	Banteay Meanchey	589	249	42%	19	6
2	Batambang	775	77	10%	20	5
3	Prey Veng	727	155	21%	10	0
4	Kampong Chhnang	366	40	11%	8	0
5	Kratie	318	88	28%	8	2
6	Kampong Cham	1,060	268	25%	18	6
7	Kampong Thom	599	121	20%	13	2
8	Kandal	702	126	18%	0	11
9	Pursat	362	57	16%	7	40
10	Siem Reap	590	39	7%		34
11	Stung Treng	157	31	20%	17	9
12	Pailin	64	17	27%	8	9
13	Preah Vihea	215	9	4%		
14	Takeo	637	3	0%		
15	Otdar Meanchey	189	0	0%		
16	Phnom Penh	232	0	0%		
17	Ratanakiri	178	0	0%		
18	Svay Rieng	388	0	0%		
Total		8,148	1,280	16%	128	124

Source: PFERNA Team Assessment

FIGURE 36: NUMBER OF AFFECTED SCHOOL BUILDINGS AND YEARS OF CONSTRUCTION



Source: PFERNA Team Assessment, 2013

14 *The estimation was just for damages and losses of the 252 surveyed schools. It excluded all remaining schools where the assessment team did not visit.*

During flood children attend Temporary Learning Spaces in Pursat province – (Photo: Save the Children)

At least 442 school buildings were affected by floods: 247 wooden buildings and 195 concrete buildings. Many school buildings that were built between 1991 and 2000 showed a high level of dilapidation (87 wooden and 155 concrete). MoEYS recognized that the maintenance of school buildings in Cambodia was a major problem that needed to be addressed. The technical expert from the Department of Construction of MoEYS said the school buildings should be repaired or maintained five to seven years after they were built. Old school buildings become unsafe for students if strong winds hit the building. Possible improvements in building design (a construction code for safe school building was launched in 2010)[15] to withstand strong winds and floods were noted and endorsed as a guideline for applying for safe school construction. In general, the current recommended designs of MoEYS proved suitable for the extreme winds and unusual flooding. The survey shows that 30 percent of the total affected 1,280 schools were severely affected by floods, and 100 percent of those affected were poor quality structures that need to be replaced or repaired to make them safe for children and suitable for use. The assessment on the impact of the floods on education was conducted in 12 provinces. The number of affected schools per province ranged from 10 percent to 42 percent in the most affected provinces of Battambang, Banteay Meanchey, Kampong Thom, Kampong Chhnang, Kampong Cham, Kratie, Prey Veng and Kandal. Pailin, Pursat, Siem Reap and Stung Treng were considered less severely affected by the floods. MoEYS reported that hundreds of schools located in the lower lands of Battambang and Banteay Meanchey were impacted by the floods in 2013, and in previous years. It found 155 schools were closed for one to nine weeks at the beginning of the school year 2013-2014. Only 15 percent retained daily learning and teaching activities by establishing Temporary Learning Spaces, applying a flexible learning schedule or compensating teaching hours on Thursdays or weekends to provide continuity of learning for children.

Based on the survey conducted among those severely affected schools, despite the number of enrolments increasing in the academic year 2013-2014, (5,224 higher than the academic year 2012-2013), 2,182 children dropped out of school (did not return to school after flood).[16] Children dropped out because their families were affected by the flood, their school materials were lost and their parents did not have money to replace them. Some affected families migrated, forcing their children to drop out of school. In the 155 most severely affected schools, where the new academic year 2013-2014 was delayed on average from two to four weeks, at least 100,000 teaching hours were lost, meaning that each individual teacher lost approximately 100 teaching hours due to the floods disrupting the schools' function. In terms of indirect loss, it is estimated that US$69,750[17] in teacher salaries was lost when affected teachers delayed their teaching for approximately three weeks. The teachers themselves were also affected by the floods, as they needed to take care of their families, evacuate to safe places and maintain household livelihood during the floods. The floods forced at least 31,000[18] children to delay their schooling for one to nine weeks. The average loss of student learning hours was approximately: 1 student x 19 hours/week x 3 weeks = 57 hours => 57 hours x 50,000 children = 2,850,000 hours.

Many of the school buildings were constructed without disaster proofing or raised plinth, using local materials and craftsmen. Many wooden school buildings which were partially affected by the flood were expected to have structural damage and/or collapse, creating a high risk to children. There were no significant, organized maintenance mechanisms on school infrastructure due to lack of financial resources and management, and it was often up to the communities to keep the buildings usable.

MoEYS estimated that at least 50,000 children re-enrolled behind schedule because their schools were flooded and community roads and bridges were damaged, preventing access to schools, even after the floods had subsided.

15 *Supported by ADB.*

16 *Source: Report of the consultation workshop with MoEYS on 27 December 2013 at Imperial Garden.*

17 *Estimated: 155 most affected schools x 6 teachers/school x 3 weeks x US$ 25 government salary per week = US$ 69,750.*

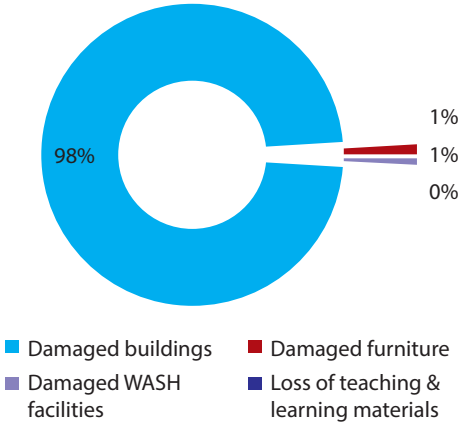
18 *Estimated in the consultation workshop, 290 children per school x 155 most affected schools.*

An unsafe structure which needs replacement. (Photo: PFERNA Team)

Engineers reported on the current condition of buildings and the estimated cost of bringing them up to an acceptable standard for teaching, rather than strictly to repair the flood or wind damage. It is more cost-effective to replace timber buildings with infestations of woodworm or termites than to repair them, because of the difficulty in obtaining high quality timber. There was a recommendation for thatch and bamboo buildings, used as temporary classrooms, to be replaced with modern concrete structures that provide a better teaching environment and ensure increased protection from future natural disasters.

MoEYS engineers inspected a 20 percent sample of schools in the 12 most-affected provinces of Banteay Meanchey, Batambang, Prey Veng, Kampong Chhnang, Kratie, Kampong Cham, Kampong Thom, Kandal, Pursat, Siem Reap, Stung Treng and Pailin to verify reports from Provincial Education Offices.

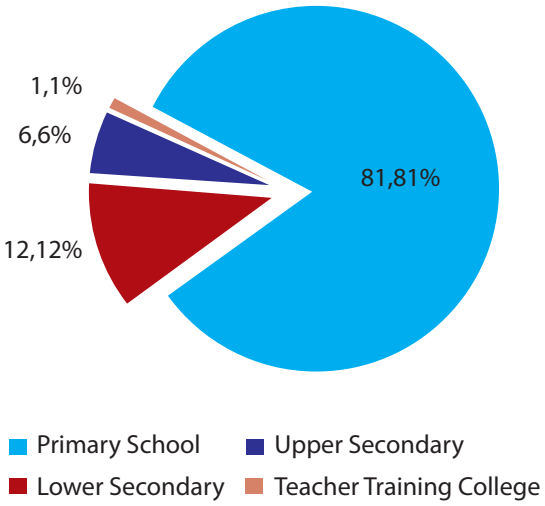
FIGURE 37: PERCENTAGE OF FLOOD-AFFECTED SCHOOLS WITH DAMAGE TO FACILITIES



Source: PFERNA Team Assessment, 2013

Buildings needing repair or replacement were mostly primary schools (98 percent). The floods caused only partial damage to school buildings, but high winds caused severe damage, which communities could not repair themselves. Flooding collapsed some un-reinforced floors and foundations that need resurfacing or replacement.

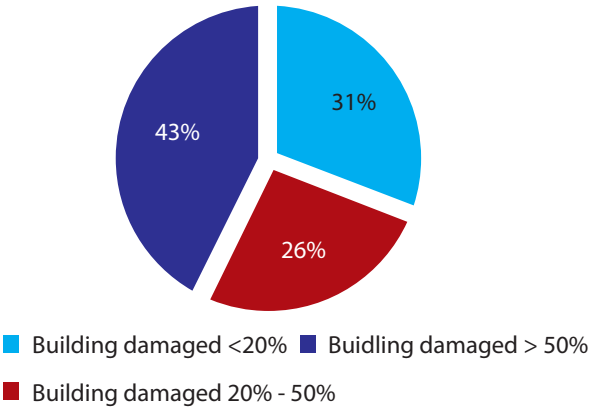
FIGURE 38: PERCENTAGE OF BUILDING TYPES DAMAGED



Source: PFERNA Team Assessment, 2013

Some 82 percent of the total affected schools are primary schools, and 30 percent of the buildings need repair or replacement.

FIGURE 39: MAGNITUDE OF DAMAGE TO SCHOOL BUILDINGS(%)

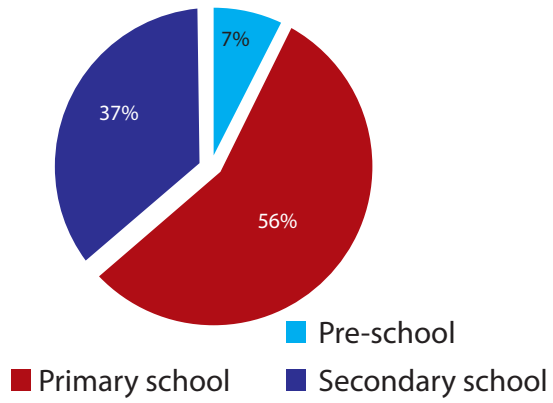


Source: PFERNA Team Assessment, 2013

The degree of damage to 895 schools was less than 50 percent, indicating less need for repair, while 385 schools sustained greater than 50 percent damage and require replacement or reconstruction, including furniture and WATSAN facilities.

Traditional wooden school furniture is made from nailed timber, and while the quality and workmanship is not high, local hardwoods are resistant to water damage and will not be extensively damaged by short periods of flooding. From a sample of 252 schools surveyed, 183 buildings (605 rooms) were found with 30 percent of furniture damaged and 70 percent of WATSAN facilities damaged. The replacement cost for wooden furniture is expected tobe US$116,513 (US$430 per room, or US$2,150 per building with five rooms). Based on recommendations from school teachers and children, all replacement buildings should be equipped with new furniture.

FIGURE 40: LOSS OF TEACHING AND LEARNING MATERIALS (SCHOOL BOOKS, TEACHERS' BOOKS, PAPER AND TEACHING AIDS)

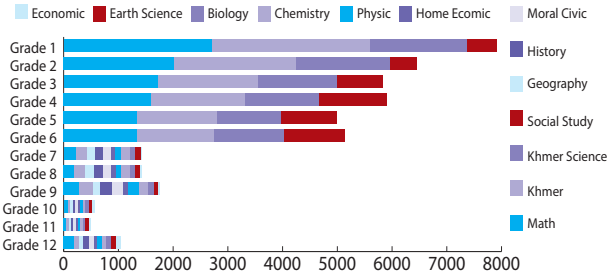


Source: PFERNA Team Assessment, 2013

The MoEYS estimated some 49,317 school textbooks, teachers books including other reading and drawing materials at pre-schools were lost in which 56% are primary schools.

The survey done in 12 most affected provinces found approximately 49,317 school text books were lost during flooding, in which most are primary education text books of Khmer and Mathematic subjects. The MoEYS estimated loss of at least USD 49,317 in total (at the estimated cost of 1 US$ per book).

FIGURE 41: NUMBER OF TEXT BOOKS AND READING BOOKS LOST BY SUBJECT AND GRADE



Source: PFERNA Team Assessment, 2013

Most of those lost were primary text books on Khmer and mathematic subjects. MoEYS estimated losses as detailed below (estimate: one book costs US$1).

TABLE 24: SUMMARY OF DAMAGES AND LOSSES BY CATEGORY

Main category of Damages and Losses	Disaster Affects, US$		
	Damages	Losses	Total
School infrastructure School building Windows and doors WATSAN facilities including wells, toilets, hand-washing facilities	14,521,611		14,521,611
School furniture Blackboards, desk and chairs	1,125,912		1,125,912
Teaching and learning materials Student textbooks Teaching aids Teaching hours	0	119,067	119,067
Total	15,647,523	119,067	15,766,590

Source: PFERNA Team Assessment, 2013

Capacity Assessment and Disaster Response

The MoEYS response to the disaster was centrally managed, with the provincial education offices taking the lead role in compiling lists of schools affected by the floods and forwarding them to the Department of Construction for compilation. The provincial education offices relied on district education offices and did not always verify reports. The field visits were conducted to selected schools by the Department of Construction and the situation on the ground was often different from the reports.

MoEYS has Education Management Information System (EMIS) databases of schools, buildings, classes and enrolment statistics for all schools in Cambodia. It is nearly 100 percent accurate when verified in the field. The quality of the infrastructure is reported to some extent in the EMIS data, however inventories of assets have only started in a few pilot areas and have not been completed by most provinces. All basic information and school locations have been uploaded onto the Google map system, but are yet to be shared. The poor quality and lack of maintenance of these assets has been highlighted by the surveys of flood-affected schools, and the baseline information on the quality of the infrastructure is largely incomplete.

The capacity of MoEYS to respond to disasters depends on the leadership of the ministry in mobilizing resources on a case-by-case basis. The capacity to respond to small-scale disasters within MoEYS is high, with a strong technical team that is experienced in construction and rehabilitation projects. It is strongest at the project level (i.e. World Bank-financed Cambodia Education Sector Support Project, CESSP, or the ADB-financed Second Education Sector Development Programme, ESDPII), where established projects with self-contained administration and management could be in a position to help in response to disasters.

The issue with a larger, medium-term response is a matter of scale. The surveys have shown that the state of many school buildings is such that they cannot be considered safe in high winds, or even suitable learning environments. The resources necessary to upgrade or replace damaged buildings, while at the same time supporting existing MoEYS programmes, would severely stretch the available capacity. However, MoEYS has submitted its proposal to ADB for reconstructions and repair of school buildings.

- Few considerations emerge after conducting the assessment that might benefit any future effort to evaluate damage and loss:
- Questionnaires should be prepared and shared with all relevant department ministries and provincial departments;
- Consolidated and internationally agreed methodology shall be reviewed and explained, including how to do sampling. The sample size should be above 10 percent to more accurately represent the figures of the whole country;
- Realize human resources and technical persons from relevant government ministries/departments.

5.4.4 Health

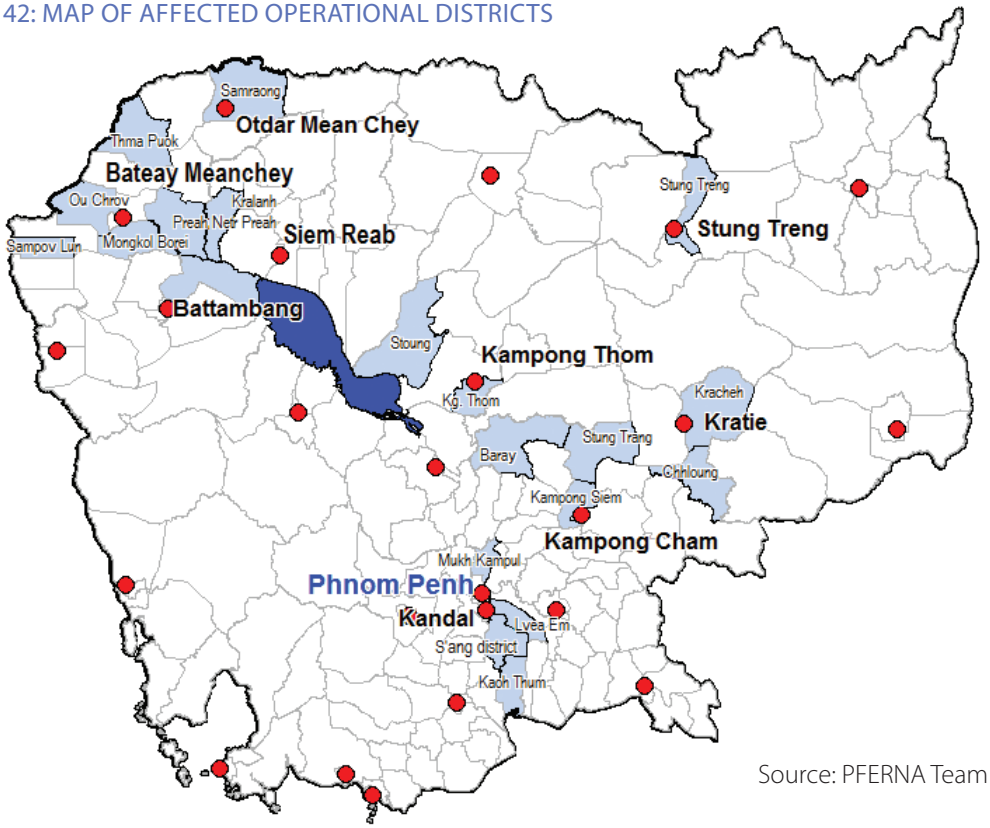
Following the 2013 flash floods and Mekong floods, a variety of levels of damage and loss were reported, despite having insignificant impacts on most of the health centres in the country. After the flood, those severely affected Health Centres (HCs) and referral hospitals (RHs) were preliminarily assessed by the MoH team. A further assessment led by NCDM and UNDP with the support of MoH was conducted in January 2014.In consultation with technical experts of MoH, the DaLA method was used as rapid assessment to estimate the damage and loss in relation to health infrastructure, equipment, medical supplies, facilities and estimated loss of health centre income when health services were disrupted by floods. The calculation of DaLA was based on both the secondary data collected from MoH and verification with ground work done by PHD, OD, health centre personnel and community members. All severely affected health centres/RHs were assessed and 10 percent were selected to validate the figures given by MoH.

Based on the Health Information System (HIF), the Cambodian health system comprises 1,050 health centres, 79 operational districts (ODs), 83 referral hospitals, 24 provincial hospitals, eight national hospitals, two NGO-supported hospitals. Each health centre covers a population of about 10,000 people (MoH, 2013b). Each OD covers a population of between 100,000 and 200,000 people and comprises 10 to 20 health centres and one referral hospital. The development of the Cambodian health system is guided by the Health Strategic Plan 2008–2015 (HSP2) (MoH, 2008), which addresses the policy direction of the health needs and health improvement of the population. Quality of health services greatly contributes to the long-term process of poverty reduction, enhancement of the economy and social development. A natural disaster of significant magnitude could impede or divert the delivery of such strategic health services. MoH, which is a member of NCDM, established the Health Disaster Management Committee (HDMC) at national and sub-national levels. The development of the Emergency Preparedness and Response Plan (EPRP) for the health sector is in progress; Provincial Health Departments (PHDs) and ODs in most floods-prone areas are aware of their roles and responsibilities in preparedness and response. Medical supplies including Chloramine/Aquatabs, Abate and serum/vaccines are stocked at RHs/ODs and are ready to be mobilized when floods hit.

MoH reported at least two RHs and 48 Health Centres (HCs)in nine provinces, Kampong Cham, Kandal, Battambang, Banteay Meanchey, Siem Reap, Oddar Meanchey, Kampong Thom, Kratie and Stung Treng, were directly affected, and some 50 buildings of HCs/ RHs were partially affected. These would need some small reparation or rebuilding to elevate them above the ground and avoid risk from future potential floods[19].

With reference to the secondary data given by MoH, the PFERNA team[20] conducted a quick field assessment focusing on damage and loss to health facilities and services. PFERNA found that more than half of the affected health centres were disrupted from functioning normally for between one week and two months, and caused a reduction in consultation services of between 50 and 70 percent over the flood period. This was due to difficulties in transportation (people need to travel to health centres by boat, etc.).

FIGURE 42: MAP OF AFFECTED OPERATIONAL DISTRICTS



Source: PFERNA Team Assessment 2013

TABLE 25: SUMMARY OF STATISTICAL RECORDS BY 50 AFFECTED HEALTH CENTRES/RHS IN 9 PROVINCES (MOH)

Category	Total population covered by health centre	# consultation per month per health centre	# delivery per month	# health personnel	% consultation decreased during flood	Flood disrupt health centre for 1-2 wks	Flood disrupt health centre for 3-4 wks	Flood disrupt health centre for>4 wks
Average/ mean	10,145 per health centre	575 per month/ health centre	13 per month/ health centre	9 per health centre	50%-70%*	15 health centres	11 health centres	11 health centres
Totals for 50 affected health centres/RHs	507,250	28,750.	650.00	450.00	50%-70%*	15 health centres	11 health centres	11 health centres

Source: PFERNA Team Assessment, 2013

19 *Based on MoH report on damages occurred to Health Facilities.*

20 *PFERNA Team: Khim Phearum (local consultant), Chea Huot (local consultant), Ngeth Sovann (MoH), DrMony (MoH).*

The floods caused difficulties in accessing some health centres, so some households asked a nurse or a midwife to do health checks at home, and some patients were sent to a referral hospital in the nearest provincial town. This meant increased costs for some services, while more than 50 percent of the affected health centres only saw 50 to 70 percent of their average number of out-patients. This, in turn, reduced income for health centres over the flood period. Disruption of health services within those severely affected health centres was reported to range from between one to five weeks depending on their geographical location (and even up to eight weeks in a few cases). The majority of the affected health centres were 0.2 – 0.8 meters submerged by flood water (inside the health centre building) with water levels even higher in the surrounding areas. One-third of the affected health centres reported complete closure for between one and two weeks, but health services remained functional during the flood, as health centre personnel moved the facilities to higher ground so they could still serve the population. The short closure and interruption by flooding resulted in a reduction of people seeking healthcare services and lost service revenues (government-subsidized service fees) that the centres would normally generate. A reduction in revenue of between 50 and 70 percent (100 percent for a small number of cases) over a period of about one month (on average) was reported.

The estimated loss of health centre revenue is around US$0.09 million and the total effect of the floods on the entire health sector is estimated at US$0.26 million. This is meagre if compared to the destructive effects on the sector caused by the 2011 floods. The PFERNA team observed that most of the visited buildings are in good condition but have partial damage to walls, floors, fences, furniture, toilets and wells, and many have cracked walkways and incinerators, etc. Repairing or replacing these might need only a small budget (reference in DaLA table), but to prevent future damage by flooding, those health centres need to be built on higher ground. Based on the health centre record on peak incidence of health problems during and after seasonal flooding (May – October), there has been a greater demand for medicines to treat rashes, eye infections, diarrhoea, dengue fever and colds, which resulted in an unusual growth of medical supplies for those particular illnesses (for a period of about three weeks to one month for some places). That generates an additional burden (especially a financial burden) to health centres to ensure daily functioning, as those highly needed medicines are running out of stock. In some cases the centres need to purchase medicines privately to ensure availability. Given limited functioning latrines, the practice of open defecation and the consumption of untreated water by more than 50 percent of households observed, concerns exist around increasing incidence of infectious diseases, especially diarrhoea, in particularly in people living along the Mekong River. To provide a practical example, Koh Khel Health Centre, visited on 5 January 2014, saw the number of consultations increase by 10 percent during

TABLE 26: CAMBODIA 2013 FLOODS, DAMAGE AND LOSS IN THE HEALTH SECTOR (US$)

Province	Damage to Structure: Health Centers/ Posts	Damage to Equipment: Furniture/Medical Equip., /Medicines…etc.	Loss of Center's Income* (due to flood interruption)	Total (DaLA)
Kratie	4,421	2,506	2,002	8,928
Kampong Cham	13,262	7,519	6,005	26,785
Kandal	11,201	3,447	13,666	28,314
Kampong Thom	4,421	2,506	2,002	8,928
Banteay Meanchey	13,500	13,500	11,259	38,259
Stung Treng	1,105	627	500	2,232
Uddar Meanchey	5,526	3,133	2,502	11,161
Battambang	6,000	4,500	6,005	16,505
Siem Reap	7,650	20,000	13,294	40,944
Prey Veng	5,526	3,133	2,068	10,727
Others	24,866	14,098	26,896	65,860
Total	**97,477**	**74,969**	**86,197**	**258,642**

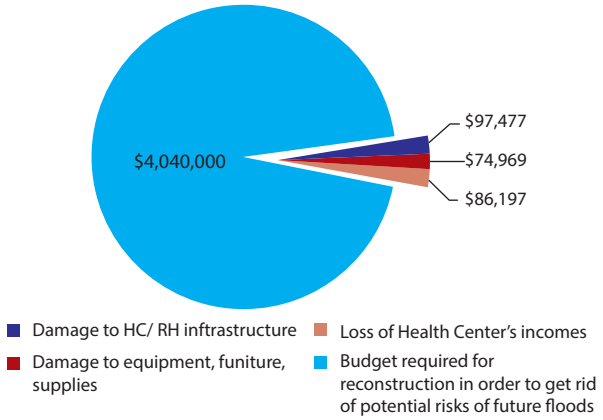
* Flood Interruption to Health Centers ranged from 1 to 8 weeks (depending on geographical locations)

Source: PFERNA Team Assessment, 2013

NOTE: In the table above: Column one = 97,478, column three = 86,199 and column four =258,643.

this period. Delivery and consultation fees varied from one health centre to another, ranging from US$0.25 to US$15 per patient depending on case/diagnosis.

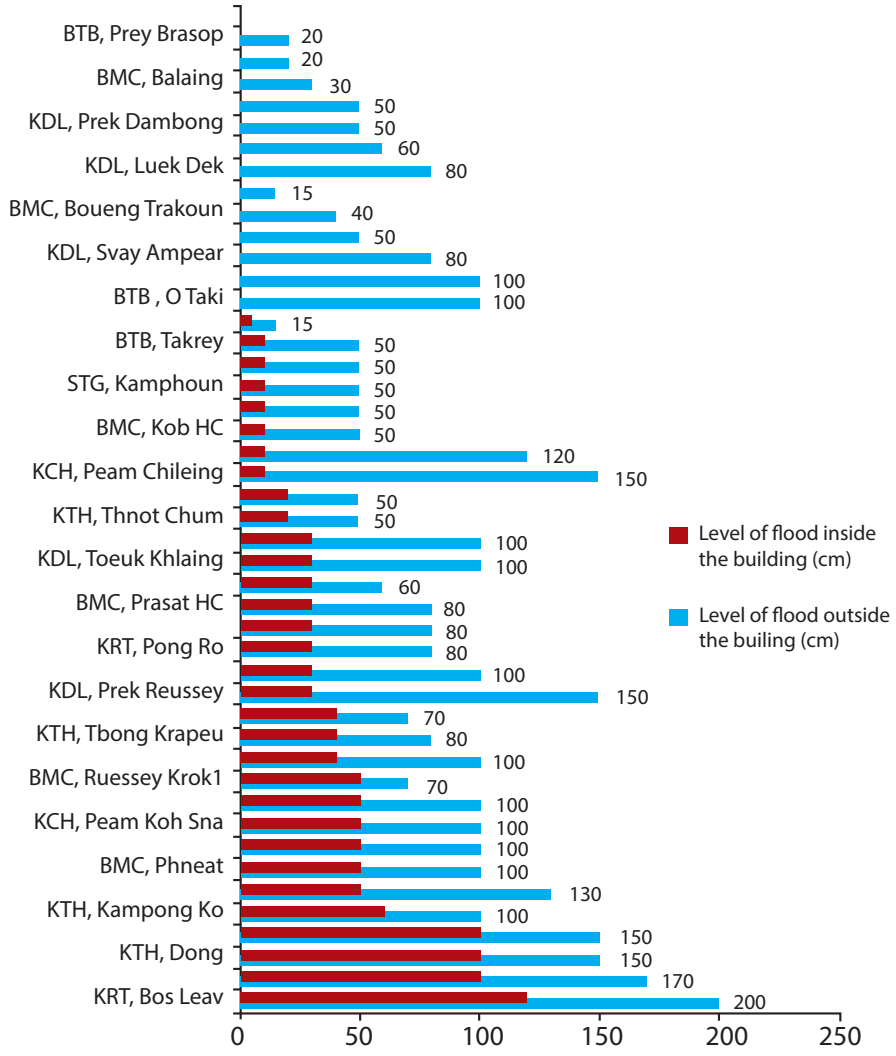
FIGURE 43: CATEGORY OF DaLA IN US$



Source: PFERNA Team Assessment, 2013

The experience of the 2011 floods is believed to provide better knowledge of awareness and preparedness capacity against flood disaster, especially in flood-prone areas. Based on this experience, the Ministry of Health is planning to request financial support from development partners (see the recovery section and annex for detailed proposal) to repair or rebuild some of the affected health centres, designed to be resistant to flood and storm, in elevated positions (health centres are built elevated above the ground) to avoid risk of being flooded in future. The majority of current health centres are constructed as single story buildings (building attached to ground).

FIGURE 44: LEVEL OF FLOODWATER IN HEALTH CENTRES/RHS (RECORDED IN CENTIMETRES)[21]



Source: (MoH, 2013a)

21 *BTB: Battambang, BMC: Banteay Meanchey, KDL: Kandal, KTH: Kampong Thom, STG: Stung Treng, KCH: Kampong Cham, KRT: Kratie*

DaLA for Health Impacts

- Health Operational District reported insignificant damage to health equipment and building structure.
- Overall damage and loss to health sector reported insignificant if compared to 2011 floods.
- Experience of 2011 floods is believed to provide good knowledge of awareness and preparedness against disaster, especially floods, as Cambodia is very prone to them.
- Data sources: Ministry of Health, Provincial Department of Health (Health Operational Districts) and field mission survey by the PFERNA team.

Step I: Damage to Structure
(Health Centre/Posts) US$ 0.10 million

Step II: Damage to Health Equipment
(Furniture/Medical Equipment/Medicines)
US$0.07 million

Step III: Loss of Health Centre's Income
(Due to flood interruption)
US$0.09 million

Step IV: Effects on Health Sector
US$0.26 million

The health sector is one of the Government's development priorities and public spending on health is increasing every year. According to the 2014 Draft Budget Law, the Ministry of Health's 2014 budget expenditure is planned to increase by 8.4 percent, to US$244.4 million(over its 2013 budget) representing about 11.8 percent of the total central government's current expenditure, or approximately 1.4 percent of GDP.

To promote good hygiene practices among the flood-affected population, MoH would need to cooperate with the Cambodian Red Cross, WHO, UNICEF and other humanitarian agencies to immediately distribute hygiene kits, including water purification tablets (Dicloro Iso Cyanurate Sodium)[22], to more than 9,000[23] directly affected households. With limited resources, MoH, PHDs, ODs and Health centre personnel need to conduct outreach activities and prioritize the response in the affected provinces. In a small number of snake bite cases, MoH provided PHDs some 1,197 ampules of snake ant venom serum. According to PDHs, among the total population covered by the affected health centres and RHs, at least 25,000 people per month (5 percent of the total population) would need access to healthcare services. Pregnant women and children are the most vulnerable groups.

Some important service delivery was still provided during the floods. The PFERNA mission team met a health centre director who reported a case of a baby beingdelivered with 0.4 m of floodwater in the delivery room of the MohaKhnhong Health Centre in Kampong Cham province. "The midwife and nurses were standing in floodwater while delivering the baby. After delivery, the mother and newborn baby were transported to the referral hospital for a better support of health service," said Mr. Meng Savuth (director of MohaKhnhong Health Centre in Kampong Cham).

A similar case was reported by the Kralanh Referral Hospital in Siem Reap province. There are also reported cases of home-based delivery by midwives coming from the health centre.

The existing problems and challenges of poor access to health care by vulnerable populations are magnified due to flooding. They include:

- Limited capacity and resources of the health centre/RH to deliver a large-scale response to reach affected populations at scale;
- Lack of transportation or cost of local transport might be higher due to flood situation;
- Limited means of providing information from MoH/PHD/RHs and lack of systematic planning for disaster preparedness and risk reduction at local level.

Noting sector-specific limitations, the team observed that:

- Questionnaires should be prepared and well informed to all relevant departments, ministries and provincial departments;
- PFERNA methodology shall be reviewed to include a larger size of selected sampling. The sample size should be more than 10 percent;
- Greater participation of human resources and technical persons from relevant governments (ministries/departments).

22 *MoH reported 1.5 million tablets distributed to Operational Districts and Referral Hospitals.*

23 *3W of Humanitarian Response Forum.*

5.4.5 Landmines

The Landmine sub-sector assessment was led by NCDM and UNDP and supported, in the field, by relevant government authorities and local stakeholders. The team adopted two inter-related courses of research to inform this assessment on disaster impact both carried out between November and December 2013. One was to develop a rational evidence-base on the true impact of flash flooding on landmine and ERW contamination, specifically to come to a more considered opinion on the reality of potential floating mines. This was delivered, as proposed through secondary research, including canvassing expert opinion in the international mine action community, not least with some of the expert operators present in Cambodia, such as the Mine Action Group (MAG) and the HALO Trust (HALO). Second, the team undertook field-based assessments and review of secondary evidence to assess the impact of the disaster in the landmines sector. Information from this second set of research activities consisted of three main sources:

- A Joint UNICEF/Cambodian Mine Action and Victim Assistance Authority (CMAA) Impact Assessment study of the flooding in mine- and ERW-contaminated areas in Battambang, Pailin and Banteay Meanchey (See Annex);
- Fieldwork by Dara Seng of CMAA, focusing on the 'evidence points' established by the study detailed in 1. above, plus reports from the Cambodian Mine Action Centre (CMAC), MAG and the Community-Based Mine Risk Reduction(CBMRR) network, etc. (See Annex);
- Secondary research through mine action operators done by an international mine action expert (See Annex).

The flash flooding had an impact on the problem of landmines and explosive remnants of war (ERW)[24] . This carries some implications for the mine action sector, as detailed in Section 8 'Recovery Measures' (see paragraph n. 8.4.5.). The problem concerns the way landmines and other ERW can, in certain circumstances, be exposed by erosion after flash floods and, in some but not all cases[25] , subsequently be moved by the fast flowing currents of flood water and deposited in new areas. Often eroded or moved items will be visible, however sometimes they will be freshly buried in soil from the flood. The extent and impact of this problem has been found to be quite limited, both in terms of area/sites confirmed as having been affected, and the number of items that were either eroded and newly exposed in place, or eroded from the soil and moved by flood waters (known as 'wash out'). In terms of casualties, there seems to have been no discernible impact in the communities affected.

Much of the concern expressed by some within the Cambodian landmines sector in the immediate aftermath of the flooding in September 2013was based on the belief that anti-personnel landmines, can be eroded from the soil, and subsequently 'float' away on the flood waters in large numbers, contaminating wide areas that previously were not known to have confirmed or suspected hazardous areas. If true, this would obviously have very serious consequences. This report, however, urges caution in assuming that the 'floating mines' could be a widespread and general problem. Many experienced landmine specialists consulted during this research, view the risks associated with the 'threat' of floating mines[26] during floods might have been exaggerated, while accepting that in some countries, in some locations, 'wash out' of anti-personnel landmines can occur. Wash out is a different process. Typically, wash out occurs in countries with thin soils and/or desert conditions, where occasional violent flash floods will have severe erosive impact, capable of 'washing out' and disbursing landmines and ERW in the violent flood currents. Landmines moved in this process are washed away with other debris, rather than gently 'floating off'. Part of the research in this sectorial report was therefore concerned with gathering an evidence base on the impact of flash flooding on mine-affected areas, not just in terms of exploring 'floating mines', but to consider the broader range of possible impacts, and what this would mean for the national mine action programme in Cambodia. Finally, it should be noted that deforestation has increased vulnerability of communities lying below mine-affected highlands to the threat of wash out.

The impact of the flooding disaster on the landmines sector is seen as very limited. In terms of casualties, there have been no additional injuries[27]

24 *Please refer to Annex 'Glossary of Key Mine Action Terms'. However, the term 'Landmines', as used in this section of the report refers to both anti-personnel and anti-tank landmines. 'ERW' includes items such as Unexploded Ordnance.*

25 *For example, it is likely that many of the larger items of ERW (UXO) reported as being new flood related items were merely uncovered in situ, rather than moved by the flood waters as such.*

26 *It is not so much that mines 'float' on flood waters, but that they are moved in violent water currents, like other debris eroded from the soil and carried away.*

27 *Correct at the time of writing. CMVIS and other surveys have reported that there have been no mine accidents as a result of the flooding and associated problems.*

as a result of flood-related mines and ERW in previously 'safe'[28] locations. As noted in the Annex (Section: Context of Mine Action in Cambodia), casualties are rightly seen as being a key criteria for setting priorities for mine action planning. The Cambodian Mine Victim Information Service (CMVIS) data from October 2013 records only three people having been injured (two in Pailin and one in OddarMeanchey). CMVIS data for November and December has been requested, but not received at the time of submission of this report. This data is required to make a definitive judgment on this crucial issue. Again, impact is strongly indicated by accident rates (or the lack of them). By contrast, in October 2012, 19 people were killed or injured (a decrease of 84 percent). This limited impact can be attributed to various mitigation factors in the existing mine action structure that have massively reduced the vulnerability of affected communities. These include the effective reporting of items discovered by CBMRR project agents, good recognition and awareness of items by the general public, awareness of where to report these items, effective responses by mine action operators (undertaking spot clearance tasks) and emergency mine risk education messages/campaigns that enhanced general awareness of the risk of mines and ERW appearing in previously low-risk areas. For example, a UNICEF/CMAA report notes that of 174 flood-related items its survey identified, 172 had been reported to mine action operators for removal and destruction. Equally though, the number of items found as a result of flood-water movement or erosion in place is, in absolute terms, relatively low, as are the number communities affected. It is possible to argue that where flood waters have exposed ERW through erosion and those items have remained in place, the flash floods have actually made communities safer, as hidden dangers (previously unknown in many cases) have been exposed and destroyed. But this is only true because of the mitigation systems in place, which have reduced vulnerability and therefore risks associated with the threat.

The CMVIS surveyor's results are summarized in the table below. It should be noted that information received by Dara Seng during his field work revealed that some 523 items were discovered by CMAC as a result of the floods, and data received from MAG contains further records not listed within either the CMVIS or CMAC data. The CMVIS results are therefore not seen as comprehensive.

TABLE 27: CMVIS UNICEF JOINT POST-FLOOD SURVEY RESULTS

No	Provinces	District	Commune	Village	In Village		In rice/farming field		Height area		Total
					Mine	ERW	Mine	ERW	Mine	ERW	
1	B.Meanchey	Our Chrouv	Kob	Kon trey				1			1
2	B.Meanchey	Svay chek	Treas	Treas			1				1
3	B.Meanchey	Thmar Puok	Kok Romiet	Ta Ley				1			1
4	Battambang	Kamrieng	Our Da	Kampong Ley		11		18			29
5	Battambang	Kamrieng	Our Da	Manas Kal			1				1
6	Battambang	Kamrieng	Tasen	Our Anluk		2					2
7	Battambang	Samlout	Tasanh	Tasanh				10			10
8	Battambang	Samlout	Tataok	Our Tatiek			2	6			8
9	Battambang	Samlout	Tataok	Our Treng			19	2			21
10	Battambang	Samlout	Tataok	Peam			3	4			7
11	Battambang	Samlout	Tataok	Peam Ta	3	4					7
12	Battambang	Samlout	Tataok	Phnom Reiy			7	5			12
13	Battambang	Samlout	Tataok	Tataok			11	6			17
14	Battambang	Samlout	Tataok	Veal Rolim			2	18			20
15	Battambang	Samlout	Kampong Lpov	Svay Chhrom			5	6			11
16	Battambang	Samlout	Kampong Lpov	Our Daemcheck			8	3			11
17	Pailin	Pailin	Bayakha	Bahuy Cheng					2		2
18	Pailin	Pailin	Bayakha	Bahuy Cheng	1						1
19	Pailin	Pailin	Bayakha	Batang Su	2						2
20	Pailin	Sala Krau	Our Andong	Thnal Kaeng			1				1
21	Pailin	Sala Krau	Sala Krau	Sre Anteak			2	5			7
22	Pailin	Sala Krau	Stung Kach	Our Beng			2				2
Grand Total					6	17	64	85	2	0	174

Source: PFERNA Team Assessment, 2013

28 *In mine-affected areas it is never appropriate to refer to 'safe' locations. Rather it is safer to speak of 'low risk' as there is often some form of residual risk, even after land has been 'cleared'.*

TABLE 28: CMAC DATA ON LOCATIONS OF FLOOD-RELATED LANDMINES AND ERW

Nº	Battambang - Pailin	Mine Found			Total
	District	AP Mine	AT Mine	ERW	
1	Banan	0	0	2	2
2	Kos Krolor	1	0	46	47
3	Ratanak Mondol	1	1	88	90
4	Bavel	6	0	4	10
5	Rok kiri	15	7	40	62
6	Moung Rasey	5	0	18	23
7	Phnom Prek	10	1	16	27
8	Sampovloun	3	0	2	5
9	Kom Rieng	7	1	6	14
10	Samlot	105	1	101	207
11	Pailin	5	0	3	8
12	Sala Krao	8	1	19	28
Total		166	12	345	523

Source: PFERNA Team Assessment, 2013

Based on the fieldwork carried out by the team, the following can be observed:

- Respondents interviewed during fieldwork confirmed that mines and ERW found after flooding were the result of both erosion in place and assumed movement, from washing out from higher ground;
- Assertions that mines had moved from higher ground cannot always be taken at face value, or proved, and it is hard to differentiate between mines/ERW that were moved and mines/ERW that have been exposed in place due to erosion. This is especially true of heavier items of ERW (such as mortars) and even some landmines (such as a POMZ casing – a fragmentation mine which is effectively a heavy metal grenade on a stick);
- Experts believe that heavy items of ERW are highly unlikely to have been moved far, if at all, and many of those observed appeared to have been exposed as a result of erosion, rather than wash out or being moved by flood waters. Landmines most likely to have been moved long distances in flood waters are the lighter, plastic anti-personnel mines such as the Type 72 or PMN-2, and yet no photos of these have been provided by CMAC or as a result of the field work (although this may be because these items were destroyed during spot tasks). It might be seen as irrelevant whether 'new mines or items of ERW' have emerged in previously safe areas through movement, as opposed to erosion/exposure. It is only relevant in as much as conclusions must not be reached that support the largely inaccurate assertion that landmines float after floods, and indiscriminately and freshly contaminate widespread areas that previously were considered low risk;
- CBMRR personnel have played a vital role in reporting items discovered after the floods to mine action operators such as CMAC or MAG. It is likely that the lack of incidents after the floods is far more to do with this community-based reporting structure being in place than as a result of emergency MRE activities. Emergency MRE is more important in highlighting the need to report and enhancing general community awareness, than in reducing vulnerability through other forms of risk reducing behavioural change. Recommendations from respondents to ensure sustained funding for, and increased technical capacity of, the CBMRR network is thoroughly endorsed;
- Deforestation on higher ground is seen to be a key factor by respondents in increasing the likelihood of incidents of mines being washed out, and being moved to lower, previously low-risk areas. Deforestation is generally a key issue in enhancing the vulnerability of Cambodian communities to flash flooding, and the mine action sector is no different in this regard;
- Villagers in flood-affected areas seem to be well aware of the enhanced risk, especially along the sides of rivers, streams and ponds. Equally, they seem to be aware of the need to report any items discovered to the authorities. This indicates awareness of, and confidence in, reporting mechanisms. However, it is not entirely clear if this is as a result of mines having moved from higher ground, or erosion in place.

While not precluding the possibility that further studies might reveal a deeper impact on community life and livelihoods, it is assessed at this stage that the impact of flash-flooding on the landmines sector has had extremely limited, or possibly no impact, on livelihoods in mine-affected areas of western Cambodia. People in the affected communities recognize mines and other ERW, and know to report it. CBMRR activists are doing a good job in co-ordinating and passing on such reports, and mine action agencies are responding by doing 'spot tasks' on the items reported in a timely manner.

As stated above, washed out or erosion-exposed landmines/ERWare generally visible, making them easy to spot, identify, report and clear through spot tasks with no requirement to search or clear large areas of adjacent ground. This system represents an effective risk mitigation process established to respond to the mine action problem in general. It has proved its worth in dealing with this specific threat of new flood-related tasks. In these circumstances, the team believes that people in affected communities are not going to stop using a paddy field that has previously been safely cultivated, because a few mines (more likely ERW) have been washed out and/or found exposed on the surface, reported and destroyed. The ultimate test is revealed in the lack of any spike in accident rates. Increased accidents linked to flood-related items might create conditions where people adjusted their economic interactions with their land and environment. Without such accidents, it is almost impossible to believe that livelihood practices would be altered in any way. While little can realistically be done to prevent this problem from occurring again in the future[29], the existing system works as an effective risk mitigation process to ensure that any similar conditions will equally have limited impact.

As noted in the detailed reports contained in the Annexes, the existing system of CBRMM agents, including both community-based reporting structures and response mechanisms (of CMAC and INGO mine action operators), have worked well in reducing the risk from the threat of landmines and ERW exposed, or moved by, flood waters to almost negligible levels. The sector has responded well to this new threat, and the limited physical impact created by the flash floods in the landmines sector has– it is believed at the time of writing – been essentially dealt with. Any residual problem remaining will be adequately dealt with by existing reporting and response mechanisms. It is of concern that the CBMRR network may not continue to be supported by CMAC, and this is reflected in the Recovery Measures (Recommendations) section.

29 *Clearing CHAs/SHAs on high ground, especially that which has been deforested, that overlooks lowland farming and residential areas is obviously the only preventative measure that can be implemented. Possibly, consideration of the potential to be a source of washed out mines and ERW might be included in processes of prioritization for such SHAs/CHAs, but the limited impact of this phenomena in 2013 would suggest that any weighting given to this should be quite low, relative to other considerations in the current prioritization process.*

The sector response has been dealt with extensively in other sections of this report. CMAA, with support from UNICEF, co-ordinated an initial MRE emergency response by appealing for a concerted effort of MRE operators, demining agencies, NCDM agents, donors and other stakeholders, and has coordinated MRE Emergency Trainings, with MoEYS and CMAC. Such a response however needs to be reviewed critically and cautiously. The current system of community-based mine action agents, community liaison staff of mine action operators, and their technical threat eradication teams responded well to the new problem posed by flood-related items. In this light, it is questionable how relevant the 'emergency' MRE response was, especially if it was based on assumptions drawn from the risks associated with the 'threat' of 'floating mines', something which is seen as largely as unlikely in the way it is popularly conceptualized.

Vulnerability to the threat of washed-out mines and ERW has been increased by de-forestation in western Cambodia, and other mine-affected areas of the country. Deforestation clearly is a key driver of flash flooding and associated erosion that is critical in creating conditions whereby wash out becomes possible. Where movement occurs, the risk is created by mines and ERW moving from higher ground to previously low-risk, low-land areas where people have lived and farmed at very low risk from mines and ERW in the recent past. However, risks from this threat have perhaps been over-stated, and existing structures and processes in the mine action community in Cambodia have effectively mitigated risks almost completely. It is perhaps significant that photographic evidence does not reference light plastic mines one would most assume would be involved in wash out, such as Type 72s. Rather it reference heavier metallic items of ERW, such as mortars and POMZ casings.

Other Impacts of Floods on the Landmine Problem / Mine Action Planning: Part of the ToR for this mission required that the consultants consider other impacts of flash flooding on the landmine problem in Cambodia, and what this might mean for mine action planning and programmes. In particular, concern was focused on the impact of flooding on anti-tank mines (ATMs), especially since ATMs accounted for more victims in Cambodia in 2012 than anti-personnel landmines. Concerns here were more to do with the erosion of soil, bringing previously deeply buried ATMs into play, rather than problems arising from their movement through wash out. Mine action expert Heine Truter believes *"that most are on old road alignments (which by and large have heavy vegetation coverage). Currently, used roads and tracks are usually*

safe, being 'new' alignments or refurbished, and used to such an extent that they can be considered free of threat. So new road alignments may well suffer erosion, slippage, etc. due to recent flash floods but, as a rule, do not contain anti-tankmines. Old road alignments that do contain anti-tankmines, and are killing farmers as they reclaim land, are probably not subject to the effects of flash floods."[30]

There have been a number of well-reported cases over the history of mine action in Cambodia where wet season conditions, especially the impact on soil conditions and structure, have increased the vulnerability of people to anti-personnel mines. 'Safe' paths, even areas where new villages have been constructed in dry season conditions without incident, suddenly become areas of high mine risk during the wet season, due to the changes in soil structure and conditions once inundated with water. Any area in locations where landmines have been widely used in the past (and this includes much of western Battambang, Pailin and Banteay-Meancheay provinces), which has been subjected to erosion from flash flooding, may, both during and immediately after flooding and in the long term, be considered to have a heightened mine risk, especially from older, previously deeply buried minefields. However, the level of risk is driven as much by impact as it is by likelihood, and in this regard, while possible, it is considered quite an unlikely eventuality. Ultimately, only professional non-technical and, if required, technical surveys, using risk-based assessment procedures will be able to come up with a comprehensive answer to these questions.

5.5 INFRASTRUCTURE

5.5.1 National and Rural Roads and Electrical Network

A flood event in October 2013 resulted in damage to 440 km of national, provincial and city roads and 64 drainage structure locations managed by the Ministry of Public Works and Transport (MoPWT). It affected 1,557 km of rural roads and 555 drainage structure locations managed by the Ministry of Rural Development (MRD), and caused considerable damage. The National and Rural Roads sub-sector assessment was led by NCDM and UNDP and supported, in the field, by relevant Provincial Departments of various government line ministries. All the data analysed in the present assessment were collected during the main mission carried out from 15th to 21st December 2013. UNDP was engaged to work cooperatively with the RGC and responsible line ministries in each of the separate components of the Infrastructures sub-sectors to understand the extent of the damage and verify the figures provided by different line ministries.

The flood event of October 2013 caused significant damage to all road types.

The most adversely affected provinces where determined to be:

- Battambang (BTM),
- Banteay Meanchey (BMC),
- Siem Reap (SR),
- Kampong Cham (KPC),
- Prey Veng (PV).

The damage to rural infrastructure has been significant and is detailed in the table below.

TABLE 29: SUMMARY 2013FLOODS MAIN DAMAGE CAUSED TO RURAL INFRASTRUCTURE

Road Classification	Length (Km)	Bridges (Number)	Management Authority
	Total Damaged	Total Damaged	
National Roads	64.7	Bridges - 18 locations Pipe Culverts - 40 locations Box Culverts - 6 locations Total- 64 locations	MoPWT
Provincial Roads	310		
City Roads	65		
Rural Roads	1,557	Bridges- 28 locations Pipe Culverts- 404 locations Box Culverts - 115 locations Spillways - 8 locations Total - 555 locations	MRD

Source: PFERNA Team Assessment, 2013

30 *Email to Paul Davies from Matthew Hovell, SE Asia Desk Officer, HALO Trust, 9th December*

The field mission was conducted between aimed to:

- Get an understanding of the damage and loss in the sub-sector and the impact of the losses;
- Allow the results of the mission to inform and guide the decision making and early recovery framework;
- Allow to plan and coordinate the recovery framework, which must be owned by the Government and provincial authorities;
- Assess the human capital available, capabilities and capacity to address the needs of the recovery framework;
- Assess the capacity development and technical assistance required to fulfil the goals and tasks of the recovery framework.

This sector sub-section includes large – scale and community facilities, defined as:

- National roads and bridges;
- Provincial roads and bridges;
- Rural roads and bridges;
- Electrical network.

To address all issues of collection of data, questionnaires were administered to MoPWT in all the provinces visited (see annexes).Descriptions of disaster effects and impacts on the sector include:

- Direct physical damage to all road types, localised breaches of the road carriageway, wash out of box culvert and pipe culvert location;
- Wash out of road surface: bitumen seal, double bitumen seal, gravel;
- Bridge damage varying from minor to extremely severe, mostly associated with scouring of abutments;
- Road surface damage associated with unregulated traffic on saturated pavements resulting in road bottlenecks in rural road locations;
- Damage and breaching of dikes and levy banks that form rural roads;
- Negative impact in communities, households, individuals and societal processes (human impacts) as a result of poor access in rural roads sector;
- A direct and significant impact on cross cutting sectorial areas of agriculture, education and access to health facilities. Negative impact on the most vulnerable - young and elderly;
- Rural roads access impact on the WATSAN sector;
- Rural roads impact on access for recovery in the shelter sector;
- Electrical infra-structure.

Field mission notes were prepared for each province inspected and samples of damage recorded and assessed. The limited nature of the field mission and the time available in preparing the PFERNA limited the locations of inspections. Often in provinces, the most badly affected infrastructures were prohibitively remote from the main city. Approximately 175 locations were recorded by MRD in the provinces visited. The field mission was able to visit 26% of the affected locations over a five day period.

Little or no damage was reported in the HV distribution system. One open air 115 kV HV switch yard (13°31'38.70"N, 103°33'53.12"E, near BMC) inspected showed the switch yard platform well above the flood event, the perimeter had been sandbagged as a precaution. LV poles and line had sustained some damage but not sufficient for recording. Outages in the network have not been reported. Damage figures provided by MoPWT provide an approximate picture of the real damage and more detailed costing for post-flood interventions and improvement works should be sought prior to engaging in rehabilitation. It is worth noting that it is important to separate cost for repairs for roads (by type) from drainage structures, to allow an informed interrogation to take place. The cost of damage to National and Provincial Roads adds up to US$ 27 million and the Rural Road damage to US$ 44 million and is detailed in the tables below. At the time of the assessment the RGC had already disbursed US$ 7 million necessary for the Emergency reconstruction.

TABLE 30: FLOOD EVENT OCTOBER 2013 NATIONAL & PROVINCIAL ROADS DAMAGE SUMMARY

Road Classification	Roads & Drainage Structures US $	Management Authority
Emergency Intervention	US$ 7,000,000	MoPWT
Post-event reinstatement to pre-event conditions	US$ 20,000,000	

Source: PFERNA Team Assessment, 2013

TABLE 30: FLOOD EVENT OCTOBER 2013, RURAL ROADS DAMAGE SUMMARY

Road Classification	Roads		Drainage Structures		Management Authority
	Length (Km)	Cost (US $)	Total Number	Cost US $	
Rural Roads	1,557	44,012,425	28	8,597,725	MRD

Source: PFERNA Team Assessment, 2013

The figures for damage and replacement for rural roads represent an average replacement cost of US$28,266 per km. Indicative replacement cost evaluation in the 2011 flood response was costed at US$15,000 to US$18,000 per km. While it is understandable to build back better for resilience of rural roads, a conversation about improving the built stock needs to be held. Losses in the rural sector associated with the flood are centred on additional expenses related to Vehicle Operating Costs (VOC), to enable essential traffic flow after the disaster.

The VOC came about as a result of:

- Higher road transport costs due to use of alternative, longer routes;
- Use of lower quality road surfaces;
- Use of alternative, higher-cost modes of transport.

Data requirements to calculate VOC include:

- Road traffic data for each main road sector - (before and after disaster event);
- Unit operating costs for different types of vehicles on different types of roads;
- Timeframe for repairs.

Information sources for this data have been:

- MoPWT;
- MRD;
- Feasibility studies of new road projects;
- Unit costs for proposals and contracts performed over the previous 12-month period.

Estimating higher transportation VOC is done by comparing:

- Pre-disaster traffic flows versus post-disaster flows;
- Estimating marginal operating costs of vehicles under baseline and post-disaster traffic conditions, including alternative modes of transport (in US$/km for each type of vehicle);
- Estimating time required for repair and reconstruction of damaged road sections;
- Combining these to estimate the amount of increased costs.

During the field mission an assessment of existing capacities and capability gaps was attempted. Given the limited nature of the time available, this assessment should be followed up. In four of the five provinces visited, the technical office of MoPWT was inspected and a selection of personnel interviewed:

- Existing capacity in emergency response was generally assessed to be rapid, coordinated and technically appropriate (for rapid intervention);
- Numerous examples were also observed of on-going maintenance work addressing flood and other damage in a technically appropriate manner;
- Assessment of capability and capacity in the project management of works was not possible in the time available;
- Existing capacity in engineering design was assessed to be limited and the technical personnel interviewed, except in Siem Reap, require further training;
- The technical personnel interviewed in Siem Reap were assessed to be technically sound and competent;
- Engineering design software was available in each province, but the technical competency to use the software was limited;
- The gaps in required capacity for early/long-term recovery should be addressed in an on-going capacity development and technical assistance programme at PDRD level;
- Strategies for meeting capacity and technical gaps should be a combination of workshops, seminars and on-the-job training.

5.5.2 Water and Irrigation System

As acknowledged by the ADB reconnaissance mission (ADB; MEF, 2014), MoWRAM reports that 13 irrigation infrastructure projects, currently under construction or restoration using ADB financial support in eight provinces, were affected by the floods. The most damage was in the north-western provinces: Battambang, Banteay Meanchey and Oddar Meanchey. The estimated cost of damage is US$52 million. MoWRAM has already undertaken emergency repair works valued at aroundUS$4.5 million. The majority of direct flood damage observed during the mission involved over-topping erosion and/or water storage bank (dam) failure. This inundated main canals and caused breaches in some cases. The surge of overland flow impacted cultivated areas close to the point of failure, and the concentrated 'dam break' flows also damaged road and canal structures. Some temporary repairs to breached dams, roads and canal banks have been implemented.

5.5.3 WATSAN

The WATSAN sub-sector assessment was led by NCDM and UNDP co-led by UNICEF and supported, in the field, by relevant Provincial Departments of various government

line ministries. The objectives of the rapid assessment and evaluation were to gain an overview of the water and sanitation situation, subsequent to heavy rainfall and flooding, to inform response priorities. The findings are meant to contribute to coordination discussions and to define a recovery framework that could highlight gaps and needs.

According to the economic impact of WATSAN in Cambodia in 2008 poor WATSAN has led to an economic loss of US$32 per capita. This number can be translated as US$448 million per year to the economy (EIC, WSP, 2008). Responding to the issues, there are a number of efforts to deal with WATSAN being implemented across the country. These include WATSAN projects being implemented with support from MRD, PDRDs, ADB, UNDP, UNICEF and other WATSANNGOs, INGOs and qualified contractors. Access to safe water supply and sanitation in the rural areas of the five provinces visited by the WATSAN team is quite low. Improving hygiene through the use of latrines and hygiene practices that could avoid germs, protecting water sources from facal contamination, ensuring sustainable sources of water, as well as monitoring water quality remain key challenges in rural areas.

Flood Damaged well in Siem Riep (Photo: PFERNA Team)

The team interviewed 25 households in five provinces (BTB, SR, KPC, BTM and PVG) as detailed in the table below.

Damaged Well in Banteay Meanchey (Photo: PFERNA Team)

Flooded Area in Siem Riep (Photo: PFERNA Team)

TABLE 31: PROVINCES/DISTRICTS/VILLAGES ASSESSED

Province	District	Commune	Village	Number families living in the village	Number of Households interviewed	Remarks
Siem Reap	Pourk	La Var	KoksuMor	143 HHs	Interview with 2 Households composed by 10 persons plus one commune chief and 2 village chiefs	No borehole 14 dug wells2 wells have water in dry season
Siem Reap	Pourk	La Var	Kom Ro	150 HHs	Interview with 4 Households composed by 20 persons plus preliminary conversation with 2 village chiefs	Surface water-source of water
Battam Bang	Sangke	Tapun	Tapun Village	25 HHs	Preliminary conversation with 1 commune chief, 1 village chief and 3 households composed by 15 people in total	The wells assessed, dirty water discharged/ polluted
Battam Bang	Ekphnoum	Prek Norin	Prek Krouch	286 HHs	Preliminary conversation with 1 commune chief and 1 village chief whiles the team assessed the well in 1 Pagoda and 1 school. In addition, the team also interviewed with 3 households composed by 18 people and assessed 2 wells in the village.	30 % use ponds source of water and 70% population buy water
Battam Bang	Sangke	norea	norea	26 HHs	The team interviewed with 2 household and 1 commune chief and 1 village chief and assessed 1 well in the village	One well, damaged 3 years ago in 2011 floods
Battam Bang	Sang ke	Roka	Por Battang Bang	10 HHs	The team interviewed with 1 household composed by 5 people plus with 1 commune chief and 1 village chief whiles the team assessed 1 well in the village	60 people, one hand pump damaged 1 year ago
Battam Bang	Sang keu	Roka	Roka village	16 HHs	The team interviewed with 1 household composed by 5 people plus had some preliminary conversations with 1 commune chief and 1 village chief whiles the team assessed 1 well in the village	76 people no water source people consume surface water
Banteay Meanchey	SerieSophom	Omombel	Prohout	549 HHs	The team interviewed 2 households composed by 11 persons plus had some preliminary conversations with 1 commune chief and 1 village chief and assessed 2 wells in the village	The 2 pumps assessed ,are hand pump built 1993, damaged in 2011 floods
Banteay Meanchey	Ohchrov	Samrony	Thmey	200 HHs	The team interviewed 3 households composed by 15 persons plus had some preliminary conversations with 1 commune chief and 1 village chief whiles the team assessed 2 well in the village	1200 people, the hand pump assessed built 1998, not function, flood damaged
Banteay Meanchey	Ohchrov	Samrong	Bottrony	183 HHs	The team interviewed 2 households composed by 11 persons plus had some preliminary conversations with 1 commune chief and 1 village chief whiles the team assessed 2 well in the village	11 wells exist in the village, 3 wells assessed not functioning
Kampong Cham	Koh Roka	Koh Roka	Kloh roka Health center	5 persons	The team Interviewed 5 health center personnel and had some preliminary conversations with the commune chief and PDRD personnel.	Dug well has 11 meters distance from two Septic tanks (standard 40 m)
Kampong Cham	Koh Roka	Koh Roka	Koh Roka	6 persons	The team Interviewed 1 household composed by 6 members	The well is unusable due to existed of Arsenic

Source: PFERNA Team Assessment, 2013

Household interviews and observation of the water and sanitation infrastructure revealed a general lack of knowledge and practice of the assessed population on use, treatment and storage of water.

In particular:

- 10 percent of the interviewed households believe they can assess that the water is clean just by looking at it;
- 80 percent said they treat water before use by means of sedimentation, straining, boiling and solar disinfection;
- 10 percent had water filters distributed by UNICEF or other agencies, but do not use chlorination. Some households said they never cleaned the water.

As confirmed by the National Strategy for Rural Water Supply, Sanitation and Hygiene (RGC, 2011b), access to safe water in rural areas is possible to just 53 percent of the population during the dry season, and access to hygienic sanitation is only possible for 24 percent of the population. Open defecation is practiced by the majority of the rural population, polluting the surrounding environment and water sources. In Kuk Sumor village in Seam Reap, out of 143 households surveyed, only 22 had latrines. This improper disposal of faces, coupled with a lack of hygiene practices can be harmful to the health of the wider population, especially children and women. The overall damage to WATSAN infrastructure adds up to US$ 2.66 million and is detailed as indicated in the table below.

TABLE 32: CAMBODIA FLOOD 2013 AFFECTED AND DAMAGED BOREHOLES AND DUG WELLS

No	Provincial Name	District	Commune	Village	Type of Affected Wells		Type of Damaged Wells		Estimated Cost Rehabilitation and Chlorination per wells		Total Cost Per Province	
					Total Boreholes	Total dug Mix-Wells	Total Boreholes	Total dug Mix-Wells	Boreholes	Dug Wells	Boreholes	Dug Wells
1	Banteay Meanchey	9	55	570	1159	2459	1159	1375	30 HHs	180 persons	$208,620	$247,500
2	Battambang	12	0	0	2450	1248	285	231	30 HHs	180 persons	$51,300	$41,580
3	Kampong Cham	7	38	0	2852	2125	1426	1062	30 HHs	180 persons	$256,680	$191,160
4	Kamponng Chhnang	4	12	0	98	395	98	395	30 HHs	180 persons	$17,640	$71,100
5	Kampong Thom	7	0	0	149	505	149	505	30 HHs	180 persons	$26,820	$90,900
6	Kandal	11	0	0	1220	16	1220	16	30 HHs	180 persons	$219,600	$2,880
7	Kratie	5	25	108	268	564	268	564	30 HHs	180 persons	$48,240	$101,520
8	Otdar Meanchey	5	0	72	130	53	130	53	30 HHs	180 persons	$23,400	$9,540
9	Paulin	2	7	0	92	0	92	0	30 HHs	180 persons	$16,560	$-
10	Phnom Penh	3	6	10	7	52	7	52	30 HHs	180 persons	$1,260	$9,360
11	Preah Vihear	5	8	16	43	7	43	7	30 HHs	180 persons	$7,740	$1,260
12	Prey Veng	6	40	186	19300	17	942	17	30 HHs	180 persons	$169,560	$3,060
13	Pursat	5	30	171	375	1848	169	745	30 HHs	180 persons	$30,420	$134,100
14	Ratanakiri	5	5	14	3	81	3	81	30 HHs	180 persons	$540	$14,580
15	Siem Reap	11	0	0	298	176	298	176	30 HHs	180 persons	$53,640	$31,680
16	Stung Treng	5	29	110	275	64	275	64	30 HHs	180 persons	$49,500	$11,520
17	Svay reing	3	0	0	140	0	140	0	30 HHs	180 persons	$25,200	$-
18	Takoe	3	5	0	47	0	47	0	30 HHs	180 persons	$8,460	$-
Total					28,906	9,610	6,751	5,343			$1,215,180	$961,740
Total number of Beneficiaries using, 12,094 wells will be											2,176,920 persons	

Source: MRD Assessment & Team Verification

Flood-Damaged Well, Bannon Village (Photo: PFERNA Team)

The most dangerous situation in KPC Province reported by PDRD and commune chiefs was the presence of arsenic in the water of drilled wells. PDRD Preah Veng has an arsenic testing kit and any well which is drilled by PDRD is a priority for arsenic testing. This chemical element is mostly found around the Mekong River. As PDRD in KPC reported, in 2012 they closed five arsenic wells in that province. The most critical issue is wells situated less than 25 m from a contamination source. In Kloh Roka health centre in KPC Province the water source was 11 meters away from the contamination source and the clinic was using the water for patients. To achieve sustainable national targets for water supply and sanitation in villages, improved service delivery approaches need to focus not only on the provision of hardware and facilities, but on associated behavioural change or mechanisms that promote ownership and lead to proper use and maintenance of the system.

Well at Kloh Roka Health Centre (Photo: PFERNA Team)

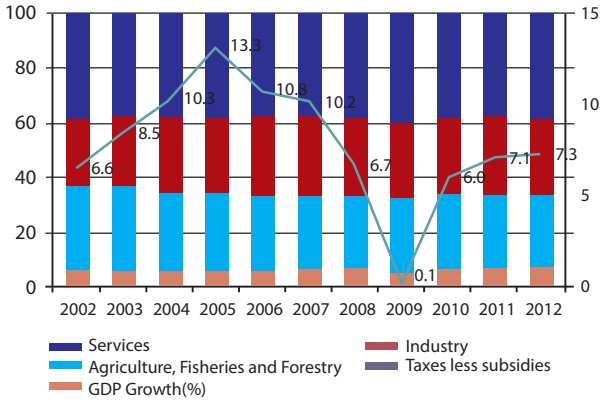
Flooded Health Center in Kokhak Commune in Siem Riep (Photo: HRF)

6 MACROECONOMIC IMPACT

6.1 CAMBODIA PRE-FLOOD ECONOMIC TRENDS

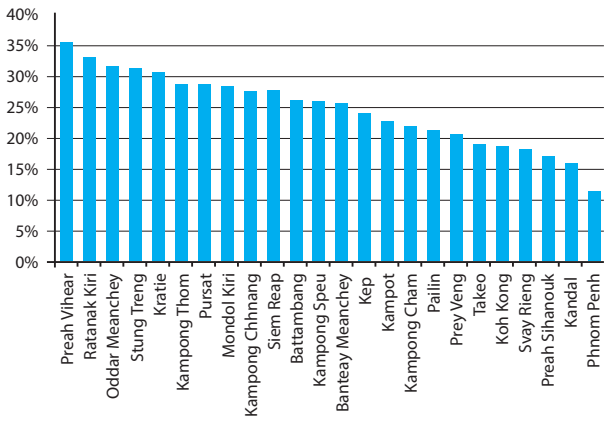
Cambodia experienced strong economic growth over the past decade, averaging 8.0 percent per annum (2003-2012)(ADB, 2013). The growth was driven by agriculture, mainly paddy crops, industry (especially garment and textile manufacturing, which is the country's prime foreign exchange earner) and the service sector (mainly tourism, hotels and restaurants).. The pre-flood projection of economic growth in 2013 was anticipated at 7.6 percent (MEF, 2013), but after the devastating floods of September/October 2013this prospect might be facing a downward trend. Agriculture represents 26 percent of the economy and plays an important role in contributing to growth and ensuring food security, with some 80 percent of the population depending on it to support their daily livelihood (ADB, 2013; NIS, 2013; RGC, 2011a). The sector grew by an average rate of 4.5 percent annually over the five years 2008–2012. According to the most recent Cambodia Socio-Economic Survey (NIS, 2012), 51 percent of the country's employed population is directly working in the agriculture sector, with the 80 percent of the population being rural (NIS, 2013; MAFF, 2011). As the staple of the traditional diet, rice provides more than three-quarters of the daily energy intake for the average Cambodian and plays a strategic role in income growth, poverty reduction and national and household food security (Bingxin & Xinshen, 2010).

FIGURE 45: SECTORIAL SHARE OF THE ECONOMY (IN PERCENT)



Source: National Institute of Statistics (NIS)

FIGURE 46: PROVINCIAL POVERTY INCIDENCE (IN PERCENT)



Source: NIS and WFP Report on the Small-Area Estimation of Poverty and Malnutrition in Cambodia, April 2013

Rice farming has remained a dominant activity in agriculture, while forestry and fisheries provide rural households with a means to diversify their subsistence, and some income generation (MAFF, 2012). Cambodia is a rice net exporter and its paddy rice production expanded by an average of 6.7 percent per annum over the period 2008–2012 (MAFF, 2012). The paddy rice production in 2012 grew to 9.3 million tons; it rose by 5.8 percent compared to the previous year (MAFF, 2012). A 4.7 million ton paddy surplus was reported in 2012, most of which was exported, with some kept as seed reserve. The increase in rice production in recent years resulted from expansion of cultivated areas of paddy fields and rising productivity (due to better cropping techniques and post-harvest management). Cultivated areas increased by an average of 3.1 percent per annum over the five years 2008–2012 (MAFF, 2011; RGC, 2010b).

There are two major rice farming seasons in Cambodia: the wet-season rice and the dry-season rice. Wet-season rice plays a very important role in contributing to Cambodia's total annual rice production, normally accounting for 78 percent of the total paddy rice production. Unfortunately, the floods hit Cambodia during a time when the wet-season rice was in the middle of plantation, and some areas were even close to harvesting (MAFF, 2011). Most of the hardest-hit paddy fields were wet-season rice. Since the publication of the government Rice Policy Paddy Production has been strongly encouraged at national

level (RGC, 2010b). The policy's target is to turn Cambodia into a major rice exporter in the international market, with a goal of exporting at least 1 million tons rice of by 2015 (RGC, 2010b). This reflects the country's clear vision for the potential benefits from the sector. The Government also promotes the sector as the fundamental base of economic growth and poverty reduction. Its long-term vision is to: (i) enhance agriculture productivity, (ii) diversification, and (iii) commercialization (MAFF, 2011)in order to reduce poverty and promote economic growth. The Strategy of Agriculture Sector Development Plan (2009-2013) was prepared to direct medium-term implementation to achieve these development goals (MAFF, 2011).

6.2 Macroeconomic Impact of 2013 Floods

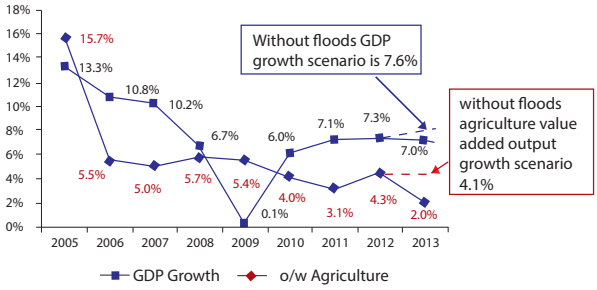
Cambodia enjoyed strong economic performance over the decade ending 2012, with average annual GDP growth of 8.0 percent per annum (ADB, 2013). The economic expansion continued accelerating in 2012, reaching a five-year high of 7.3 percent, a result of: strong recovery in the agriculture sector (paddy rice production rose by 5.8 percent in nominal terms in 2012); a more diversified export-manufacturing industry (mainly garment exports which grew by 10 percent in 2012); and the solid performance of the service sector (tourism, hotels, restaurants). Tourist arrivals rose by 24.4 percent in 2012, compared to 2011 (ADB, 2013; MoT, 2012).

Cambodia was anticipating another year of solid economic performance in2013, but the destructive floods of September and October are likely to have a slight downward effect on the economy. This is mainly due to the estimated decline of agricultural production growth (due to decimation of paddy production from floods). Battambang, Banteay Meanchey and Prey Veng, three of the country's top-five rice producers[31] were severely hit by the floods, depleting many hectares of their paddy fields. Total paddy rice production growth for 2013 is estimated at 1.7 percent (down from pre-flood projection of at least 4 percent growth in 2013).The floods destroyed some 128,421 ha of paddy fields (equivalent to 5.0 percent of total planted paddy fields, mostly wet-season rice)(MAFF, 2013). Many of the affected provinces are among the poorest in the country. The damage and loss of productive properties and assets could have serious long-term impacts on the livelihood of rural communities, where many people depend on agriculture for their daily subsistence.

31 *Top-five rice producing provinces are Prey Veng, Takeo, Battambang, Kampong Cham and Banteay Meanchey.*

As paddy rice production is paramount to Cambodia's agricultural sector, a reduction in production would lead to a shrinking trend of the overall agricultural gross value added output. Overall real agricultural output is estimated to grow just 2.0 percent in 2013 (down from a pre-flood projection of at least 4.1 percent for 2013). Taking into account the effects of the floods, overall GDP growth prospects for Cambodia in 2013 are anticipated to shrink slightly to 7.0 percent down from the pre-flood projection of 7.6 percent (MEF, 2013). This is largely caused by shrinking agriculture production. Nevertheless, the Government is expecting to see solid growth trends in 2014 with projected GDP growth of 7.0 percent, while per capita income is forecast to increase to US$1,139 in 2014. Industry and Service sectors are expected to be uninterrupted, as the effects of the flood on these sectors are insignificant (despite some impacts on rice millers and their rice stocks mainly in Battambang and Banteay Meanchey province).

FIGURE 47: FLOOD IMPACT ON COUNTRY'S GROSS DOMESTIC PRODUCT (GDP)



Source (MEF, 2013) and PFERNA team Calculations

Cambodia's industry sector is largely driven by the performance of export-oriented manufacturing, mainly garments and footwear, which account for nearly 80 percent of the entire manufacturing industry (ADB, 2013). Despite some limited effects on manufacturing (particularly rice stocks and SMEs in the province of Battambang, Banteay Meanchey and Siem Reap), the flood is unlikely to cause serious impact on the entire industry sector growth in 2013, as many garment/footwear industries are located in urban areas and were uninterrupted by the floods. Exports of the industry's major products continued to gain momentum during the first nine months of 2013. Shipments of garment and footwear products from Cambodia to international markets rose by 12 percent during the first nine months of 2013 (compared to the same period last year). The US and EU markets are the largest destination, accounting for 40 percent and 36 percent respectively. Exports of these products are likely to increase by 11 percent for year 2013 (ADB, 2013).

FIGURE 48: GDP ESTIMATION WITH AND WITHOUT FLOODS

(In percent)	Outturn		Projection	
			No-Floods	Floods
	2011	2012	2013	2013
Agriculture, fisheries, and forestry	**3.1**	**4.3**	**4.1**	**2.0**
o/w Crops	4.3	4.9	4.1	0.3
Livestock	0.2	0.8	1.3	1.0
Fisheries	3.1	6.7	7.1	7.0
Forestry	-0.1	-2.5	-1.3	-1.3
Industry	**14.6**	**9.2**	**9.1**	**9.6**
Manufacturing	16.2	7.1	7.0	7.2
Textiles	19.9	6.9	6.5	7.0
Services	**5.0**	**8.1**	**8.7**	**9.2**
o/w Trade	4.4	6.2	7.7	8.0
Hotels and restaurants	6.6	12.5	13.7	14.2
Total GDP	**7.1**	**7.3**	**7.6**	**7.0**

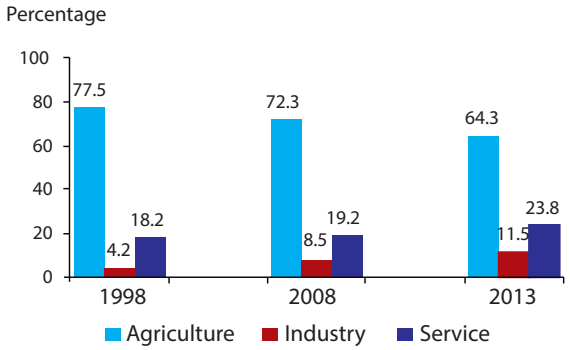
Source: National Institute of Statistics (NIS) and PFERNA 2013 Team Estimation

Garment and footwear industries are crucial to employment generation in Cambodia. By September 2013, the two sectors employed some 525,000 workers, accounting for 60 percent of the total employed population of the industry sector (World Bank, 2013) (about 95 percent of them are female with limited education background). On average[32], US$60 million in salaries are paid to these workers every month. This would have further multiple effects on workers' families, many of whom live in rural areas.

Milled-rice is the country's fastest emerging export commodity. In 2012, Cambodia's milled-rice exports rose by 30 percent to US$140 million, with figures pointing to an increase during the first nine months of 2013 (compared to the same period of 2012), reaching US$168.4 million. In terms of quantity, exports in the first nine months of 2013 already passed the entire rice export of 2012 (ADB, 2013). This trend reflects positively on the Government's rice export policy, introduced in July 2010 (RGC, 2010b). While Cambodia's industry sector represents 29 percent of the economy, and garment exports are the industry's backbone, damage to the industry sector from flooding was minimal. The loss is reported to reach about US$11.3 million (greater detail of this sector analysis is elaborated in the Industry Sector section, below). According to the National Institute of Statistics, the industry sector is projected to expand by 9.6 percent (from 9.2 percent in 2012)(NIS, 2011).

32 *On average in the first nine months of 2013.*

FIGURE 49: CAMBODIA'S EMPLOYED POPULATION BY INDUSTRIAL SECTOR, 1998, 2008 AND 2013



Source: General Population Census of Cambodia 2008 (Aug. 2009) and Cambodia Inter-Censual Population Survey 2013 (Nov. 2013)

The service sector is the largest sector of the economy, representing nearly 40 percent of economic output. It has expanded by an average of 8.0 percent annually over the decade ending 2012(MoT, 2012). The floods had some minor effects in the provinces of Battambang, Banteay Meanchey and Siem Reap (Siem Reap is the largest tourist destination of the country) but there were no serious interruptions or tangible damage. Despite some rescheduling of visits by some small proportion of tourists, particularly in small areas affected by the flood, the effect is not significant. The PFERNA team noticed some shrinkage at guesthouses during the week-long disruption of flash floods, but most large hotels and tourism businesses were functioning as usual in Siem Reap province. Damage and loss in the tourism sector are estimated close to US$2.0 million nationwide (greater detail is seen in the Tourism Industry section below).The service sector employs 23.8 percent of the working population and has been growing at a very impressive rate over the past few years (MoT, 2012; NIS, 2011). The growth was largely driven by hotels and restaurants, transportation and finance sub-sectors. The spike in international tourist arrivals and domestic tourists coincides with robust expansion of the banking sector (deepening the financial sector in recent years). This has promoted the service sector's expansion. The service sector is projected to grow at 9.2 percent in 2013 (up from 8.1 percent the previous year)(ADB, 2013). The expected solid growth is attributable to the favourable prospect of foreign tourist inflows, robust activities of hotels and restaurants, and transportation and trade. The number of foreign tourist arrivals to Cambodia jumped by 24.4 percent to 3.6 million visitors in 2012, bringing US$2.2 billion into the economy. The number of international visitors to Cambodia is expected to grow by 15 percent

to 4.1 million in 2013. The Asia Pacific region is the most important tourism market; visitor arrivals from this region accounted for 76 percent of the country's total tourist arrivals in 2012 (MoT, 2012). The tourism industry has been one of the prime sources of revenue generation for the service sector and Cambodia's development. Its growth prospects have potential in the medium and long term.

The flood is expected to have no impact on the country's external sector. Cambodia's total merchandise exports are estimated to increase by 10 percent to US$6,393 million in 2013 and by 12 percent to US$7,166 million in 2014. With corresponding export-growth prospects, the current account deficit is projected to narrow from -13.4 percent of GDP in 2012 to -12.7 percent of GDP in 2013, and is further anticipated reduce to -0.2 percent in 2014. According to the IMF Article IV Mission Press Release (IMF, 2013), the current account deficit remains fully financed by foreign direct investment (FDI) and official loans. It is projected to improve over the medium term as exports continue to grow and the completion of large power projects slows down import growth. Gross official reserves stood at US$3.7 billion in September 2013, about 3.5 months of prospective imports (IMF, 2013)33. FDI is expected to continue to gain ground, with strong growth of 80 percent to US$1,410 million in 2012. It is projected to increase further to US$1,453 million in 2013.The nominal exchange rate has remained stable, depreciating by 0.5 percent against the US dollar in September 2013, trading at 4,062 riels per US$1(end-of-period official rate)(ADB, 2013). The National Bank of Cambodia (the country's Central Bank) has continued its intervention policy on foreign exchange rate markets. It injected US$282 million worth of local currency into the market during the first nine months of 2013 to keep the exchange rate stable. The Central Bank purchase and sale of foreign exchange is believed to be efficient in maintaining the stability of the riel in Cambodia. Despite a reported slight increase in rice prices of about 3 percent in September and October 2013 (if compared to the same period the previous year), the inflation rate remains relatively low, standing at 3.7 percent in September and 4.2 percent in October 2013. The slight increase in inflation rate might be due to the Government's recent efforts to tackle illegal smuggling and tax evasion. However, the consumer price inflation rate remains under the government-targeted rate, which is projected at around 3 to 4 percent over 2013 and 2014 (IMF, 2013).

33 *Under the Article IV consultation, IMF personnel undertake annual surveillance and analysis of economic developments and policies of member countries for discussion by the Executive Board.*

TABLE 33: REPORTED PRICES OF RICE IN PHNOM PENH CITY (PRE AND POST-FLOOD, RIELS PER KG)

Types of rice	Aug 2013	Sept 2013	Oct 2013	Nov 2013
1st quality rice, PhakaKanhey	2,915	2,920	2,930	2,920
2nd quality rice, Neang-Menh	2,420	2,428	2,438	2,428

Source: National Institute of Statistics (NIS), CPI 2013

The 2013 floods are unlikely to have serious impacts on government budget performance, despite an additional budget burden being anticipated for 2014, due to rehabilitation of some damaged infrastructure. Fiscal revenue collection is expected to continue improving in 2013 and might reach 14.4 percent of GDP, while expenditure is kept at about 19.9 percent of GDP. The budget deficit of about 5.5 percent of GDP would be supported mostly by foreign financing, with a small proportion to be settled by domestic financing. Growth of fiscal mobilization is mainly due to strong and buoyant economic activity and strengthened revenue administration. According to the Government's draft 2014 Budget Law, its total expenditure for 2014 is planned at 20.6 percent of GDP, and targeted revenue collection of 15.3 percent of GDP (with expected fiscal deficit of 5.3 percent of GDP)(RGC, 2013). The increased expenditure outlay in 2014 is driven by a planned increase of the civil service wage bill. The Government is poised to raise the wage bill from its baseline threshold of 40 percent of total current expenditure to 45 percent of total current expenditure in 2014 (which would be equivalent to about 5 percent of GDP) to improve productivity and efficiency within government; at the same time deepening reforms of the Public Financial Management Programme, and the decentralization and de-concentration of the public civil service, while strengthening efforts to combat corruption.

The IMF 2013 Article IV mission to Cambodia indicated that, despite this progress, there is room to increase fiscal buffers that can be used to mitigate the adverse impact of potential shocks(IMF, 2013)(i.e. future economic downturn crises, natural disaster, etc.). Cambodia's fiscal policy is normally used to guide macroeconomic stability and serves as a tool to mitigate external risks and shocks (e.g. during the 2008/2009 global economic crisis), while the use of monetary policy is limited due to the highly dollarized environment of Cambodia's economy and the absence of interbank market. By the end of 2012, US dollar-denominated deposits at commercial banks

accounted for 96 percent of total deposits (95 percent by the end of September 2013). Some 83 percent of Cambodia's broad money is dollar-denominated currency (81 percent by the end of September 2013)(ADB, 2013). Given the pervasive dollarization and the defacto peg of the riel to the dollar, fiscal policy has served as the main instrument for macroeconomic management and has been a key factor leading the National Bank of Cambodia (the Central Bank) to keep the riel tightly linked to the US dollar, with fluctuations limited to a band of ±1 percent. The economy is effectively dollarized despite limiting policymakers' monetary options(World Bank, 2011) Cambodia has accepted obligations under the IMF Article IV (sections 2, 3, and 4) and maintains an exchange system free of restrictions on making payments and transfers for current international transactions (IMF, 2009).

Despite expectations that fiscal performance for 2013 will be uninterrupted, the Government is likely facing an extra burden for reparation and rehabilitation of some damaged infrastructure such as roads, bridges, etc. The draft Budget Law 2014 has proposed an increase in capital spending for MRD and MoPWT for building, reparation, rehabilitation and construction (RGC, 2013). The capital expenditure budget for MRD for 2014 is proposed at US$30 million (an increase of 20 percent in nominal terms compared to the 2013 Budget) while the capital expenditure budget for MoPWT in 2014 is proposed at US$61.3 million, 20 percent higher than that of 2013.

Oddor Meanchey, Chung Kal district , Focus Group Discussion in Chung Kal commune (Photo: HRF)

7 RECOVERY FRAMEWORK

The recovery framework is a synthesis of the sectorial and thematic early and longer-term recovery needs and priorities. It brings these together into a consolidated vision of how recovery and reconstruction could be done, based on assessed impacts and needs. The recovery framework aims to provide a basis for the design and implementation of a comprehensive and coordinated set of recovery interventions, under the leadership of the RGC.

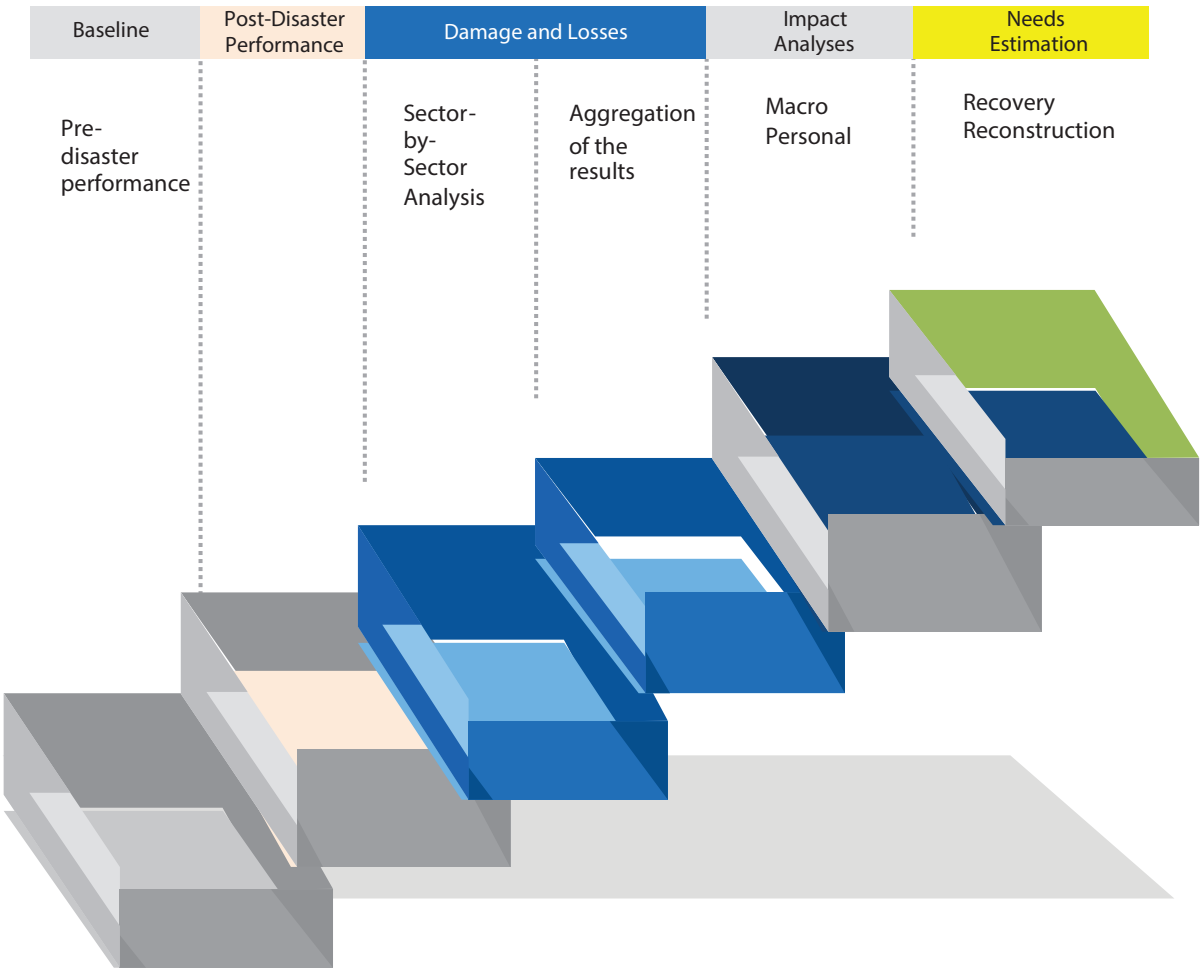
7.1 GUIDING PRINCIPLES FOR RECOVERY

The main goal of the PFERNA assessment was to estimate the loss and come up with a comprehensive Recovery Framework that could provide guidance for future reconstruction. Three objectives emerge within this simple main goal:

- **Evaluating** damage and loss;
- **Providing** an Early Recovery Framework (short to Medium term measures);
- **Suggesting** longer-term reconstruction assumptions and need.

Each of these objectives requires a firm theoretical background that could guide their achievement and better ground their findings in an interlinked process that should integrally seek to obviate the disaster, but also try to learn from it.

FIGURE 50: DAMAGE AND LOSS ASSESSMENT PROCESS



Source: GFDRR, PDNA Conceptual Framework – DaLA Generic Procedure, 2010

Any disaster may have two main types of effect on a society and its economy: total or partial destruction of physical assets, and subsequent changes or losses to the economic flows in the affected area. As noted above the DaLA, , defines these two effects as **Damage** and **Loss**. The quantitative estimation of damage and loss enables the analysis of disaster impact at different levels. At the macroeconomic level, estimated sector-wide losses enable the determination of disaster impact on overall economic performance in terms of temporary GDP growth modification. They can also explain temporary changes in the balance of payments and trade, as well as in the fiscal position of the affected country. At the micro level, estimated sector losses are used to assess the decline in employment and on personal or household income. Further refinements of disaster impact estimation enable the analysis of possible poverty aggravation due to the disaster(GFDRR, 2010).The reflection about the loss is functional to the elaboration of a recovery framework. The overall focus of the recovery approach is to restore the capacity of national institutions and communities to recover from a conflict or a natural disaster, enter transition or 'build back better', and avoid relapses. In this overall consistent approach, two different points of view need to be adopted in order to make any intervention prompt, but also sustainable: an early recovery point of view and a longer-term reconstruction point of view (GFDRR, 2010).

Early recovery is a multidimensional process guided by development principles. It begins in a humanitarian setting and seeks to build on humanitarian programmes and catalyse sustainable development opportunities. It aims to generate and/or reinforce nationally owned processes for post-crisis recovery that are resilient, participatory and sustainable. It encompasses the restoration of basic services, livelihoods, transitional shelter, governance, security and rule of law, environment and other socio-economic dimensions, including the reintegration of displaced populations. It strengthens human security and aims to begin addressing the underlying causes of the crisis. Early recovery is the response to a transformation process, starting immediately after the onset of a crisis. The priorities of this response are to produce immediate results for vulnerable populations and to promote opportunities for recovery setting the basis for a longer-term reconstruction. Longer-term reconstruction needs to be based on the recovery framework and should take into consideration important soft and hard interventions that could mitigate a similar event in the future. The estimation of reconstruction needs is made on a sector-by-sector basis, using pre-defined common standards across the board. These can provide overall figures, but also highlight further specific assessment or research needs (UNDP, 2007).

7.2 OVERALL RECOVERY VISIONS, GOALS AND OBJECTIVES

With Cambodia's specific flood situation in mind, and the country's existing capacity on governance, natural resource management and disaster risk reduction, the early recovery will focus on improving the national and local capacity of mitigating the short-term impact of the disaster, restoring and sustaining livelihoods, and reducing vulnerability and future risks in longer-term rehabilitation. It would be achieved through pursuing the following strategies:

- Leveraging resources and expertise for positively influencing and assisting the RGC in planning and implementing its recovery and restoration programme. It would facilitate application of best international practices and provide a technical backstop in specific fields of post-disaster recovery, with emphasis on the capacity development of multi-sectorial national and local partners in the process;
- Promoting application of risk reduction approaches in sectorial recovery activities, e.g. safe rebuilding, better land-use planning and disaster preparedness in all sectors. It would aim to mainstream disaster risk reduction in both planning and implementation of the recovery and restoration, so as to strengthen safeguards against future disasters;
- Assisting the RGC in coordinating early recovery support from international organizations, NGOs and CSOs, recognizing the strengths and competencies of each partner and leveraging resources to maximize gains in a collaborative way. Wherever feasible, it would develop a partnership with the thriving private sector in Cambodia so that its technology and other capabilities benefit the people in need;
- The RGC shall develop its own internal capacity for early recovery in the course of planning and managing the programme so that it could integrate with existing development policies and practices in the country on a long-term basis;
- The evidence-based early recovery interventions shall be based on factual assessments of conditions in the affected areas, taking into account cultural differences in minority areas and

the different needs of women and men, as well as the special needs of orphans, the elderly, disabled, people living with HIV/AIDS and other vulnerable groups;

- Promoting gender equality in disaster risk reduction and ensuring gender-mainstreaming recovery in support of women and men to build back better. Efforts will be made to ensure women's unique interests are incorporated and they have equal opportunity in recovery and restoration.

The overall Post-Flood early recovery would aim to:

- Strengthen post-disaster governance functions by reinforcing capacity at the national and local levels in planning and managing early recovery processes to address immediate post-flood needs of affected populations, particularly the most vulnerable ones;

- Mainstream disaster risk reduction into recovery and the nation's long-term development policy frameworks, with particular emphasis placed on capacity development at existing national and sub-national levels;

- Facilitate coordinated, effective building back better efforts by contributing to multi-stakeholder, community-based recovery processes that are sensitive to multi-hazards and with disaster risk reduction approaches woven into sectorial recovery efforts, particularly in disaster-prone communities.

Timeframe wise, the Early Recovery programme has been separated into three phases, with inter-linked but different objectives:

- **Short-term Early Recovery:** three to six months after the emergency response phase with priorities on supporting existing recovery efforts, recognizing the needs and aspirations of the members of the affected communities/sectors, especially the most vulnerable and disadvantaged, restoring basic social services and critical infrastructures; and detailed planning and resource mobilization for longer-term rebuilding and rehabilitation;

- **Medium-term Recovery:** this would last in a timeframe of six to eighteen months, with focus on engaging multi-stakeholders in rebuilding and securing people's livelihoods, creating regulatory and policy environments for longer-term rehabilitation; rebuilding/retrofitting infrastructures with disaster risk reduction measures integrated, as well as strengthening national and local capacity in organizing and implementing early recovery programmes;

- **Longer-term Rehabilitation:** eighteen months and beyond, mainstreaming disaster risk management into national and local laws, regulations, development policies and processes, upgrading/reconstruction of key infrastructure with risk mitigation functions; developing national and local contingency plans for key sectors and taking a systematic approach in building capacity for responding to and recovering from natural disasters at all levels.

Note: *Many of the areas of possible early recovery could be scaled up, or otherwise modified, depending on interest and resources available.*

Banteay Meanchey, Pnom Srok Road to Trapaing Thma dam2 (Photo: HRF)

8 PROPOSED RECOVERY PRIORITIES BY SECTORS AND ESTIMATED RESOURCE NEEDS

8.1 OVERVIEW

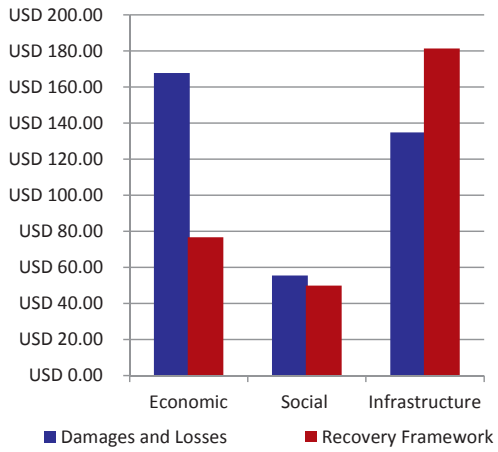
The recovery framework proposes a set of recommendations and rehabilitation interventions totalling US$306.28 million. This economic need will be distributed as detailed in the table below in a timeframe that spans from 2014 (short to medium term) to 2016 (long term). The financial requests, if compared to the damage and loss figure, account for 86 percent of the actual negative effect caused by the floods.

TABLE 34: SUMMARY OF RECOVERY NEEDS PER SECTOR AND PER SELECTED TIMEFRAME

Sectors and Subsectors	Short term (million US$)	Medium Term (million US$)	Long Term (million US$)	Total (million US$)
Economic	41.73	18.10	16.26	76.09
Agriculture, livestock, Fisheries	41.70	17.50	15.60	74.80
Industry and Commerce		0.10	0.10	0.20
Tourism	0.03	0.50	0.50	1.03
Market	-	0.00	0.06	0.06
Social	23.75	10.13	15.52	49.39
Livelihoods	13.33	3.33	3.33	20.00
Housing	0.06	0.95	10.00	11.01
Education	9.99	1.69	0.20	11.88
Health	0.25	4.04	1.50	5.79
Landmines	0.12	0.11	0.49	0.72
Infrastructure	52.93	61.33	66.54	180.80
National and Rural Roads	43.60	52.00	30.00	125.60
WATSAN	1.33	1.33	0.54	3.20
Water and Irrigation system	8.-00	8.00	36.00	52.00
Total	118.41	89.56	98.32	306.28

Source: PFERNA Assessment Team, 2013

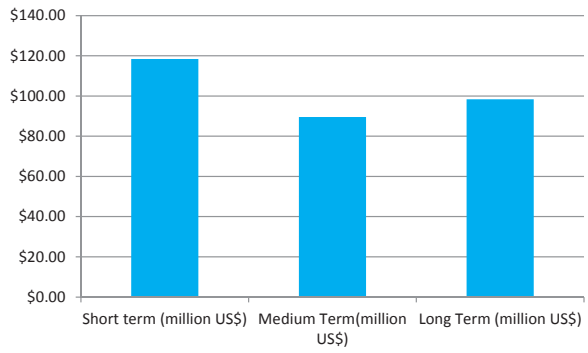
FIGURE 51: DAMAGE AND LOSS AND RECOVERY NEEDS COMPARISON IN MILLION US$



Source: PFERNA Team Assessment, 2013

When compared with actual loss, the recovery needs, costed in millions of dollars, are relatively lower in all three sectors, and significantly lower for the economic sectors. A closer look at each sector reveals that some recovery recommendations costed interventions that almost compensated the occurred damage and loss (social sectors), while others preview longer-term interventions to prevent future, and maybe much higher, human and economic loss (infrastructure) that a natural disaster of the same kind might involve. As per the landmines sector, it is worth noting that the damage cannot be fully costed. The long-term effects of having new areas exposed to landmines could imply much higher numbers of casualties, which could be prevented with the right education. Equal mismatch can be observed for the economic sector damage and loss and recovery measures that do not seem to be able to compensate, in the short term, the loss experienced during the floods. Longer-term and relatively inexpensive actions, such as the provision of low-interest special credit lines, could help these sectors fully return this year's lost investments, at no-cost. The timeframe of the recovery suggests actions that seem to distribute equally overtime, with a concentration of more resources, 39 percent, in the short term and almost equal resources, in money, over the medium, 29 percent, and longer term, 32 percent.

FIGURE 52: TIME DISTRIBUTION OF RECOVERY NEEDS



Source: PFERNA Team Assessment, 2013

8.2 SECTORIAL RECOVERY RECOMMENDATIONS

8.3 ECONOMIC SECTORS

8.3.1 Agriculture, Livestock and Fisheries

In building resilience to shocks of disaster and climate change, especially at the grassroots level and that accentuates vulnerability and risk, the following should be considered as priorities in post-flood recovery:

Short term (3-6 months): Restore livelihoods

- Seasonal provision of resilient rice seeds through provision of rice kits;
- Recovery kits for vulnerable families: poultry and home garden with drip irrigation;
- Ensure proximity of agricultural extension services in the affected areas;
- Rehabilitate the irrigation canals/schemes including the secondary and tertiary canals;
- Community mobilization through establishment of saving groups and self-help groups.

Estimated cost: US$41.7 million

Medium term (6-18 months): Income generation

- Continue the assistance to farmers through provision of agricultural extension services;
- Farmers can access rural micro-finance services with appropriate interest rates;
- Perform Farmer Field Schools (FFS) with introduction of resilient rice seeds and use of new technologies in each affected community, e.g. drum seeder.

Estimated cost: US$17.5 million

Long term (18 months and beyond): Preparedness Policy

- Disaster risk management to be mainstreamed into Agriculture Development Policy and to be applied in local planning processes;
- Mainstreaming disaster risk management and climate change into the ministry's Policy Framework and Strategy Development (extension policy);
- Develop guidelines of mainstreaming disaster risk management and climate change in a practicable, decentralized and de-concentrated planning process;
- Develop capacity of government personnel at national and sub-national level;
- Construction of new irrigation canals/schemes to farms cultivating dry-season rice.

Estimated cost: US$15.6 million

8.3.2 Industry and Commerce

Shortterm (3 - 6 months)

- The Government should postpone tax collection or introduce a short tax holiday/tax exemption policy for the affected industry/commerce (tax exemption of two to six months according to the industry);
- Provide quick loans for buying productive equipment and enhancing access to finance for those affected;
- Rural Development Bank or micro-finance institutes should be encouraged to provide low interest loans to the affected rice millers/families to buy paddy rice, machinery and equipment for production, or for those whose commercial activity is at risk;
- The National Bank of Cambodia (NBC) and Commercial Bank should establish special standard loan procedures for restructuring and extending loan periods to the affected debtors. The Government had already appealed to MFIs and banks for this policy and there is compliance and support to those affected. The policy should be continued in case of future disaster;
- The size of the loan can be increased to half a million US dollars or one million US dollars (especially for large rice milling enterprises in Banteay Meanchey, Battambang and Siem Reap);

- Despite some of these considerations having been initiated and proposed by the Government right after the floods, many people are still in need, especially those who are not associated with MFIs or commercial banks.

The estimated cost of the above-mentioned recommendations is zero. Nonetheless, the Rural Development Bank (RDB) should set aside US$5 million in low-interest loans (at less than 5 percent per annum) to the seriously affected rice millers.

Medium to long term (6 - 18months and beyond)

- Develop a regulatory framework and strengthen capacity of local authorities to provide early preparedness, timely information and immediate response to natural disasters, especially floods, to which Cambodia is prone (compared to other natural disasters);
- Provide technical support to the industry sector in understanding disaster/flood management plans;
- Expand the role and function of commune councils to collect, analyse and assess damage and loss caused by disasters, so that the response from central government and donor communities can be appropriate, timely and efficient;
- Develop capacities of provincial departments of line ministries, especially the Provincial Department of Industry and Provincial Department of Commerce, on immediate response to floods to help the private sector establish its own disaster-management plan.

Estimated cost: US$0.2 million

8.3.3 Tourism

Shortterm (3- 6 months)

- Media information to be published and distributed to tourists of areas affected by floods;
- Advertise and raise awareness via media channels about affected sites;
- Clean up flood-hit areas (use all resources including volunteers, students, etc.);
- All tourist information centres provide advisory on the tourist safety.

Estimated cost: US$0.03 million

Medium to longerterm (6 -18 months and beyond)

- The Government, donors and stakeholders must continue investing and improving tourism-related infrastructure;
- All tourist information centres offer information about safety concerns;
- Improve and rehabilitate physical infrastructure such as roads, drainage, water and sanitation that are connected to tourist sites.

Estimated cost: US$1 million

8.3.4 Market

No significant early recovery measure seems to be necessary to repair damage incurred directly to markets. Immediate recovery measures have already been put in place by market managers, and some markets have been relocated to different areas.

In the longer term a further assessment of the 46 district markets at risk would be needed to better evaluate if they need to be placed on higher ground or moved to another area. Rural roads surrounding district markets and connecting them to villages need to be improved to allow trading and access to food during floods, as well as a rapid return to normality after the floods.

Regarding the indirect effects floods might have caused to markets, it is worth noting that the significant loss in rice cultivation fields might lead to a rapid price increase in the coming months (despite rice prices remaining relatively stable at the time of assessment). Reserves should be prepared to inject rice stocks into the market and lower the price if needed in the near future.

Longer term (6 -18 months and beyond)

- Disaster risk assessment of 46 district markets at risk of floods.

Estimated cost of 46-district assessment: US$0.06 million

Estimated cost of the necessary rice quantity to be injected should be evaluated according to the price increase.

8.4 SOCIAL SECTORS

The floods hit 20 provinces where poverty levels were already relatively high. The general profiles of households in these provinces suggest that households rely primarily on rice and other crop farming. Agriculture, rice farming

in particular, is the major source of food consumption and income. For rural households, November and December represent an accelerated period of income generation, either harvesting their own crops or selling their labour to other farms. These jobs were decimated with the 2013 floods. While rural Cambodians are highly vulnerable to risks and shock, the flooding was another blow to the current livelihoods. The loss of livelihoods incurred by the flooding will further maintain the affected communities in poverty, and nullify some of the economic and development progress made in recent years. Farmers and unskilled labourers, who rely on agriculture for food and income, have experienced the most severe consequences. Particularly affected groups include children, people with disabilities, female-headed households and older persons. These effects have been recognized to be caused by the disruption of livelihoods, but also of main social services like health and education, as they could be hampered by the dislodging of landmines.

8.4.1 Demographics and Livelihoods

The figures above do not reflect the human misery in terms of displaced people, homeless families, whole villages that must be relocated, and people living in temporary shelters. The restoration of people's livelihoods in the recovery phase becomes thus even more critical. In terms of moving forward, affected households overwhelmingly stated their desire to be taught more about coping with disasters, and that such disaster preparedness training could come not only from government, but also from community leaders, including pagodas.

In terms of immediate needs in the coming three to six months, the affected households stated food support and house repairs. In terms of longer-term needs, communities cited infrastructure, such as dams and roads, to prevent flooding in the future as their main priorities. The following strategic framework will contribute to long-term risk reduction.

1. Short-term "emergency response" needs to be linked to sustainable rural economic development and development of effective social safety nets;

2. Risk transfer mechanisms (micro-credit, micro-insurance, capacity development at the household level, alternate livelihood opportunities, etc.) are to be put in place, insulating the poor and marginal farmers as well as less risk-bearing households from the emerging risks;

3. Coordinated strategies and actions based on reliable and updated information are essential to address risk reduction issues.

The starting point for any intervention needs to be to support the restoration of livelihoods of the affected households. Areas close to poor people's livelihoods include cash-for-work, food-for-work, supply of subsidized inputs, access to productive assets and access to non-exploitive credit. The recommendations listed below combine all this within the particular context of Cambodia, as well as in synergy and convergence with other on-going efforts undertaken by multiple actors.

A total of US$15-20million is needed for the recovery and rehabilitation of the livelihood sector.

The following activities have been deemed priority recovery needs in the livelihood sector:

Short term (3-6 months)

- Enhance the seed supply for the subsequent dry season (e.g., rice, maize, cassava, sweet potato, vegetables, mung bean, groundnut, soybean and sesame);
- Supply fertilizers, tools, livestock and fishery resources to the most affected farmers and fishermen;
- Establish large-scale cash-for-work, food-for-work and local employment generation schemes.

Estimated cost: US$13.33 million

Medium term (6-18 months)

- Continue short-term assistance schemes (e.g., seed, fertilizer, tools, capital and capacity development) to strengthen the recovery process;
- Enhance agriculture and livestock production and small agri-business/rural entrepreneurships through the provision of seed, tools, micro-credit, livelihood relief funds, extensions and other means;
- Focus on gender-sensitive alternative employment generation to compensate loss of livelihoods in the immediate post-disaster period.

Estimated cost: US$3.33 million

Long term (beyond 18 months)

- Strengthen the national and provincial capacity for emergency response (focusing on the institutional capacity of agencies such as NCDM, PDCM);
- Build capacity at the household level (e.g., focusing on small holders and creating storage facilities, seed banks and grain banks);
- Integrate emergency food security, poverty alleviation and rural development programmes;
- Promote crop insurance as a risk-transfer mechanism;
- Strengthen the link between agriculture and industry and commerce to reduce risks and to increase incomes and production;
- Support the commercialization of agriculture, livestock and fishery products, and create resilient agricultural fisheries and livestock assets ensuring community participation.

Estimated cost: US$3.33 million

8.4.2 Housing

Post-disaster housing reconstruction needs to be integrated into holistic planning of settlements, including physical infrastructure, services and economic opportunities, to be of value to communities. Reconstruction needs to be planned in collaboration with recovery of infrastructure, services and livelihoods.

An emphasis on proper land-use planning and disaster resistant construction is crucial to avoid recurrent damage and loss in the sector in the face of increasing frequency and impact of disasters, as evidenced in the vulnerability profile of the areas assessed. Safe and healthy housing cannot be independent of basic amenities, such as water and sanitation. Reconstruction costs for housing should incorporate the cost of rehabilitation or construction of water and sanitation facilities for affected households. Vulnerable groups, such as households with little or no capacity to reconstruct their houses should be prioritized for assistance. These groups may consist of female-headed households, households with heads who are disabled or elderly, and labour-poor households.

The majority of those assessed are illegal tenants in commune-owned land who do not own any land. The situation is similar in many disasters, where the most vulnerable group has been illegal tenants who live in high-risk locations. Steps need to be provided to reduce the risk of these communities by ensuring secure land tenure, while taking into account their willingness to relocate and their access to services, infrastructure and livelihoods.

The aim of long-term recovery in the housing sector should be to provide access to safe, healthy and culturally appropriate housing to communities vulnerable to disasters such as storms and flooding.

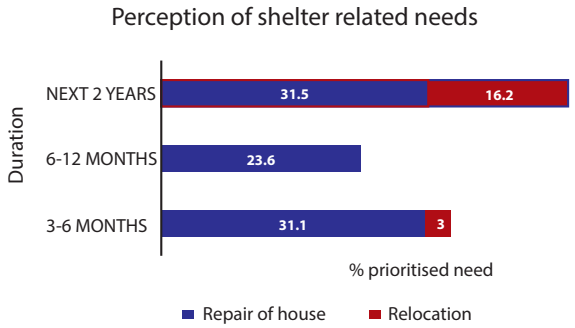
The household survey indicated that communities ranked shelter and housing needs high among their priorities after the disaster. Shelter-related needs were highest in the long term, including 16.2 percent of the respondents who wished to relocate from their current locations.

Short term (3-6months)

- Provide basic shelter kits to 300 affected families.

Estimated cost: US$0.06 million

FIGURE 53: PERCEPTION OF SHELTER-RELATED NEEDS FROM HOUSEHOLD SURVEY



Source: PFERNA Team Assessment, 2013

Medium term (6-18 months)

Focus on repair and reconstruction of damaged and destroyed houses as well as building the capacities of local builders to improve disaster resilience of the reconstructed households. In detail:

- Reconstruction of 190 destroyed houses incorporating disaster resilient features (24 sq. m.);
- Repair and retrofitting of 210 damaged houses to improve their resistance to future disasters;
- Training of 200 local construction tradesmen in disaster-resilient construction;
- Voluntary/consultative relocation of affected communities in high-risk areas to safer ground.

Estimated cost: US$0.9535 million (See detailed breakdown in the Annex section).

Long term (beyond 18 months)

Focus on building capacities of stakeholders to implement programmes to integrate disaster risk reduction into spatial planning and development so that housing and settlements in general are more resilient to disasters, thereby reducing recurrent economic damage and loss to households and the nation as a whole. In detail:

- Development of a disaster-resilient land use plan for disaster affected provinces of Cambodia;
- Development of zoning and building regulations for disaster-affected provinces incorporating DRR measures at district level;
- Building capacities of communes to enforce building and zoning regulations.

Estimated cost: US$10 million (See detailed breakdown in the Annex section)

8.4.3 Education

The assessments done to date provide a basis for planning but eventually they must be expanded to cover the remaining areas less severely affected by the floods. Some organizations which were interested in assisting with the immediate needs did not have the necessary technical expertise, even though they have access to funding. Recently, Save the Children, Action Aid, Oxfam, People in Need, Plan International, World Vision and others have developed Early Recovery Plans and proposals and submitted them to donors, but they have not considered education rehabilitation at this stage. The reports of the Department of Construction should be shared with NGOs and other donors so that they can assess where they will be able to help.

To prevent the recurrence of natural disasters such as the 2013 floods, MoEYS must have a programme in place to maintain school constructions and upgrade or replace buildings that are not safe in high winds and floods, which are becoming more frequent. These programmes must cover all provinces of Cambodia, not just the area affected by the floods in 2013. Consideration should also be given to other natural disasters. Lightning strikes have become an increasing problem in Cambodia as rural buildings are electrified without proper safety standards.

In the long term, MoEYS needs to develop a school infrastructure maintenance programme. MoEYS reported that there is very limited budget from the Government for school maintenance, and this budget must also be used for the other running costs of the schools. Without maintenance of the school facilities, even the modern concrete buildings financed by international donors will fall into disrepair. This maintenance programme must be financed by the RGC.

To address the shorter-term needs of the affected schools, MoEYS proposes to randomly select 252 schools (20 percent of 1,280 schools) representing all schools affected by the floods in 2013. Engineers from the Construction and Planning Department of MoEYS assessed school building conditions, while other departments such as Primary Education and Curriculum Development assessed school enrolment figures. Results revealed that intervention is urgently needed. Based on the samples surveyed to date, the cost of this short-term and medium-term intervention would be US$15.8 million.

The flood had a major impact on children's safety in regard to health and hygiene. The school toilets were severely damaged and are not accessible or functioning, meaning girls were particularly reluctant to come to school. At the beginning of the school year many children who missed school had little hope of being able to catch up. Some schools were used as emergency shelters during disasters, which can result in damage to the school infrastructure as well.

Preliminary analysis shows that the full needs for early recovery response in the education sector would be beyond the scope of resources immediately available to MoEYS. However, there has been consideration from development partners. Funds may be made available from the existing ADB or World Band financing programmes providing assistance to MoEYS, so a measured immediate response, targeting the most in urgent needs for school reconstruction, is feasible. Reports from the Department of Construction of MoEYS can provide the basis for prioritizing responses to the most needed areas.

In the short term, a more focused response is needed to target the education facilities of the affected schools that are still having difficulty repairing damaged buildings. The detailed engineering reports on the buildings surveyed in two provinces covering 12 percent of the flood-affected schools provide a means for doing this. These reports can be examined on a case-by-case basis together with an inspection of the photographic evidence, school enrolment records and total number of classrooms. This will determine which buildings require priority repairs or replacement.

The Department of Construction has estimated that between 25 percent and 30 percent of the buildings surveyed to date require immediate intervention for schools to resume normal teaching. This will be verified when the compilation of all reports is complete and they have been screened and prioritized. An estimated budget of US$16 million will be required to meet these immediate needs.

Short term (3-6 months)

- Emergency repair of buildings currently not suitable for teaching;
- Emergency replacement of teaching and learning materials;
- School furniture, equipment.

Estimated cost: US$9.99 million (See annex for detailed breakdown)

Medium term (6-18 months)

- Reconstruction of damaged school buildings.

Estimated cost: US$1.69 million (See annex for detailed breakdown)

Long term (18 months-beyond)

- Establish maintenance mechanisms of all school buildings in Cambodia (RGC Annual Budget);
- Systematic upgrading (plinth) of existing school buildings in Cambodia to make them safer in high winds, more resistant to floods and other natural disasters (RGC Annual Budget) by re-enforcing existing safe school construction guidelines;
- Finalize and disseminate education contingency plan and support school committee to strengthen preparedness capacity and develop a response plan;
- To compensate the loss of teaching hours MoEYS and PoE shall replicate the model of Temporary Learning Spaces when floods disrupt education. Resources will be mobilized from civil society organizations and the private sector;
- Reinforce the implementation of a flexible school calendar (flexible school curricular). Use existing guideline of MoEYS.

Estimated cost of long-term intervention US$0.2 million

The cost for replacement is estimated at US$180/^{m2}. A typical five-classroom building is 360^{m2}, so the cost of replacement would be US$65,000 per replacement building. The cost of repair work is estimated at US$20/^{m2}, furniture repair costs were estimated US$430/classroom. As reports are compiled for the northern provinces, where the flash floods caused most damage to furniture, materials and equipment, these figures can be further refined.

8.4.4 Health

To enhance potential long-term benefits of health protection, the sites for the construction of health facilities must be selected appropriately, taking into account improved design and better construction standards (elevated above the ground for centres located at flood-prone areas). Resources for maintenance and repair of health facilities should be planned adequately in annual operational plans (AOPs).

To reduce the risk of future losses from disasters, all affected health centres should be retrofitted following the new design of health facility construction. Relocation of some health centres to safer areas will have to be considered.

Short term (3-6 months)

- Health Outreach Services during and after emergencies should be better prepared and managed in alignment with the improved preparedness plan of PHDs and PCDM;
- Provide preventive and curative care, including maternal and child health services, to affected populations (after floods), with basic health education to promote good practices of hygiene and sanitation;
- Continue to support village health support groups (VHSG) to participate in conducting health outreach activities in all affected villages as part of their routine support from the health centre;
- Urgent repair of minor damage to health centre infrastructure and equipment.

Estimated cost: US$0.25 million

Medium term (6-18 months)

- Community education and awareness-raising programmes should be integrated, with a

minimum package of activities, through community health networks;
- Retrofitting and upgrading of 48 health centre buildings (elevated above ground) and two OD buildings.

Estimated cost: US$4.04 million

Longterm (18 months and beyond)

- Regulatory framework and policy development should be taken into consideration during 2014 AOP implementation (government budget);
- Provide capacity development to HDMC, including strengthening the function of rapid response teams at sub-national level. This should be taken into consideration during 2014 AOP revision and planning process;
- Improve the data management system for health. This should be considered when providing technical support to HDMC at all levels.

Estimated cost: US$1.5 million

8.4.5 Landmines

As noted in the assessment, the mine action sector has essentially responded to, and recovered from, the impact of flash flooding. There remain some steps that can be taken to strengthen resilience to this threat, as detailed in the recommendations section.

Short term (3-6 months)

- Commission a mine action operator to undertake further comprehensive non-technical and technical surveys in communities reporting mines and ERW in new areas after floods. Surveys should focus on suspect spoil (deposits of soil moved in flooding) that is believed locally (by CBMRR agents) to contain possible washed out mines and ERW. Some might argue that the CBMRR agents have already undertaken a non-technical survey, but validation of current reports through repeated non-technical survey is deemed important.
- Commission a small study to gather and amalgamate all survey data on landmines and ERW, washed out or newly discovered after the floods. The CMAA/UNICEF survey, together with the data provided by mine action operators, has been helpful in undertaking this assessment, but the data sets indicate gaps, such that no one set contains the complete picture. Bringing together all the data and producing a comprehensive list, perhaps one which could be further verified by verification/survey with CBMRR officers, community liaison and other field staff of mine action agencies operating in western Cambodia over the next few months, could provide a final and comprehensive impact, as well as ensuring that any residual items not previously reported are destroyed as spot tasks[34].
- Undertake risk assessments for confirmed hazardous areas (CHAs) and suspected hazardous areas (SHAs) likely to be affected by future flash floods. This would involve identifying high land CHAs/SHAs, especially those directly above or in the catchments of river systems leading into populated areas. Particular attention should be paid to CHAs/SHAs in areas that have experienced deforestation.
- Refrain from initiating mass 'emergency' MRE campaigns until the evidence-base of impact has been established. This is not a widespread issue, but is relatively limited in its scope and scale. 'Do No Harm' concepts should be applied to all such programming no matter how well intentioned.
- Consider targeted emergency MRE campaigns only in communities that have been identified as vulnerable. Such MRE should focus on basic messages such as:
    a. Awareness that flash floods can move mines through wash out and cause ERW and mines to be exposed through erosion;
    b. Recognition;
    c. 'Don't Touch' / Mark / Warn Others;
    d. 'Report' – to whom, etc.

Estimated cost: US$0.12 million

Medium term (6-18 months)[35]

- Conduct mine risk education in flooding areas contaminated by mines.

Estimated cost: US$0.11 million

34 *Recommendations 2 & 3 concern essentially the same need: to develop a comprehensive final picture of the extent of the problems caused by the flash floods in the mine action sector. 2 does not preclude 3, and 2 could be a part of 3.*

35 *Medium term recommendations are supposed to take place only if the findings assessments listed under the short term measures deem them necessary.*

Longer term (beyond 18 months)[36]

- Ensure that further research is done to establish the reality of risks associated with mine wash out and exposure from erosion as a result of flash flooding.
- Ensure sustained funding for, and increased technical capacity of, the CBMRR network as its work has proved essential in limiting the impact of mines that have either moved or been exposed as a result of flooding.

Estimated cost: US$0.49 million

8.5 INFRASTRUCTURE

The national and provincial road network was observed to be well equipped and resourced with both national and international construction companies and highly technical competent engineering companies to respond to emergencies similar to the 2013 floods.

Rural roads in the locations inspected were very poorly supported in terms of technical and construction resource capabilities. UNDP or other agencies supporting MRD-DRR could make a significant impact in this area.

Rural roads are critical to the most vulnerable of socio-economic groups and will impact the recovery effort in shelter, WATSAN and livelihoods and in connecting small lot farmers with markets to supplement income-generating activities.

It is important that intervention in the rural roads is rapid, and takes place before the next rainy season. It should concentrate on a priority list of access roads:

a. **Rehabilitation phase:** Bring roads back to minimum maintainable standard or make improvements in the road, including locations of culvert washouts and raising embankments where funds allow;

b. **Routine Maintenance:** Establish labour-based maintenance system;

c. **Spot Improvements:** Plan and carry out a follow-up programme of selected spot improvements.

Programme interventions should be considered for small-scale contractor development and local labour-based interventions, empowering the community to take ownership of rural roads in remote locations.

Basic access interventions are small-scale, varied and scattered. This work is ideally done by small-scale labour-based contractors and community contractors.

Such types of contracting require:

1. An appropriate policy environment;
2. Capacity development programmes for designing, managing and executing maintenance contracts and regular supervision by technically competent personnel during the dry season;
3. Appropriate rural-compatible equipment like tractors, trailers, pull-behind rollers and pull-behind graders;
4. Appropriate procurement procedures.

For rural roads, floodplain management should be addressed by adopting a resilience approach to road design and construction, with for example, dry stone causeways that are resilient to damage. This is more sensible than trying to install a pipe culvert when the catchment and rainfall intensities at any one location are unknown.

UNDP has developed a proposal to support an early warning system (EWS) that is currently being considered for approval. The EWS proposal concentrates on the capacity and infrastructure to collect data, which is very important. The use of data by the Department of Hydrology and River Works (DHRW) in predicting flood events is possibly equally or more important. Developing sophisticated predictive software and flood modelling, in conjunction with the MRC to enable prediction and locations and peak flow levels of flood events, should be an integral part of any EWS. This would be true of the negative impact of road embankments, such as NR8 in Prey Veng, on the floodplain, and the sudden release of waters, like the breaching of the Kamping Pouy dike wall.

Due to time limitations, no attempt was made to assess the capabilities and capacity of the DHRW, but it is thought that intuitional strengthening of this department is critical to a EWS.

36 *Part of the long term recommendations are supposed to take place only if the findings assessments listed under the short term measures deem them necessary. Further discussion on the hypothetical revision of the long term measures need to take place before following the recommended actions listed under long term measures.*

As part of EWS, it is important to establish safe havens as refuges for rural communities in flood events. The safe haven platform levels should be above the 1-in-100 year return flood period (similar in level to National Highways) and should have well-constructed latrines and water points also above the 1-in-100 year return level.

The desired long-term recovery outcome in the rural roads sector should be to ensure that roads are compatible and passable for a 5- to 10-year flood return period, with the least damage possible. The flood return period should be selected on appropriate economic drivers and engineering design, and may vary on a prioritized basis within the rural roads network.

8.5.1 National and Rural Roads

The ADB Reconnaissance Mission[37] aimed to provide additional financing to reconstruction; the most urgent works have been undertaken by MPWT and its provincial departments at a cost of some US$7 million. MPWT is now preparing 13 contract packages in six provinces[38] to restore national roads with a total estimated cost of some US$53.92 million. This is for the reconstruction of national/provincial roads and the contract packages will serve about 1,151,000 beneficiaries. Five contract packages for the reconstruction of two bridges (one in Banteay Meanchey on PR 156 D and one in Kampong Cham on PR 270) and three roads, with a total estimated cost of US$7.108 million, are part of the repairs needed before the next wet season, to avoid more extensive damage in case of more flooding. The Government, with the support of ADB, is planning to: (i) restore the damaged roads to passable condition through grading and filling damaged areas by January 2014; (ii) raise embankments and restore structures with appropriate road profile and compaction such that they would not be washed away during the rainy season of 2014; and (iii) pave the roads with a single seal[39].

Short to medium term (3-6 months)

- National and provincial roads emergency interventions. Promote access to and rehabilitation of rural roads and small infrastructure to enable sustained circulation of people in the most affected rural areas, concentrating on critical bottlenecks and broken culvert locations to assist access to means of production (agriculture) and strengthening reintegration of access to WATSAN, education, health and shelter recovery as prioritized funding arrangements allow;
- Rural roads emergency intervention to reinstate to pre-event conditions
- Investigate more fully the construction costs, and scrutinize the location and extent of damage, from information provided by the responsible line ministries to form a complete understanding of the difference between replacement cost and building more resilient roads for all road types

Estimated cost US$ 43.6 million

Medium term (6-18 months)

- National and provincial roads and drainage structures post-event reinstatement to pre-event conditions,
- National and provincial roads and drainage structures, early recovery improvement works,
- Rural roads drainage structures early recovery improvement works.

Estimated cost US$ 52 million

Longer term (18 months and beyond)

- Rural roads early recovery improvement works,
- Early recovery capacity building and technical assistance including further assessments and soft recommendations per the PFERNA infrastructure report.

Estimated cost US$ 52 million

8.5.2 Water and Irrigation System

Urgent repairs to be done before the coming wet season will mostly involve temporary actions to restore the use of canals/water reservoir embankments. This will involve bulk earthworks and management of the remaining water available behind damaged dam walls, and the partial if not full reinstatement of damaged canal banks and associated structures. The estimated cost for these interventions is about US$16 million serving about 400,000 beneficiaries. None of the damaged works inspected during the reconnaissance mission[40] were beyond immediate repair works to bring them

37 *Ibidem.*

38 *Battambang, Banteay Meanchey, Siem Reap, Kampong Thom, Kampong Cham and Preah Vihear.*

39 *As quoted in the Reconnaissance mission report, Ibidem.*

40 *Ibidemsee footnote.*

back to functionality for the 2014 wet season. However, MoWRAM is currently reviewing overall flood damage and is updating the list of schemes and required works (quantities and costs) that would be suitable for funding under the project. This includes identifying schemes that require short- to medium-term repairs, and others for which more permanent repairs should be deferred until after the next wet season. In light of the damage, it is foreseen that further detailed hydrological assessment and scheme operations planning will be required to mitigate future risks.

Estimated cost, short - to medium-term recovery: US$16 million

Estimated cost, long-term recovery: US$36 million[41]

8.5.3 WATSAN

Early recovery actions should focus on supporting the Government to implement large-scale well rehabilitation/chlorination in the hardest hit provinces. Current working practice for rehabilitation/chlorination is insufficient and assessing damaged wells, pumping out water, cleaning wells and restoring hand pumps will require more comprehensive support. More activities in terms of providing training and education for provincial technical personnel on WATSAN and hygiene promotion and sanitation will also be required in rural areas, to enhance the safety and health of the rural population.

These activities should be implemented with the aim of reducing vulnerability to future flooding and water logging, while mitigating/reducing the potential negative impact on the environment and increasing local communities' resilience to potential future floods.

Increased public awareness is required on WATSAN methods of how to treat water using purification sachets, safer excretal disposal and traditional methods to address the turbidity of water.

Wells and latrines built in low points need to be built on high points or on raised platforms and plinths.

Basic training sessions should be organized, specifically targeting women and children in the most at-risk communities, focusing on hygiene promotion, especially with families living in overcrowded spaces.

The availability of facilities in designated safe areas needs to be improved. Some of the displaced families returned home prematurely, when flood water was still high in their home villages. This was due to the safe areas having inadequate services, such as toilets and safe drinking water, etc. Sub-national authorities need to clearly know their roles and responsibilities.

Institutions and humanitarian resources tasked to deliver water and sanitation services at scale are still limited.

Monitoring the progress of the sector is difficult and a single standardized management information system is required. Technology options appropriate for such a challenging environment are not widely available. The sector requires a technology needs assessment.

<u>Short to medium term (6 – 18 months)</u>

Estimated cost of reconstruction and restoration of damaged wells: US$2.66 million

<u>Longer term (18 months and beyond)</u>

Estimated cost: US$5,000, multiplied for the 108 districts affected add up to US$0.54 million.

41 *Calculate as the difference of the declared damage US$52 million and the short to medium term recovery needs US$16 milllion.*

8.6 RECOVERY NEEDS FRAMEWORK

Sector	Sub-sector	Priorities	Estimated Cost (USD million)
Short-term Recovery Objective: supporting existing recovery efforts, recognizing the needs and aspirations of the members of the affected communities/sectors, especially the most vulnerable and disadvantaged, restoring basic social services and critical infrastructures; and detailed planning and resource mobilization for longer-term rebuilding and rehabilitation.			118.41
Economic	Agriculture, livestock, Fisheries	Seasonal provision of rice resilient seeds through provision of rice kit.	41.70
		Recovery kits for vulnerable families: poultry and home garden with drip irrigation.	
		Ensure proximity of agricultural extension services in the affected areas.	
		Rehabilitate the irrigation canals/schemes including the secondary and tertiary canals	
		Community mobilization through establishment of saving groups and self-help groups	
	Industry and Commerce	Postpone tax collection or introduce a short tax holiday/tax exemption policy for the affected industry/commerce (i.e. tax exemption for 2 to 6 months in accordance to seriousness of the industry).	None
		Provide quick loans for buying productive equipment and enhancing access to finance for the affected.	
		Rural Development Bank or Microfinance institutes should be encouraged to provide low interest loans to the affected rice millers/families to buy paddy rice, machineries and equipment of their production or those whose commercial activity is at risk.	
		The National Bank of Cambodia (NBC) and Commercial Bank should establish special standard loan procedures for restructuring and extending loan periods to the affected debtors.	
		The size of loan can be increased to half a million US dollars to one million US dollars (especially for large rice milling enterprises in Banteay Meanchey, Battambang and Siem Reap particularly).	
		Despite some of these considerations have been initiated and proposed by the government right after the floods, many are still in need especially those who are not associated with MFIs or commercial banks.	
	Tourism	Media information to be published and distributed to tourists of affected areas by floods	0.03
		Advertise and raise media awareness via media channel about the affected sites	
		Cleaning up flood hit areas (utilize all resources including volunteers, students…etc.)	
		All tourist information centres provide advisory on the safety of tourists	
	Market	None	- None
		SECTOR SUB TOTAL	41.73
Social	Demographic & livelihoods	Enhance the seed supply for the subsequent dry season (e. g., rice, maize, cassava, sweet potato, vegetables, mung bean, groundnut, soybean, and sesame);	13.33
		Supply fertilizers, tools, livestock, and fishery resources to the most affected farmers and fishermen;	
		Establish large-scale cash-for-work, food-for-work, and local employment generation schemes.	
	Housing	Provide basic shelter kits to 300 affected families	0.06
	Education	Emergency repairing of buildings where is not suitable for teaching	9.99
		Emergency replacement of teaching and learning materials	
		School Furniture, Equipment	

	Health	Health Outreach Services during and after emergency should be better prepared and managed as it shall fall into the improved preparedness plan of PHD/PCDM.	0.25
		Provide preventive and curative care including maternal and child health services to affected populations (after floods), with basic health education in order to promote good practices of hygiene and sanitation.	
		Continue to support VHSG to participate in conducting health outreach activities at all affected villages as part of their routine support from HC.	
		Urgent repair of minor damaged HC infrastructure and equipment.	
	Landmines	Commission a mine action operator to undertake further comprehensive non-technical and technical surveys in communities reporting mines and ERW in new areas after the floods.	0.12
		Commission a small study to gather, and amalgamate all such survey data on landmines and ERW washed out or newly discovered after the floods	
		Undertake risk assessments for CHAs/SHAs likely to be affected by future flash floods	
		Reframe from initiating mass, 'emergency' MRE campaigns until the evidence-base of impact has been established	
		Consider targetted emergency MRE campaigns only in communities that have been identified as vulnerable.	
		SECTOR SUB TOTAL	23.75
Infrastructure	National and Rural Roads	National and Provincial Roads Emergency Intervention	7.00
		Rural Roads Emergency intervention to reinstate to pre-Event conditions	28.00
		Rural Roads Drainage structure repair to pre-event condition	8.60
	WATSAN	Instigate a Rehabilitation programme of water and sanitation infrastructure, concentrating on a hazard risk reduction strategy for wells contaminated by naturally occurring arsenic, including public awareness campaign and an ongoing testing program of all wells in the identified affected areas.	1.33
	Water and Irrigation system	Restoration and rehabilitation of the Water Irrigation system	8.00
		SECTOR SUB TOTAL	52.93
Medium-term Recovery Objectives: engaging multi-stakeholders in rebuilding and securing people's livelihoods, creating regulatory and policy environment for longer-term rehabilitation; rebuilding/retrofitting infrastructures with disaster risk reduction measures integrated, as well as strengthening national and local capacity in organizing and implementing early recovery programmes			89.56
Economic	Agriculture, livestock, Fisheries	Continue the assistance to farmers through provision of agricultural extension services.	17.50
		Farmers can access to rural micro finance services with appropriate interest rates	
		Perform Farmer Field Schools (FFS) with introduction of resilient rice seeds and use of new technologies in each affected communities, i.e. drum seeder.	
	Industry and Commerce	Develop a regulatory framework and build capacity of local authorities to provide early preparedness, timely alert information, and immediate response of natural disaster especially floods	0.10
		Provide technical support to industry sector in understanding disaster/flood management plan.	
		Expand the role and function of commune council to collect, analyse and assess damage and loss caused by disaster so that appropriate response from central government and donor communities can be done more timely and efficiently.	
		Develop capacities of provincial department of line ministries especially the Provincial Department of Industry and Provincial Department of Commerce of flood immediate response in order to help private sector establish its own disaster-management plan.	

	Tourism	The government, donors and stakeholders must continue investing and improving tourism related infrastructure.	0.50
		All tourist information centres offer information about the safety concern.	
		Improve and rehabilitate physical infrastructure such road, drainage, water and sanitation that connected to tourist sites.	
	Market	None	None
		SECTOR SUB TOTAL	18.10
Social	Demographic & livelihoods	Continue short-term assistance schemes (e.g., seed, fertilizer, tools, capital, and capacity building) to strengthen the recovery process;	3.33
		Enhance agriculture and livestock production and small agri-business/rural entrepreneurships through the provision of seed, tools, micro-credit, livelihood relief funds, extensions, and other means;	
		Focus on gender-sensitive alternative employment generation to compensate loss of livelihoods in the immediate post disaster period.	
	Housing	Re-construction of 190 destroyed houses incorporating disaster resilient features (24 sq.m)	0.95
		Repair and retrofitting of 210 households to improve their resistance to future disasters	
		Training of 200 local construction tradesmen in disaster resilient construction	
		Voluntary/ consultative re-location of affected communities in high risk areas to safer ground	
	Education	Reconstruction of damaged school buildings	1.69
	Health	Community education and awareness-raising programs should be integrated with minimum package of activities and through community network for -health	4.04
		Retrofitting and upgrading of 48 health center buildings (elevated above ground) and 2 OD buildings.	
	Landmines[42]	Conduct Mine Risk Education in Flooding Areas contaminated by Mines	0.11
		SECTOR SUB TOTAL	10.13
Infrastructure	National and Rural Roads	National and Provincial Roads and Drainage structures Post Event Reinstatement to pre-Event conditions	20.00
		National & Provincial Roads & Drainage structures Early Recovery Improvement works	27.00
		Rural Roads Drainage structures Early recovery Improvement works	5.00
	WATSAN	Instigate a Rehabilitation programme of water and sanitation infrastructure, concentrating on a hazard risk reduction strategy for wells contaminated by naturally occurring arsenic, including public awareness campaign and an ongoing testing program of all wells in the identified affected areas.	1.33
	Water and Irrigation system	Restoration and rehabilitation of the Water Irrigation system	8.00
		SECTOR SUB TOTAL	61.33
Long-term Recovery Goal: mainstreaming disaster risks management into national and local laws, regulations, development policies and processes, upgrading/reconstruction of key infrastructure with risk mitigation functions; developing national and local contingency plans for key sectors and taking a systematic approach in building the capacity for responding and recovery from natural disasters at all levels.			98.32

42 *Medium term recommendations are supposed to take place only if the findings assessments listed under the short term measures deem them necessary*

Economic	Agriculture, livestock, Fisheries	Disaster Risks Management to be mainstreamed into Agriculture Development Policy and to be applied in the local planning process.	15.60
		Mainstreaming Disaster Risk Management and Climate Change into the ministry's Policy Framework and Strategy Development (i.e. extension policy):	
		Develop guidelines of mainstreaming Disaster Risk Management and Climate Change in a practicable and decentralized and de-concentrated planning process.	
		Develop Capacity Building Development Program for personnel at national and sub-national level.	
		Construction of new irrigation canals/schemes to farms cultivating dry-season rice	
	Industry and Commerce	Same measures proposed for the Medium term (see above)	0.10
	Tourism	Same measures proposed for the Medium term (see above)	0.50
	Market	A further assessment of the 46 district markets at risk be conducted	0.06
		SECTOR SUB TOTAL	16.26
Social	Demographic & livelihoods	Strengthen the national and provincial capacity for emergency response (focusing on the institutional capacity of agencies such as NCDM, PDCM)	3.33
		Build capacity at the household level (e.g., focusing on small holders and creating storage facilities, seed banks, and grain banks);	
		Integrate emergency, food security, poverty alleviation, and rural development programs; promote crop insurance as a risk-transfer mechanism;	
		Promote crop insurance as a risk-transfer mechanism;	
		Strengthen the link between agriculture and industry and commerce to reduce risks and to increase incomes and production;	
		Support the commercialization of agriculture, livestock, and fishery products; and create resilient agricultural fisheries and livestock assets ensuring community participation	
	Housing	Development of a disaster resilient land use plan for disaster affected provinces of Cambodia	10.00
		Development of zoning and building regulations for disaster affected provinces incorporating DRR measures at District level	
		Building capacities of communes to enforce building and zoning regulations	
	Education	Establish maintenance mechanisms of all school buildings in Cambodia: (RGC Annual Budget)	0.20
		Systematic upgrading (Plinth) of existing school buildings in Cambodia to make them safer in high winds, more resistant to floods and other natural disasters: (RGC Annual Budget) by re-enforcing existing safe school construction guideline	
		Finalize and disseminate education contingency plan and support school committee to strengthen preparedness capacity and response plan development.	
		In order to compensate the loss of teaching hours MoEYS and PoE shall replicate the model of Temporary Learning Spaces when floods disrupt education of children. Resources shall be possible to mobilize from civil society organization and private sectors.	
		Re-enforce the implementation of flexible school calendar (flexible school curricular). Use existing guideline of MoEYS	
	Health	Regulatory framework and policy development should be taken into consideration during 2014 AOP implementation (government's budget).	1.50
		Provide capacity building to HDMC included strengthening function of Rapid Response Teams at sub national level. This should be taken into consideration during 2014 AOPs revision and AOPs planning process	
		Improve data management system for health, this should be considered on providing technical support to HDMC at all levels.	
	Landmines[43]	Ensure sustained funding and support for, and increased technical capacity of, the Community Based Mine Risk Reduction (CBMRR) agent network	0.49
		Ensure that further research is undertaken to establish the reality of risks associated with mine wash out and exposure from erosion resultant on flash flooding.	

43 *Medium term recommendations are supposed to take place only if the findings assessments listed under the short term measures deem them necessary*

		SECTOR SUB TOTAL	15.52
Infrastructure	National and Rural Roads	Rural Roads Early recovery Improvement works	25.00
		Early recovery Capacity building and Technical assistance including further assessments and soft recommendations per the PFERNA Infrastructure report	5.00
	WATSAN	Training on how to restore wells to be delivered to the Affected Districts	0.54
	Water and Irrigation system	Restoration and rehabilitation of the Water Irrigation system	36.00
		SECTOR SUB TOTAL	66.54
		TOTAL	306.28

9 CONCLUSIONS

This report presented the main damage and loss caused by the2013 Cambodia Floods, using both old and new methodologies. While the DaLA method was adopted, new sectors that current research on disaster deems crucial have been added to traditional ones: Livelihoods and Markets. These have been recognized as closer to people's lives and as proxies of other more important cross-cutting issues such as food security, coping strategies and inequality. Given the geography of the phenomenon, the landmines sector was considered essential for the assessment. The report was produced in January 2014after different rounds of fieldwork conducted between December 2013 and January 2014.At the time of the assessment, floodwaters had partially receded but frequent rains, with occasional heavy showers, were still happening on an irregular basis.

The report has followed precise methodologies designed by each sectorial team in the two weeks that preceded the mission inspired by the DaLA method. Nonetheless the study has some limitations as the Assessment presented some challenges. Time and human resources were the main constraints during the assessment as experienced in any rapid assessment where international consultants are involved. More time spent on planning, training resource persons and sharing tools and methodologies may have increased the effectiveness of the assessment. However, due to time constraints in which the assessment needed to be carried out and differing times of arrival of assessment team members coming from abroad, this was not possible.

The lack of a systematic post-disaster bottom-up data collection system may have a negative impact on the results, as the information available is not sufficiently detailed. The quality and usefulness of data in calculating damage and loss was based on the data available and the information obtained by each sector/sub-sector team.

The tools used for the assessment were of varying degrees of effectiveness. The household survey was time consuming to administer and enter into a database. Selecting a statistically significant sample and administering a questionnaire specially developed for the purpose may have had more positive results. The key informant surveys were less time consuming and village officials provided useful data. The only disadvantage of using key informant interviews may have been biases and deliberate manipulation of information by the respondents.

In light of the above, a few basic recommendations emerge as fundamental if such an exercise is to be undertaken in the future:

- Adequate time (at least two full days) should be spent on training and consolidation of methodologies;
- Increase size of selected sampling;
- Greater participation of human resources and technical persons from relevant government ministries/departments;
- Questionnaires should be prepared and well informed to all relevant departments, ministries and provincial departments.

The main findings of the assessment demonstrate that the 2013 floods caused significant harm to the country. If compared with previous disasters, the level of damage and loss is similar or even higher, across some of the poorest areas of the country. A closer look to sectorial data, calculated following a new methodology that included Livelihoods into the damage, reveals that the extent of Social Sectors damage is significant and equal to 15.4% of the total. Overall the Damage and Loss Picture calls for a prioritisation of micro recovery needs (households) as of the damage to Agriculture and its possible implications on food prices in short and medium term. Longer term Recovery measures should focus on infrastructure and prioritise 'build back better' measures and climate proof building techniques capable of holding sudden flood waves and of preventing flash floods events.

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11 ANNEXES

11.1 ECONOMIC SECTOR

11.1.1 Composition of Economic Sector Team

1. Team Composition of Agriculture Sub-Sector		
Name	Function	Institution
Mr. UNG Dara Rat Moni	Adviser	UNDP
Mr. CHEA Huot	Economic Sector Team Leader	UNDP (UNDP Consultant)
Mr. FANG Weihua	Remote sensing expert	
Mr. TUOR Vannak	Chief of Statistics Government Officer	Beijing Normal University
Mr. SUM Sokhom	Government Officer	Dept., of Planning and Statistics (MAFF)
Mr. MAO Sao Horn	Government Officer	General Directorate of Agriculture (MAFF)
Mr. IM Sophal	Government Officer	NCDM
	Project Assistant	NCDM
Mr. TENG Huot		UNDP
2. Team Composition of Tourism and Industry/Commerce Sub-Sector		
Mr.Narin SOK	Head of UNIDO Operations/Cambodia	UNIDO Cambodia Office
	Tourism and Industry/Commerce	
Mr. Yeng LUN	Sector Team Leader	UNIDO (UNIDO Consultant)
	Officer	
	Officer	
Ms.Sovattei CHEA	Officer	UNIDO
Mr.Sobonn ROS		UNIDO
Mr. Rafik FEKI		UNIDO Headquarter (Vienna)

Weihua Fang and Sum Sokhom (Photo: GDA/MAFF)

Sum Sokhom, Chea Huot and TuorVannak (Photo: GDA/MAFF)

Rice field (Photo: GDA/MAFF)

Teng Huot, Chea Huot, Weihua Fang and TuorVannak (Photo: UNDP/MAFF)

Prof. Weihua Fang and Farmer in Battambang Province (Photo: GDA/MAFF)

Sum Sokhom, Keo Kim Aun (Chief Agriculture Office, Sereysophoan district) and Huot Sothy (Photo: GDA/MAFF/PDA)

11.1.2 Schedules and itineraries

Date	Location	Activities	People met
December15, 2013	Phnom Penh to Battambang	Travel	
December 16, 2013	Meeting room of the provincial town of Battambang	Meeting	Annex C
	Provincial Department of Agriculture of Battambang	Meeting	-Mr. Long Phorn, PDA Deputy Director -Mr. Im Sophal, NCDM -Mr. Heng Seth, Planning, PDA Officer -Mr. Vin Chheab, PDA Deputy Chief -Ms.Tak Vida, Deputy Chief Fisheries
	Field visit: Sasar and Boeng Preah villages in Ou Mal commune, Battambang district	Field visit and interview	Farmers Officials from Battambang Agriculture Office
December 17, 2013	Meeting room of the provincial town of Banteay Meanchey	Meeting	Annex D
	Provincial Department of Agriculture of Banteay Meanchey	Meeting	-Mr. Huot Sothy, PDA Deputy Director MBC -Mr.Huy Touch, Livestock office (PDA) -Ms. Keo Kim Aun, Chief of Agriculture Office PDA BMC
	Field visit: -Khbal Spean village, Preah Ponlea commune, Sereysophoan district -SnayDangkut village, Koh Pongsatcommune, Sereysophoan District	Interview	-Ms. KEO Kim Aun, Chief of Agriculture Office, Sereysophoan district -Farmers
	Travel to Siemreap	Mr. Fang Weihua and Chea Huot travel to Siem Reap	Meeting representatives of relevant provincial departments of line ministries and local authorities.
December 18, 2013	Provincial Department of Agriculture of Banteay Meanchey	Interview Commune Councils	-Mr. Meas Eat, CC Chief, Koh Pong Sat -Mr. Ra Buntea, CC Vice Chief, Phniet
		Interview Office of Agriculture Office	-Ms. KEO Kim Aun, Chief of Agriculture Office, Sereysophoan district
	Travel to Phnom Penh		

11.1.3 Meeting in Battambang (Provincial Hall's Meeting Room), December 16, 2013

#	Name	Function	Institution
1	Neang Sen	Government Officer	Commune Council
2	En Hel	Government Officer	NCDM
3	PrumBunnang	Deputy Chief	Provincial Department of Planning
4	Im Sophal	Deputy Director of Emergency Response and Rehabilitation	NCDM
5	Mao Sao Horn	Government Officer	NCDM
6	Duong Chhe Dim	Government Officer	Bavel District Council
7	Nou Seap	Government Officer	Water Supply Authorities
8	BoutongBorarith	Chief of Admin. Officer	Provincial Councils
9	Sok Nay Eang	Director	Provincial Department of Rural Development
10	Long Sopheun	Deputy Governor	Battambang
11	HeanTham	Deputy Director	Tourism
12	Khay Soda	Deputy Director	Provincial Department of Water Resource and Meteorology

13	VaTeannary	Government Officer	Office of Rural Road Provincial Department of Rural Development
14	Seng Sovuth	Chief of Office	Office of Rural Road
15	San Visal	Technical Officer	
16	Yan Mothe	Deputy Director	Electricity Authorities
17	Sal Sotoat	Director	
18	PechDararith	Director	Electricity
19	Men Phiroun	Government Officer	Provincial Department of Health
20	Lam Som	Deputy Governor	MaungRussey district
21	Tim Dareth	Deputy Governor	Bavel district
22	SarSophal	Governor	District Council
23	TunSothean	Chief of Administration	Office of Rural Road Provincial Department of Rural Development
24	Ma Phoudy	Deputy Chief	Provincial Department of Rural Development
25	KuyVanno	Deputy Governor	Banan district
26	Pen Khemrat	Deputy Director	
27	Khun You	Deputy Governor	
28	Pang Pharath	Deputy Governor	Banan district
29	TuorVannak	Chief of Officer	Department of Planning and Statistics, MAFF
30	Sum Sokhom	Government Officer	General Directorate of Agriculture, MAFF
31	Sim Seth	Deputy Chief	Sdao
32	Mean Thavrak	Government Officer	Ministry of Planning
33	KhuonSokunthea	Chief of Office	Ministry of Planning
34	Hang Sovannarith	Microinsurance expert	UNDP
35	Marisa Foraci	Social Protection Officer	UNDP
36	Yang Fang	ER Advisor	UNDP
37	Fang Weihua	Remote Sensing Expert	Beijing Normal University, UNDP
38	Huot Chea	Economist	External Consultant, UNDP
39	Ung Dara Rat Moni	Project Adviser	UNDP
40	Dum Chanthida	Project Officer	IOM
41	Vong Pich	Project Officer	IOM
42	Srey Sras Panha	Project Associate	UNDP
43	Aziza	Housing Expert	UN HABITAT
44	Meas Hut	Government officer	NCDM
45	Ghulam Qadir	WATSAN Expert	UNICEF
46	Teng Huot	Project Staff	UNDP
47	Sun Chanthan	Project Officer	UNDP
48	Chouop Sithan	Director of Emergency Response and Rehabilitation	NCDM
49	Tong Seng	Chief of Office	
50	Soeng Lay	Official	
51	Terry Lancashire	Infrastructure external expert	RED R, UNDP
52	Soen Thy	Interpreter	External Consultant, UNDP
53	Tham Sok	Deputy Chief	Commune Council
54	EmChoeun	Commune Council Chief	Commune Council
55	Yun Chan Song	Government Officer	Provincial Department of Women's Affairs
56	Phin Vichhika	Government Officer	Provincial Department of Women's Affairs
57	Chea Sambath	Government Officer	NCDM

11.1.4 Meeting in Banteay Meanchey (Provincial Hall's Meeting Room), December 17, 2013

#	Name	Function	Institution
1	Iv Long	Deputy Governor	Provincial Administration
2	Tin Dara	Director	Electricity Authorities
3	OeurSophoan	Deputy Director	Provincial Department of Land Urban and Construction
4	Nang Chhay	Deputy Director	Provincial Department of Tourism
5	Huot Sothy	Director	Provincial Department of Agriculture
6	Yim Kosal	Deputy Director	Provincial Department of Planning
7	Kheng Nhol	Deputy Director	Provincial Department of Rural Development
8	Ma Pody	Department Deputy Chief	Ministry of Rural Development
9	VaBunnak	Deputy Chief of Office	Ministry of Rural Development
10	San Visal	Official	Ministry of Rural Development
11	ButhPeou	Chief of Office	Provincial Department of Water Resource and Meteorology
12	NhelBunthoeun	Director	Provincial Department of Industry
13	Ung Dara Rat Moni	Project Adviser	UNDP
14	Fang Weihua	Remote Sensing Expert	Beijing Normal University, UNDP
15	Im Lay	Government Official	MoWRAM
16	Chea Huot	Consultant	UNDP
17	Pich Kamsat	Government Officer	CHRD
18	Ung Hay Leng	Government Officer	WVC
19	PechLumAng	Chief of Office	Provincial Administration
20	Teng Huot	Project Staff	UNDP
21	Im Siphal	Government Officer	NCDM
22	Mao Sao Horn	Government Officer	NCDM
23	Meas Hort	Government Officer	NCDM
24	Sum Sokhom	Government Officer	General Directorate of Agriculture, MAFF
25	Suoy Kim Lin	Government Officer	Provincial Department of Rural Development

11.1.5 MARKET QUESTIONNAIRE – FORM 4. MARKET ASSESSMENT TOOL

បញ្ជីសំណួរទី៤ សម្រាប់វាយតម្លៃផ្សារ FORM 4. MARKET ASSESSMENT TOOL

ឈ្មោះអ្នកសម្ភាសន៍ Interviewer Name:_____កាលបរិច្ឆេទនៃសម្ភាស៍ Interview Date: |__|__|/|__|__|/|__|__|

ឈ្មោះខេត្ត Province:_____ ឈ្មោះស្រុក District:_____

ឈ្មោះឃុំ Commune:_____ឈ្មោះភូមិ Village:_____ ឈ្មោះផ្សារ Market:_____

ផ្នែកទី១: តម្លៃស្បៀងអាហារ(រៀល/គីឡូក្រាម)

Section 1: Food Commodity Prices (Riel/Kg)

អ្នកលក់ Trader	អង្ករគុណភាពលេខពីរ 2nd quality rice (1. នាងមិញ Neang Minh, 2. នាងខុន Neang Khon)	អង្ករគុណភាពអន់បំផុត Cheapest rice (1. អង្ករចំរុះ Mixed rice, 2. អ៊ីអ៊ែ IR, 3.បន្លាយផ្តៅ Banla Pdao)	ប្រេងឆា Vegetable Oil	ត្រីឆ្អើរ Smoked fish (ត្រីរាល-បំលែងតម្លៃ/ដុំទៅតម្លៃ/គ.ក Trei Real-Convert skewered fish into price/kg)	ត្រីស្រស់ Fresh fish (ត្រីប្រា Trei Pra)	សាច់ជ្រូកបីជាន់ Pork with fat (Sach Bei Choan)	ពងទាសាប Duck egg (ចំ Large)	Cassava
1st	ប្រភេទ Type: តម្លៃ Price: ប្រែប្រួល Change:	ប្រភេទ Type: តម្លៃ Price: ប្រែប្រួល Change:	(.....រ riel .....ល liter) តម្លៃ Price: ប្រែប្រួល Change:	(.....រ riel/ .....គ.ក kg) តម្លៃ Price: ប្រែប្រួល Change:	តម្លៃ Price: ប្រែប្រួល Change:	តម្លៃ Price: ប្រែប្រួល Change:	តម្លៃ Price: ប្រែប្រួល Change:	តម្លៃ Price: ប្រែប្រួល Change:
2st	ប្រភេទ Type: តម្លៃ Price: ប្រែប្រួល Change:	ប្រភេទ Type: តម្លៃ Price: ប្រែប្រួល Change:	(.....រ riel .....ល liter) តម្លៃ Price: ប្រែប្រួល Change:	(.....រ riel/ .....គ.ក kg) តម្លៃ Price: ប្រែប្រួល Change:	តម្លៃ Price: ប្រែប្រួល Change:	តម្លៃ Price: ប្រែប្រួល Change:	តម្លៃ Price: ប្រែប្រួល Change:	តម្លៃ Price: ប្រែប្រួល Change:
3st	ប្រភេទ Type: តម្លៃ Price: ប្រែប្រួល Change:	ប្រភេទ Type: តម្លៃ Price: ប្រែប្រួល Change:	(.....រ riel .....ល liter) តម្លៃ Price: ប្រែប្រួល Change:	(.....រ riel/ .....គ.ក kg) តម្លៃ Price: ប្រែប្រួល Change:	តម្លៃ Price: ប្រែប្រួល Change:	តម្លៃ Price: ប្រែប្រួល Change:	តម្លៃ Price: ប្រែប្រួល Change:	តម្លៃ Price: ប្រែប្រួល Change:

ផ្នែកទី៣: កិច្ចសម្ភាសន៍ប្រធានផ្សារ

Section 3: Key Information-**1**-Market Chief/**2**- Trader interview (Please circle accordingly)

Name Contact number

3.1	តើផ្សារនេះ បានរងផលប៉ះពាល់ដោយសារគ្រោះមហន្តរាយនេះដែរឬទេ? (សូមលំអិត) Does the market have been affected as a result of this disaster? (y/n) (give details)		
3.2	តើឥឡូវនេះចំនួនអាជីវករឬអ្នកលក់ដូរស្បៀងអាហារនៅក្នុងផ្សារនេះមានការកើនឡើង ឬថយចុះ? ហេតុអ្វី? Have the number of food traders increased or decreased as a result of the disaster (Y/N)? And why? (Y/N) (WHY)		
3.3	តើប្រភេទស្បៀងអាហារខាងក្រោមដែលលក់នៅក្នុងផ្សារនេះបានរងផលប៉ះពាល់ដោយសារគ្រោះមហន្តរាយនេះដែរឬទេ? បើប៉ះពាល់ តើមានការប៉ះពាល់យ៉ាងដូចម្តេចខ្លះ? តើមូលហេតុអ្វីបានជារងផលប៉ះពាល់? Has availability of following Food Commodities at the Market been affected by the crisis? If YES. How? Why?		
	អង្ករ RICE (Y/N) How Why	ប្រេងឆា VEGETABLE OIL(Y/N) How Why	សាច់ជ្រូក PORK (Y/N) How Why
	ត្រីស្រស់ FRESH FISH (Y/N) How Why	បន្លែ VEGETABLES(Y/N) How Why	CASSAVA(Y/N) How Why
3.4	តើការផ្គត់ផ្គង់ស្បៀងអាហារនៅក្នុងផ្សារនេះក្នុងកំឡុងពេល៣ខែបន្ទាប់ទៀតនឹងមានការប្រែប្រួលយ៉ាងដូចម្តេច? មូលហេតុអ្វី? What do you think food supply will be over the next 3 months? Why? How they will look like Why		
3.5	តើអ្នកអាចប្រៀបធៀបតម្លៃស្បៀងអាហារនៅពេលឥឡូវនេះទៅនឹងតម្លៃមុនពេលមានគ្រោះមហន្តរាយយ៉ាងដូចម្តេចដែរ? How would you compare the food market prices now with the time before the crisis ?		

3.6	តើតម្លៃស្បៀងអាហារក្នុងពេល៣ខែបន្ទាប់ទៀតនេះនឹងមានការប្រែប្រួលយ៉ាងដូចម្តេច? មូលហេតុអ្វី? What do you think will happen to prices over the next 3 months? Why? What will happen to prices Why
3.7	តើផ្សារនេះធ្លាប់មិនអាចចូលទៅប្រើប្រាស់បានដោយសារតែទឹកជំនន់ដែរឬទេ?ប្រសិនបើធ្លាប់តើរយៈពេលប៉ុន្មាន? Has this market been not accessible because of the floods (Y/N)? If yes for how long (n.months) ? (Y/N) (N.Months)
3.8	តើការខាតបង់ផ្នែកសេដ្ឋកិច្ចជាបច្ចុរបស់អាជីវករ និងអ្នកលក់រាយក្នុងផ្សារមានចំនួនប៉ុន្មានក្នុងមួយថ្ងៃ? What has been the average economic loss for traders and retailers per day?
3.9	តើទ្រព្យសម្បត្តិអ្វីខ្លះរបស់ អាជីវករ និងអ្នកលក់រាយក្នុងផ្សារបានបាត់បង់? What has been the loss in assets for retailers (Food Stalls, Motorbike for traders……..etc.)? ប្រភេទ Type: ប្រភេទ Type: ប្រភេទ Type: ប្រភេទ Type: តម្លៃ Price (Estimated): តម្លៃ Price (Estimated): តម្លៃ Price (Estimated): តម្លៃ Price (Estimated):
4.0	តើទ្រព្យសម្បត្តិអ្វីខ្លះរបស់ អាជីវករ និងអ្នកលក់រាយក្នុងផ្សារបានបាត់បង់? What has been the loss in assets for traders (Food Stalls, Motorbike for traders…….etc.)? ប្រភេទ Type: ប្រភេទ Type: ប្រភេទ Type: ប្រភេទ Type: តម្លៃ Price (Estimated) តម្លៃ Price (Estimated) តម្លៃ Price (Estimated) តម្លៃ Price (Estimated)
4.1	How did Traders and Retailers cope with the asset loss? តើអាជីវករ និងអ្នកលក់រាយក្នុងផ្សារដោះស្រាយចំពោះទ្រព្យសម្បត្តិដែលបាត់បង់នោះយ៉ាងដូចម្តេច?
4.2	What infrastructure (Roads, Stalls) need to be reconstructed to make this market functional again? តើហេដ្ឋារចនាសម្ព័ន្ធ (ដូចជាផ្លូវ តូប) អ្វីខ្លះត្រូវការសាងសង់ឡើងវិញដើម្បីអោយផ្សារនេះអាចដំណើរការឡើងវិញបាន?

11.2 SOCIAL SECTORS

11.2.1 Demographic & Livelihoods Household Questionnaire

INDIVIDUAL QUESTIONNAIRE

FLOOD AFFECTED LOCAL COMMUNITIES IN CAMBODIA

SOCIAL SECTOR

Sub-Sector: Demographics, Livelihoods, and Shelter

IOM/UNHABITAT

INTERVIEWER _____

WHEN (dd/mm/yy) / /

WHERE

Province_____

District_____

Commune_____

DEMOGRAPHICS

1. Name _____
2. Household Size _____
3. Number of males in household _____
4. Number of females in household_____
5. Family Ages

    0-10 _____

    11-19 _____

    20-30 _____

    31-40 _____

    41-60 _____

    60+ _____

6. Head of the household

Male ☐ Female ☐

7. Number of persons with disabilities in household_____

8. Location

Province _____

District _____

Commune _____

Village _____

9. Education--What is your highest grade of education completed?

Some primary (1-3 grades)

Completed Primary School (6 grades)

Some lower Secondary (7-8 grades)

Completed Lower Secondary School (9 grades)

Some Upper Secondary (10-11 Grades)

Completed Upper Secondary School (12 grades)

University any level

Technical / Vocational

FLOODING EFFECTS & COPING MECHANISM

10. Why did you leave your home?

Flooding of home ☐

Emergency Assistance ☐

Flooding + Assistance ☐

Not leaving home ☐ (skip Question 7 & 8 & 18)

11. If you evacuated from home, where did you evacuate to?

Pagoda ☐

School ☐

Higher Ground ☐

Road ☐

Relative's house ☐

Other _____

12. **How is your situation now?**

I returned home ☐ (go to Question 13) (skip Question14)

I did not return home ☐ (go to Question 14) (skip Question13)

13. **Why did you return home?**

Home is safe ☐

Livelihood ☐

Forced ☐

14. **Why haven't you returned home? (can chose more than one)**

Safety ☐

Home Destroyed ☐

No Services ☐

Home still flooded ☐

Permanently moved household ☐

Temporary Migrated to another location for labor ☐

No Livelihood ☐

15. **Have you experienced any of the following because of the flood? (can chose more than one)**

Mental Illness(depression, anxiety) ☐

Physical Illness (respiratory, injury) ☐

Business failure ☐

Property damage ☐

Crop failure ☐

Death of household member ☐

Death of community member by drowning ☐

In-debt ☐

Robbery/theft ☐

Death of livestock ☐

Unable to find job/generate income? ☐

Other ☐

16. **What are main consequences of the flood on your household? (can chose more one)**

Cannot work ☐

Cannot afford to buy food ☐

Do not have safe water to drink at Home ☐

Cannot afford to send children to school ☐

Cannot afford to pay back previous loans to MFI ☐

Cannot afford to pay back previous loans from relatives ☐

Friends/community ☐

Cannot afford to save money ☐

Cannot afford health treatment ☐

Forced to evacuate ☐

Other (specify) ☐

17. **How do you cope with the flooding? (can chose more than one)**

Use savings ☐

Sell Assets ☐

Take a loan from Micro Finance Institute ☐

Take a loan from friends/relatives/community lenders. ☐

Reduce expenses ☐

Take children out of school to work for more than three months ☐

Do nothing ☐

Member of household migrate to another location to work ☐

Entire household move to new location ☐

Find another job ☐

Assistance from NGOs ☐

Assistance from Government ☐

18. **Which coping mechanism in the above listed is the most effective? (chose top three)**

Use savings ☐

Sell Assets ☐

Take a loan from Micro Finance Institute ☐

Take a loan from friends/relatives/community lenders. ☐

Reduce expenses ☐

Take children out of school to work for more than three months ☐

Do nothing ☐

Member of household migrate to another location to work ☐

Entire household move to new location ☐

Find another job ☐

Assistance from NGOs ☐

Assistance from Government ☐

LIVELIHOODS

19. **Before the flood, what was your main sources of livelihood (monthly income)? (rank top three)**

Day labor in rice farming during plantation and harvesting ☐

Day labor non-rice farming (cassava, fruits, vegetables) ☐

Day labor in animal raising ☐

Day labor in construction ☐

Day labor in factory ☐

Day labor in workshop (moto, electronics, etc.) ☐

Generate revenue from handicrafts ☐

Rent private property ☐

Day labor in tourism ☐

Sell crops and livestock product ☐

Received a salary from government job ☐

Generate revenue from small business (grocery, etc.) ☐

Generate revenue from transportation ☐

Receive money from relatives living aboard ☐

Receive loans from relatives and friends ☐

Receive loans from MFI ☐

Other ☐

20. **Before the flood, what is your average household monthly income?**

Less than 50 US$ ☐

51-100 US$ ☐

100-150 US$ ☐

150 US$- 200 ☐

More than 200 US$ ☐

21. **Was your livelihood affected by the flood?**

Yes ☐

No ☐

22. **Did you change your livelihood after the flood?**

Yes ☐

No ☐

23. **After the flood, what was your main sources of livelihood (monthly income)? (rank top three)**

- Day labor in rice farming during plantation and harvesting ☐
- Day labor non-rice farming (cassava, fruits, vegetables) ☐
- Day labor in animal raising ☐
- Day labor in construction ☐
- Day labor in factory ☐
- Day labor in workshop (moto, electronics, etc.) ☐
- Generate revenue from handicrafts ☐
- Rent private property ☐
- Day labor in tourism ☐
- Sell crops and livestock product ☐
- Received a salary from government job ☐
- Generate revenue from small business (grocery, etc.) ☐
- Generate revenue from transportation ☐
- Receive money from relatives living aboard ☐
- Receive loans from relatives and friends ☐
- Receive loans from MFI ☐
- Other ☐

24. **If household cannot engage in the same livelihood activities after the flood, why not?**

- Lost employment ☐
- Land destroyed ☐
- Lost seeds ☐
- Lost livestock ☐
- Lost of livelihood assets (equipment) ☐
- Death of household member who is main income earner ☐
- House destroyed and had to re- locate ☐

25. After the flood, what is your average household monthly income?

Less than 50 US$ ☐

51-100 US$ ☐

100-150 US$ ☐

150 US$- 200 ☐

More than 200 US$ ☐

26. Did you take out a loan or borrow money after the flood?

Yes ☐

No ☐

27. If yes, what was this loan or money suppose be used for? (Tick more than one)

☐ Basic needs (Food) (1)

☐ Shelter Materials (2)

☐ Healthcare/treatment (3)

☐ Children's Education (4)

☐ Livelihood inputs (agriculture e.g.) (5)

☐ Buy back/or rent land (6)

☐ Family Ceremonies (Weddings, Funerals e.g.) (7)

☐ Pay off other Loan/debt repayments (8)

☐ Migration (Travel costs) (9)

☐ Other(99) _____

28. If so, how much money did you loan in total? _____(US$)

29. Do you own livestock?

Yes ☐

No ☐

30. Did you lose livestock as a result of flood?

Yes ☐

No ☐

31. If you lost livestock as a result of the flood, what is the estimated total cost? (inUS$) _____

SHELTER

28. How was your house affected?

- Completely destroyed (not livable) ☐
- Walls only damaged (livable) ☐
- Roof and Walls damaged (foundation undamaged) ☐
- Foundation only damaged ☐
- Not Affected ☐

29. Before flood, how was your house built?

- Timber (incl bamboo) foundation/soft walls/soft roof ☐
- Timber (incl bamboo)foundation/soft walls/hard roof ☐
- Timber (incl bamboo) foundations (include bamboo)/hard wall/soft roof ☐
- Timber (incl bamboo) foundations /hard wall/hard roof ☐
- Concrete Foundation/soft wall/soft roof ☐
- Concrete Foundation/hard wall/ soft roof ☐
- Concrete Foundation/hard wall/hard roof ☐
- Concrete Foundation/soft wall/hard roof ☐

30. Square Area of House

- Less than 20 Sq. Meters ☐
- 20-40 Sq. Meters ☐
- 40-60 Sq. Meter ☐
- 60-100 Sq. Meters ☐
- More than 100 Square Meters ☐

31. Before Flood, did you have a toilet?

- Yes ☐
- No ☐

32. Before Flood, in what type of land was your house located on?

Flood plains ☐

River bank ☐

Island ☐

Highland ☐

33. When does your home usually flood?

2010 ☐

2011 ☐

2012 ☐

2013 ☐

Several times per year ☐

Yearly ☐

34. Were you aware you were living in a flood risk area?

Yes ☐

No ☐

35. If yes, why did you live there?

Livelihood ☐

Own land ☐

No money to move ☐

Ancestor property ☐

Other ☐

36. Land ownership

Own Land ☐

Not Own Land, and rent not paid to owner (squatter) ☐

Rent property ☐

Other ☐

WAY FORWARD

37. Who can teach you more about coping with disasters?

RGC

Local Administration

NGO/UN

Community leaders (chiefs, pagodas)

No Body

38. What are your immediate needs in the next three-six months? (rank top2)

Food ☐

Water ☐

House repair ☐

Distribution of livelihood assets (seeds, animals, etc.) ☐

Employment ☐

Heath assistance ☐

School assistance ☐

Other: Please specify

39. What are your mid-term needs in the next six to twelve months? (rank top2)

Food ☐

Water ☐

House repair ☐

Distribution of livelihood assets (seeds, animals, etc.) ☐

Employment ☐

Heath assistance ☐

School assistance ☐

Other: Please specify

What are your long term needs in the next 2 years? (rank top 2)

Infrastructure Development (roads, dams) ☐

Better irrigation ☐

More training on Warning System ☐

New skill/Job training ☐

Better Construction of housing ☐

Seasonal Migration for work ☐

Permanently Re-location the most at risk households ☐

Other: Please specify

11.2.2 Housing – Key Informant Questionnaire

Key Informant Questionnaire for Village official

Name of official:

Designation:

Province:

District:

Commune:

Village:

1. How many families were affected by flooding

No.	Displaced/evacuated	Returned to their land	Not returned home and currently living in					
			pagoda	school	With relatives/ host families	Migrated to other locations	Do not know	Other

1.1 Why have these families not returned? (tick relevant boxes)

i	House damaged/destroyed		iv	No services available	
ii	Receive assistance in current location		v	Livelihood affected	
iii	Flood water not receded		vi	Other (specify)	
viii	Migrated to another location				

2. No of deaths in community

Age group	Male	Female
Children		
Adults		
Elderly (60+)		
Total		

2.1 Main reasons for death

Reason	Children	Adults	Elderly
Injuries from collapsing buildings			
Engaging in activities in unsafe areas			
During evacuation			
Other (specify)			

3. No. of houses destroyed

No. of houses destroyed (not livable and needs total reconstruction)	

3.1 No. of houses damaged

Type of damage	No. of houses
Minor damages	
Walls only damaged	
Walls and roof damaged, foundation undamaged	
Roof only damaged walls and foundations not damaged	
Foundations only damaged	
Total	

4. Construction materials of affected houses

Type of construction	i Timber or bamboo foundation/ soft* walls / soft* roof	Ii Timber or bamboo foundation/ soft* walls/ hard** roofs	Iii Timber or bamboo foundation/ hard walls** / hard** roof	Iv Timber or bamboo foundation/ hard** walls / soft* roof	v Concrete foundation/ soft* wall/ soft* roof	vi Concrete foundation/ soft* wall / hard** roof	Vii Concrete foundation hard** wall/ hard** roof	Viii Concrete foundation hard** wall/ soft* roof
No. of houses damaged								
No. of houses destroyed								

**Soft walls/roofs –Timber, bamboo, grass, palm leaves, straw, plastic/tarpaulin, mixed materials mainly plastic*
***Hard walls/Roof –concrete, brick, tile, stone, metal sheets, fibrous cement, mixed material with mainly metal sheets*

4.1. Square area of houses affected

Square area	No. of houses					
	Minor damages	Walls only damaged	Walls and roof damaged, foundation undamaged	Roof only damaged walls and foundations not damaged	Foundations only damaged	Destroyed
Less than 20 sq.m						
20-40 sq.m						
40-60 sq.m						
60-100 sq.m						
>100 sq.m						

4.2. In your perception what was the cost for damage of the following in USD (4000 Rhea)

Type of damage	Soft roof (10 sq.m)	Hard roof (10 sq.m)	Soft wall (10 sq.m)	Hard wall (10 sq.m)	Timber/bamboo foundation (10 sq.m)	Concrete foundation (10 sq.m)	Destruction of total house (10 sq.m)
Cost USD							

6.0. Location of the damaged/destroyed houses?

Type of land	No. of houses
Floodplain	
Island	
River bank	
Highland	
Other (specify)	

6.1. By which of the following have areas in the village/commune been affected? (tick off the relevant boxes)

Type of disaster	Frequency					
	Several times per year	Once a year	Once in 5 years	2011	2013	Other (specify)
Storms						
Floods						

6.2. Why do communities continue to live in the high risk areas? (tick relevant boxes)

Proximity to livelihoods	
Own property/ ancestral property	
Do not own any other land	
Cannot afford to move away	
Other	

6.3. Do the affected households wish to continue to live in these locations? (If the answer is yes skip Q6.4)

Yes	No

6.4. Where is the preferred relocation area and distance from current location?

Name of location	
Distance km	

7. What is the land ownership status of the affected (houses not livable) households?

Own land	
Not own land and rent not paid (squatter)	
Rented property	
Other (specify)	

7.1. What is the average monthly rent paid by the renters in this area in USD .....

8.0. How many wells and toilets were damaged in the community?

No. of toilets damaged/destroyed	
No. of wells damaged/destroyed	

9.0. Type of housing shelter assistance provided to flood affected families after 2013 floods and remaining needs

Type of assistance	No. of houses	
	Assistance provided	Remaining needs
Tarpaulin/shelter kits		
Transitional shelter constructed by donor/cash or material for construction of Transitional shelter		
Permanent house constructed by donor/cash or material for re-construction of permanent house		
Damaged house repaired by donor/Cash or material for repairs to damaged permanent house		
Other (specify)		

Observations or remarks by interviewer

……
……
……
……
……
……
……
……
……
……
……
……
……
……

Name of interviewer: ……..

Date: ……

Location: ……

11.2.3 Housing - Recovery Breakdown

TABLE 35: SHORT-TERM RECOVERY FRAMEWORK

Outputs	Approximate cost (million US$)	Indicators	Key Govt. partners	Assumptions
Provide basic shelter kits to 300 affected families	0.06	# of families provided with basic shelter kits	NCDM, PCDM	Families are willing to use the shelter kits to make their homes weather proof There is no further self-recovery by the families
Total	0.06			

Source: PFERNA Team Assessment, 2013

TABLE 36: MEDIUM-TERM RECOVERY FRAMEWORK

Outputs	Approximate cost (million US$)	Indicators	Key Govt. partners	Assumptions
Reconstruction of 190 destroyed houses incorporating disaster resilient features (24 sq m)	0.6175	# of destroyed houses constructed incorporating disaster-resilient features conforming to minimum standard	NCDM, Ministry of Land Management	Affected households are interested in participating in housing reconstruction
Repair and retrofitting of 210 damaged houses to improve their resistance to future disasters	0.126	# of damaged houses repaired and retrofitted to improve their disaster resistance	NCDM, Ministry of Land Management	Affected households are interested in participating in housing reconstruction
Training of 200 local construction tradesmen in disaster-resilient construction	0.01	# of local construction tradesmen trained in disaster-resilient construction techniques		Local craftsmen are willing to be trained and practice in disaster-resilient construction techniques
		% of houses reconstructed and repaired incorporating disaster-resilient features		
Voluntary/ consultative relocation of affected communities in high-risk areas to safer ground	0.20	# of households relocated to safer locations	Ministry of Land Management	Communities are willing to relocate
			Provincial Government	Safe land with access to infrastructure, services and livelihood opportunities is available RGC is collaborating to provide concessionary land to affected households
Total	0.9535			

Source: PFERNA Team Assessment, 2013

TABLE 37: LONG-TERM RECOVERY FRAMEWORK

Output	cost (million US$)	Indicators	Key Govt. partners	Assumptions
Development of a disaster-resilient land use plan for disaster affected provinces of Cambodia	2.5	# of Provincial land-use plans developed	MoP Ministry of Land Management NCDM PCDM	RGC is willing to participate in developing land use plans
Development of zoning and building regulations for disaster-affected provinces incorporating DRR measures at district level	2.5	# of District zoning and building regulations developed	MoP Ministry of Land Management NCDM PCDM	RGC is willing to participate in developing zoning and building regulations
Building capacities of communes to enforce building and zoning regulations	5	# of village and commune chiefs trained in enforcing building and zoning regulations # of communes enforcing zoning and building regulations	MoP Ministry of Land Management NCDM PCDM Provincial Governments	RGC is willing to participate in enforcing zoning and building regulations
Total	10			

Source: PFERNA Team Assessment, 2013

11.2.4 Education - Post flood School Assessment check List

Purpose of the Assessment:

To identify the needs of the flood affected schools to further informing the recovery efforts in the schools for continuity of education.

Target Group:

School head teacher, teacher, students, village chief

1. Basic information

Province:_____ District:_____

School name: _____ EMIS school code: _____

School Director: _____ Telephone number: _____

No. buildings: _____ No. classrooms:_____

Type of School: ☐ Pre-school ☐ Primary ☐ Secondary

Enrolment in school year 2012-2013 Total: #_____ and _____% Girls: #_____ and _____%

Enrolment in school year 2013-2014 Total: #_____ and _____% Girls: #_____ and _____%

Dropout in school year 2013-2014 Total: #_____ and _____% Girls: #_____ and _____%

Number of teaching hours loss Total: #_____ weeks loss or delay

School applied flexible school calendar ☐ Yes ☐ No if yes how to apply? _____

2. Status of school operation

2.1 Has the school reopened after floods? ☐ Yes ☐ No

2.2 If Yes, how long did it take to reopen? _____ (days)

2.3 If no, why?_____ when school is expected to reopen? _____

2.4 Teachers organized Temporary Learning Space (TLS) for those children who cannot access the school

☐ Yes ☐ No if yes, how many TLS have been organized _____

Number of children attended _____ (daily average number)

3. Damage assessment of textbooks, materials, furniture and school infrastructure

Indicate below the damage to the items and materials listed below

A. Textbooks

Indicate the number of damaged textbooks that need to be replaced by subject and grade

Subject (list subjects)	Primary school					
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Math						
Khmer						
Science						
Social studies						
Total						

Subject (list subjects)	Secondary School					
	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
Math						
Khmer						
Geography						
History						
Moral civic						
Home economics						
Physics						
Chemistry						
Biology						
Earth science						
Economics						
Total						

B. School furniture

Indicate below the number of damaged items that need replacement:

Item	Number to be replaced
Blackboard	
Student tables	
Teacher tables	
Chair/benches	

C. Teaching and Learning materials

Please describe the damage to the teaching and learning materials and indicate what needs to be replaced

Item	Numbers	Describe damage	Estimate costs for Repairs
Foundation			
Walls			
Floor			
Window			
Roof			
Step			
Door			
Other:			

Engineer's opinion:

The school building is safe for use ☐ Yes ☐ No

1. _____ 3._____ 5._____ 7._____

2. _____ 4._____ 6._____ 8._____

D. School infrastructure (buildings and classrooms) This section is to be assessed by the engineer

Number of buildings in school: _____

Types of school building: ☐concrete building, ☐wooden building, when it was built _____

Level of flood in the school: _____ Meter (from Ground level)

Access to school (for recovery material transport) by ☐ car ☐ motorbike ☐ boat

Distance of school from provincial town: _____Km

If the school building is NOT safe,

☐Inform the school director and agree on next steps.

4. Damage to WATSAN and other facilities This section is to be assessed by the engineer

Item	Total/ Damaged (numbers)	Describe damage	Estimate costs for Repairs
Latrine			
Well / hand pump/water tank			
Rainwater collection system			
Hand-Washing facilities			
Playground infrastructure (equipments etc.)			

5. Disaster Preparedness capacity

- Is there any preparedness activity in place? E.g. ☐ Emergency Preparedness and Response Plan ☐ school EPRP ☐ other_____
- Number of teachers aware of (or received training) on ☐ disaster preparedness _____ ☐ Temporary Learning Space guideline _____
- Is TLS established in recent flooding? ☐ Yes ☐ No

If yes how?

If no why?

- Challenges or difficulties?

_____

_____

- Are students aware of disaster risks from flooding, storms, lightening, mines, disease outbreaks etc. ☐ Yes ☐ No

Preparedness Measure taken by school for students' awareness:

☐ IEC ☐ Key Messages ☐ Disaster preparedness trainings

- Comments from children

_____

6. Child Protection issues

Number of children died _____ because of ☐ drown ☐ other reasons, please explain _____

How many children are living with relatives (grandparents etc) _____

How many children headed households? _____

How many children have lost their parents in recent flooding? _____

How many children are working as child labour?

Any known case of child abuse? _____

7. Additional comments by assessment team:

_____

_____

8. Assessment Team Leader:

Date: _____ Signature: _____ Name: _____

11.2.5 Education - Affected schools

	Basic Information						Loss of teach/learn materials						Estimation damages and losses of school infrastructure							
Province	Number of building in school	Number of classroom	Number of classes	Number of total enrolment 2012	Number of total enrolment 2014	Deviation of enrolments	Estimation loss of textbooks (US$)	Loss of textbooks at primary school	Loss of secondary school's textbook	Estimation Loss of school furniture	Total cost of student / teacher furniture	Estimation of building 1 damaged	Estimation of building 2 damaged	Estimation of building 4 damaged	Estimation of building 5 damaged	Toilet damaged	Well damaged	Hand WATSAN facilities damaged	Playground damaged	Total Estimation of DaLA
Kampong Thom	28	136	104	3,757	5,803	140	768	768	0	2,755	2,755	0	0	0	0	0	60	0	0	376,202
Kandal	30	141	113	3,883	3,716	210	1,694	241	1,453	608	758	0	0	0	0	3,600	8,400	650	100	60,972
Kratie	54	143	109	3,230	3,217	100	347	301	46	6,120	6,120	0	0	0	0	0	0	0	0	510,318
Prey Veng	31	139	120	5,084	4,817	323	6,525	3,947	2,578	17,120	18,750	0	75,690	0	0	14,869	8,100	300	950	821,292
Stung Treng	49	157	184	5,659	5,729	179	474	474	0	7,775	7,775	66,090	68,058	0	0	3,805	11,900	1,285	0	229,104
Banteay Meanchey	70	249	214	6,550	6,461	248	3,648	2,286	1,362	7,031	5,281	0	0	0	0	1,305	530	0	0	1,777,354
Kampong Cham	63	277	166	8,646	8,544	280	4,473	2,940	1,533	12,543	12,543	0	0	0	0	48,000	7,800	100	655	440,158
Battamabng	66	211	236	7,137	7,878	173	9,866	7,551	2,315	32,650	34,620	0	248,790	53,500	20,000	39,980	18,200	200	0	1,550,564
Kampong Chnang	22	80	78	2,658	2,792	31	905	885	20	6,550	4,390	0	0	0	0	1,950	5,600	0	0	799,100
Pailin	22	93	111	3,007	3,432	67	0	0	0	0	0	0	0	0	0	14,999	3,600	0	0	349,600
Pursat	80	404	324	11,097	11,124	345	18,462	15,190	3,272	25,560	25,440	0	60,000	0	0	78,400	61,000	8,200	530	663,208
Siem Reap	65	239	268	10,856	10,774	405	56	1,658	867	7,380	7,480	0	168,060	0	0	2,000	900	30	0	202,997
Grand total	580	2,269	2,027	71,564	74,287	2,501	47,218	36,241	13,446	126,092	125,912	66,090	620,598	53,500	20,000	208,908	126,090	10,765	2,235	7,780,869
Dropout children				2,501																
Number of school children increased in school year 2013-2014				2,723																
Net enrolment increased in school year 2013-2014				5,224																

11.2.6 Education - Recovery Costs Breakdown

TABLE 38: SHORT-TERM RECOVERY RESPONSE PLAN FOCUSING ON REPAIRS TO SCHOOL BUILDINGS AND REPLACEMENT OF TEXTBOOKS

Category	Repair building & reconstruction			Repair furniture & WATSAN	Replace textbooks	Total
	Building	Room	Cost (million US$)		(million US$)**	(million US$)**
Pre-school			-	-	0.00	0.00
Primary School	230	910	8.82	0.10	0.03	8.95
Secondary school	39	195	0.99	0.02	0.00	1.01
TTC Stung Treng*	1	1	0.03	-	-	0.03
Total	270	1,106	9.84	0.12	0.03	9.99

*TTC: Teacher Training College in Stung Treng

**Cost estimation of student textbook per unit is US$ 1 on average

Source: PFERNA Team Assessment, 2013

TABLE 39: MEDIUM-TERM RECOVERY RESPONSE PLAN FOCUSING ON RECONSTRUCTION OF DAMAGED SCHOOL BUILDINGS

Category	School Reconstruction		
	Building	Room	Cost (million US$)
Primary School	17	81	1.29
Lower Secondary	2	11	0.20
Upper Secondary	1	5	0.20
Total	20	97	1.69

Source: PFERNA Team Assessment, 2013

11.2.7 Health -Financed Service Fees of "Sa-Ang Phnom" Health Centre (Kandal Province)

No	Health Centre Services	Fees (Riels)	Fees (US$)
1.	General Consultations adults children	1,000 riels 1,000 riels	 US$ 0.25 US$ 0.25
2.	Pregnancy Consultation	2,000 riels	US$ 0.50
3.	Gynecology	5,000 riels	US$ 1.25
4.	Supply of Contraceptives pills injection Intra-Uterus contraceptive Device (IUD)	2,000 riels 2,000 riels 10,000 riels	 US$ 0.50 US$ 0.50 US$ 2.50
5.	Delivery	6,000 riels	US$ 1.50
6.	Vaccination	1,000 riels	US$ 0.25
7.	Small Operation wound stitching wound cleaning	 2,000 riels/stitch 3,000 riels	 US$ 0.50 US$ 0.75
8.	In-patient		
9.	Transferring Patients to referral health centres to Phnom Penh		
10.	General Notice:		

Source: Health Office of Operational District "Sa-Ang"

11.2.8 List of most affected health centers and referral hospitals surveyed

No.	Province	Name of HC	Name of OD	Total pop covered	# of health staff	# consultation per month	# consultation per week	How long floods affected	Est. cost for reconstruction
1	Banteay Meanchey	Prasat HC	Preah Net Preah	7,791	8	400	100	8 weeks	$75,000
2	Banteay Meanchey	Rohat Tuek HC	Mongkol Borei	12,291	9	400	100	8 weeks	$75,000
3	Banteay Meanchey	Phneat	Mongkol Borei	4,542	7	950	238	6 weeks	$75,000
4	Banteay Meanchey	Kumrou HC	Thmar Pouk	16,620	6	800	200	1 week	$70,000
5	Banteay Meanchey	Boueng Trakoun	Thmar Pouk	10,124	9	500	125		$70,000
6	Banteay Meanchey	Kob HC	O'Chrov	15,173	21	1,200	300	8 weeks	$65,000
7	Banteay Meanchey	Malay HC	O'Chrov	8,746	28	700	175	1 week	$65,000
8	Banteay Meanchey	Reussey Srok 1 HC	Mongkol Borei	15,323	8		-	8 weeks	$10,000
9	Banteay Meanchey	Balaing	O'Chrov	9,687	7	750	188		$5,000
10	Battambang	O Taki	Thmar Koul	17,616	6	450	113	4 weeks	$65,000
11	Battambang	Prey Brasob	Thmar Koul	12,348	8	300	75	1 week	$65,000
12	Battambang	Pech Chenda	Sampov Loun	18,366	9	450	113		$65,000
13	Battambang	Takrey	Sampov Loun	12,145	7	400	100		$65,000
14	Battambang	Bavel 1	Thmar Koul	13,040	14	400	100		$65,000
15	Battambang	Thmar Koul	Thmar Koul	223,382	166	500	125	1 week	$65,000
16	Kampong Thom	Dong	Staung	15,989	9	800	200	12 weeks	$65,000
17	Kampong Thom	Kampong Ko	Kg Thom	7,278	9	500	125	12 weeks	$65,000
18	Kampong Thom	Tbong Krapeu	Kg Thom	12,251	7	600	150	12 weeks	$65,000
19	Kampong Thom	Thnot Chum	Baray Santuk	11,008	10	800	200	8 weeks	$65,000
20	Kandal	Prek Reussey	Lvea Em	7,893	7	750	188		$70,000
21	Kandal	Barong	Lvea Em	3,962	9	200	50	1 week	$70,000
22	Kandal	Luek Dek	Koh Thom	7,645	10	840	210	8 weeks	$65,000
23	Kandal	Sampov Poun	Koh Thom	15,852	8	820	205	8 weeks	$65,000
24	Kandal	Prek Dambong	Mokampol	14,008	8	900	225	3 weeks	$65,000
25	Kandal	Koh Kor	Koh Thom	12,612	7	760	190	4 weeks	$65,000
26	Kandal	Koh Keo	Lvea Em	7,400	5	450	113	4 weeks	$65,000
27	Kandal	Prek Ampil 2	Sa-ang	15,000	9	700	175		$65,000
28	Kandal	Arey Khsat	Lvea Em	9,611	6	600	150	4 weeks	$65,000

29	Kandal	Svay Ampear	Mokampol	9,191	6	500	125	2 weeks	$65,000
30	Kandal	Phom Thom Sok Sabay	Lvea Em	2,501	8	1,350	338		$65,000
31	Kandal	Prek Anchanh	Mokampol	12,139	18	1,100	275	2 weeks	$65,000
32	Kandal	Toeuk Khlaing	Lvea Em	13,520	6	1,100	275	2 weeks	$6,500
33	Siem Reap	Kralanh RH	Kralanh	121,415	32	200	50	3 weeks	$400,000
34	Stueng Treng	Kamphoun	Stueng Treng	9,287	17	464	116		$65,000
35	Utdo Meancchey	Samrorng RH	Samrorng	40,000	73	84	21		$350,000
36	Utdo Meancchey	Bosbov	Samrorng	6,983	7	320	80	1 week	$65,000
37	Utdo Meancchey	Kouk Mon	Samrorng	10,850	13	900	225	1 week	$65,000
38	Utdo Meancchey	Samrorng	Samrorng	10,960	9	320	80	1 week	$65,000
39	Utdo Meancchey	Pong Ro	Samrorng	5,160	7	500	125		$65,000
40	Kratie	Bos Leav	Kratie	10,873	13	200	50	3 weeks	$65,000
41	Kratie	Pong Ro	Chhloung	12,376	15	700	175	1 week	$65,000
42	Kampong Cham	Love	Kg Cham-Kg Siem	10,574	4	430	108	4 weeks	$65,000
43	Kampong Cham	Prek Tanong	Kg Cham-Kg Siem	10,174	7	620	155	5 weeks	$70,000
44	Kampong Cham	Moha Khnhong	Kg Cham-Kg Siem	8,692	8	750	188	5 weeks	$70,000
45	Kampong Cham	Kampong Reap	Kg Cham-Kg Siem	9,794	8	800	200	4 weeks	$70,000
46	Kampong Cham	Kien Chrey	Kg Cham-Kg Siem	11,251	10	450	113	4 weeks	$65,000
47	Kampong Cham	Peam Chilaing	Kg Cham-Kg Siem	15,432	4	450	113	4 weeks	$65,000
48	Kampong Cham	Koh Sotin	Kg Cham-Kg Siem	12,557	7	650	163	4 weeks	$65,000
49	Kampong Cham	Peam Koh Sna	Kg Cham-Kg Siem	10,626	10	750	188	1 week	$65,000
50	Prey Veng	Prey Sniet	Prey Veng-Pea Raing					2 weeks	

Source: MoH

11.2.9 Health - New Standard Health Centre Building

Sa-Ang Phnom Health Centre of Kandal Province. (Photo: PFERNA Team)

11.2.10 Landmines - Context of Mine Action in Cambodia

Origin and extent of Landmine / ERW contamination in Cambodia: Contamination in Cambodia originally stems from anti-French colonial struggles after the Second World War, but especially the Vietnam War and first civil war-era (1967-75), when large quantities of bombs were dropped on north-eastern Cambodia in the attempt to interdict Vietnamese forces along the Ho Chi Minh trail. The bulk of landmine contamination followed the 1979 intervention by Vietnamese forces to overthrow the Khmer Rouge regime, resulting in a protracted 'internationalized-internal' conflict that did not finally end until 1998, although in terms of large scale mine laying was essentially concluded by the time of the Paris Peace Agreements, signed in October 1991. Remaining large-scale minefields are concentrated along the north-western borders, whilst the heaviest concentration of ERW is in the north-east, although the extended conflict resulted in contamination throughout much of the country. Many high priority sites have been cleared as a result of more than 20 years sustained mine action programming, and in some areas farmers have spontaneously reclaimed land since many of the anti-personnel landmines layed towards the end of the conflict (mainly Type 72s, used extensively by the Khmer Rouge insurgents) were either wrongly armed, or have ceased to operate due to climatic degradation. In 2012, more Cambodians were killed and injured by anti-tank mines than anti-personnel landmines. Unexploded Ordnance has also been a significant cause of death and injury over the last 20 years, something that was initially overlooked in mine action planning, when the problem was primarily seen as a landmines issue.

National Authorities and Key Actors in the sector: Mine action began in Cambodia in 1992 under the United Nations Transitional Authority in Cambodia (UNTAC). When the UNTAC mandate ended in late 1993, the mine action programme continued in the form of the Cambodian Mine Action Centre (CMAC) as the key national organisation and the largest operator. Since 2000 national mine action policy and strategy in Cambodia has been overseen by the Cambodian Mine Action and Victim Assistance Authority (CMAA)[44] . The CMAA is an inter-governmental body of high-level officials chaired by the Prime Minister. In addition, many international NGOs have long-established operations and understanding of the problem in Cambodia, including The HALO Trust (HALO), the Mines Advisory Group (MAG),

44 Royal Decree No. 177 (September 2000) followed by Sub-Decree No. 76 (August 2001).

Norwegian People's Aid (NPA) and Handicap International Belgium (HI-B). HT and MAG in particular are considered as world leading mine action NGOs, with deep understanding of the problem in Cambodia. HALO has been operational in Cambodia from 1991, being involved first in survey work for UNHCR to assess pre-return conditions in rural landmine-affected districts, prior to the repatriation or 360,000 Cambodian refugees from Thailand in 1992-3. The Mines Advisory Group commended operations in Battambang in 1992, and has a consistent presence ever since. As such both organisations have intimate and detailed knowledge of the landmine problem, and mine action programme in Cambodia and can be considered as expert interlocutors. Both organisations were consulted as part of this study, and neither felt that the flash floods had a significant impact on the landmine problem, nor did it require substantial programmatic adjustment. This said, MAG's community liaison team in Battambang has documented some flood related impacts, its EOD teams have responded, as detailed below.

Support for Mine Action: Cambodia has a de-centralised system for mine action where most of the funds for demining are in the hands of the operators[45] and along with Afghanistan, Cambodia is one of the largest recipients of international assistance[46]. On the national level the CMAA receives international assistance from UNDP, a technical advisor plus modest funding[47]. The largest operator recipient in Cambodia is CMAC, 20% of which is multi-lateral, 60%, bi-lateral and 20% from the Government of Cambodia[48].

The Legal Framework: Cambodia acceded to the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons (CCW) on 25 March 1997[49] and signed the Anti-Personnel Mine Ban Convention (APMBC) in December 1997 and ratified it in July 1999[50]. They have not joined the Convention on Cluster Munitions (CCM)[51].

Survey and Prioritisation: Cambodia, in its twenty years of mine action has undergone many different provincial and national level surveys, employing varying techniques and methodologies. Even so, the precise extent of contamination is not known. Through UNDP support and the Clearing for Results program, the latest survey, a two-year Baseline Survey (BLS) project has estimated total mine and ERW contamination at 1,624km2.[52] The survey data has been fed into revised guidelines and criteria for work planning and prioritisation that seek to integrate clearance more closely with broader commune development plans. They specify that priority is given to clearing hazardous area polygons identified by the BLS and where there have been casualties in the past five years. This in turn feeds into the Mine Action Planning Unit (MAPU) process.[53]

The MAPU process represents an important innovation in Cambodia's mine action programme. A three-tiered mechanism functioning under the CMAA that aims to establish community preferences for demining. The MAPU works at the village and commune levels to solicit and categorise demining requirements and facilitate district workshops at which the demining preferences of the communes in the district are aggregated into a district preference ranking. These are then developed into a provincial mine action plan by Provincial Mine Action Committees (PMAC).[54] Landmine/ERW casualties are seen by all groups as an important criteria for setting priorities, and the Cambodian Mine Victim Information System (CMVIS) provides very good data and analysis on casualties.

45 *The exception being the Clearance for Results Trust Fund managed by UNDP.*

46 *In 2011 Cambodia received almost US$35.8 million for mine action from 13 donors. Landmine and Cluster Munition Monitor, 2012. http://www.the-monitor.org/index.php/cp/display/region_profiles/theme/1666 - _ftn1*

47 *Interview with Chum Bun Rong, Director General CMAA, April 5, 2013*

48 *Interview with Heng Ratana, Director General CMAC, April 4, 2013*

49 *UN Office for Disarmament website*

50 *The Treaty entered into force in January 2000 and according to its provisions, Cambodia is obliged to locate all mined areas, then to clear all known mined areas by the end of 2009. As this was not possible, Cambodia has requested the States Parties to the APMBC for a 10-year extension.*

51 *Landmine and Cluster Munition Monitor, 2012*

52 *89 out of 124 districts reporting*

53 *Landmine and Cluster Munition Monitor, 2012*

54 *Therefore, districts cannot establish the final priorities; rather, they adopt preference rankings (i.e. wish lists). Interview with SomMony, Deputy Director, MAPU Battambang, April 2, 2013.*

11.2.11 Landmines Education - Joint UNICEF/ CMAA Impact Assessment study of the flooding in mine and ERW contaminated areas in Battambang, Pailin and Banteay Meanchay

The draft report notes that, *'From 31 October to 25 November 2013, CMVIS data gatherers visited 96 villages to conduct the assessment. In Battambang they visited 177 locations, in Pailin 28 locations and in Banteay Meanchey 103 locations. In total, the CMVIS data gathers visited 308 locations in 96 villages and interviewed 1,026 representatives from local authorities and the Assessment Forms were completed accordingly.'*[55]

The report goes on to note, *'interviews indicated that there were some landmines and ERW were moved by flood water from their original locations to safe locations such as villages, rice fields, farming fields and high ground'.* [56] It should be noted, as stated below in the section *'Observations on Dara Seng's Field Work Report',* that there maybe an element of assumption here (on part of the interviewees and report writers). It is extremely hard to accurately establish whether items have moved from other locations, or been exposed by erosion in the place that they have been hidden for many years. This said, the visual evidence from the site of the item that has been reported will provide a strong indication, as in this photo taken from the report. **It should be noted that many experts consulted believe that most if not all items of ERW, and many mines (such as POMZ casings), are highly unlikely to have moved far from their original locations due to their heavy metal content and density.** However, the CBMRR agents on the ground are convinced that in some cases mines & ERWs were moved great distances from their original locations (especially in Samlaut district, in Battambang).

The report goes on, '…*the CMVIS data gatherers reportedly found 174 items of landmines and ERW that were moved from their original locations to safe areas. Of the 174 items, 72 were landmines and 102 were ERW. 23 items of landmines and ERW were found in the villages, 149 found in rice/farming fields, and 2 found in safe high ground'.* It should be noted that the CMVIS report is illustrated *only* with images of ERW that are highly **unlikely** to have been moved far, if at all, by flood-waters. Images such as the one above point to items being exposed due to erosion, rather than having been moved, or 'Washed out' by flood waters.

55 *P.2, Draft CMAA/UNICEF Report*

56 *p.3. Draft CMAA/UNICEF Report*

Recommendation: Commission a small study to gather, and amalgamate all such survey data on landmines and ERW Washed out or newly discovered after the floods. The CMAA/UNICEF survey, together with the data provided by mine action operators have been incredibly helpful in undertaking this assessment but the data sets indicate gaps, such that no one set contains the complete picture. Bringing together all the data, and producing a comprehensive list, perhaps one which could be further verified by verification / survey with CBMRR officers, and community liaison and other field staff of the mine action agencies operational in western Cambodia over the next few months, could provide a final and comprehensive impact, as well as ensuring that any residual items not previously reported are destroyed as spot tasks.

The report goes on to state at section 4 that 99.32% of interviewees were now *'scared about the potential danger of Washed landmines and ERW'.* However, only 32.68% of nearly 60% of interviewees receiving MRE after the floods received messages about the *'movement of mines and ERW from other locations to safe areas'* indicating that the communities were already aware of this issue. Whilst it is useful to include messages about the potential for mines and ERW to be **BOTH** Washed out and moved, AND exposed by erosion in place**, it is important to avoid creating a generalised fear amongst the population in flood affected areas through MRE, especially if this is based on a false belief of widespread risks as a result of mines 'floating'.** This would be contrary to the most basic principles of 'Do No Harm'. It is important to explain that Wash out of mines is NOT the same as 'floating' mines. It is important not only to focus on Washed out mines and ERW, but to give equal attention to the 'erosion and exposure' issue. **Overall, the risks must be communicated in a way that is consonant with the evidence base. Crucially, it must be acknowledged that items washed out or exposed by flood-water erosion, by simple fact of being visible are inherently less risky for affected communities**[57]. There is no need for widespread panic, either amongst the affected population, mine action agencies, or their donors. It is clear, as noted above, that the communities themselves appeared *already*

57 *Risks from landmines, and other ERW, are in large part related to the fact that they are hidden from view, buried in the soil. Buried AP landmines in particular, being victim activated, are therefore a high-risk threat. Washed out mines, unless caught up in piles of other Washed out soil and debris, are visible, and therefore as long as the community have good recognition and reporting skills, and there is an effective response mechanism to such reports (as there has been in this case), the risks will be effectively mitigated*

to be aware that heavy rains, and flooding, can bring landmines and ERW to their communities (either through Wash out or erosion and exposure). What is required then are messages that acknowledge this, but which remind people such items are usually going to be easy to spot, reinforce item recognition training as well as the need to report, together with information on who to report to. The good news is, as stated elsewhere, that this system can be seen to have worked well in the aftermath of the 2013 floods, and can be seen to have provided effective risk mitigation. Essentially then, all that needs to happen is that the system needs to be protected and reinforced going forward.

11.2.12 Landmines - Fieldwork by Dara Seng of CMAA, focusing on the 'evidence points' established by the study detailed in 1. above, plus reports from CMAC, MAG and the CBMRR network etc.

Dara Seng, Deputy Director of PR Department, CMAA reported the following, as a result of his field visit to western Cambodia, 15-20th December 2013, (highlights in bold added):

BATTAMBANG PROVINCE

The flooding really affected mine action in Battambang and Pailin Provinces where a lot of mines and ERW were reported or found during the time of flooding. *Mr. Chan San, Deputy Manager of Demining Unit 6 (DU6), CMAC based in Battambang and Pailin Provinces explained that a lot of mines and ERW were found in most districts in Battambang and Pailin during the flooding. Mine Risk Education activities have been provided to the target communities to prevent them from having accidents.*

Ms. Ham Chantha, Coordinator in Mine Action in Battambang and Pailin Province for CMAC reported that in November 2013, EOD teams of DU6 collected 523 landmines and ERW in Battambang and Pailin (see table below). Most of the mines and ERW were moved from high land and eroded by flooding and heavy rain. Based on the CMAC reports in November, 523 items of landmines and ERW that were eroded or moved from their original locations to safe areas in the villages, farming fields, along the streams in Battambang and Pailin Provinces. Fortunately, there has not been any accidents during or after the flooding *because Emergency Mine Risk Education was provided in the target areas. In addition, there is also have Community Base Mine Risk Reduction (CBMRR) in the target areas to provide information from the people to the demining agencies and local authorities.*

Ms. Yen Sambo, CBMRR in Samlout District, explained that she received many reports from the target villages about landmines that had been found in the area. Some landmines were flowing to the safe lower land or streams from the hills. ***20 items of landmines and ERWs were found in Peam Ta Village****. When she got calls from the people in the target villages, she reported this to CMAC, MAG or other demining agencies, and asked them to send their EOD teams to deliver Mine Risk Education (MRE) and collect the items.* ***She added that CBMRR is an important mechanism at community level.***

Mr. Son Vibol, CBMRR in Kamrieng District, said that after the flooding, people are very worried. Many landmines have been reported after flooding.

Unexploded Remnants found in flooded area. (Photo: PFERNA Team)

Mr. Keo Pov, CBMRR in Pailin Province, Explained that after flooding, he many reports on mines and ERW, 18 mines in Krong Pailin and 8 mines in Sala Krao district. They found 8 APM mine, 1 ATM and 19 ERW. 2 mines were reported to be found in the farming field ***in BosSa Am village. The mines lost while the area was flooded again in the next few days. We don't know where the two mines have been moved****. He also noted, "The mines can be buried in the soil by new flood"* Mortar, Samlaut District, Battambang

In Krong Pailin, 5 landmines and 3 ERW were found during the flooding he added. Some places mines and ERW are usually found after raining. Like in BosSa Am Village, people usually find mine/ ERW move every year once it has heavy rain because of loss of forest (deforestation) on high land areas.

He explained that people and authorities are very worried about the impact of mine/REW during flooding. Mr. Keo Pov thinks that there will be more mine/ERW in the farming field, perhaps being buried by spoil from the flooding. He said that those are landmines we primarily found. We hope we get more report on mine/ ERW when people go to collect production or crops from their farming fields. ***At the end Mr. Keo Pov proposed the government and relevant agencies to prove both financial and technical support to strengthen Mine Base Community Risk Reduction (CBMRR) in target communities because they are very important network in mine action at community level to get the report and to provide***

Unexploded Remnants of war found in Pailin by MAG. (Photo: PFERNA Team)

Ms. Chan Phana, chief of BosSa Am Village, Sala Kreo Commune, Sala KreoDistric, Pailin reported that people usually tell her once they find the items and she reports to CMAC, MAG and demining agencies to collect the items. During the flooding, 6 items of mines and ERWs were found along the streams ponds or farming field after flooding or heavy rain. Even after the flooding receded, people in the flood-affected POMZ, found by CMAC in Battambang *areas were still worried about this legacy of war. A 33 year-old, Ms.Ath Sam An, a farmer in Bos Sa Am village said that she found one mine was stuck along the stream when she was collecting vegetable behind her house. She was very scared. "I put mine sign to inform other people about the dangerous place, and I informed the village chief about that. I will be afraid after flooding. I have to be very careful when going to my farm. I will carefully look around when I am walking. Another villager, 26 year-old Mr. Ben Ma, reported that in October, he was "very surprised to see an item of unexploded remnant of war called B 40 in my fishing net when I was fishing. I slowly took the item from my fishing net, put it gently on the ground and report to the chief village".*

Meeting with MAG: Mr. Keo Vuthy, head of EOD1, MAG in Pailin reported that 15 items of mines and 30 ERWs were collected by his team during and after flooding. Most of the item were moved from their original locations to get stuck along the ponds or streams. *According to Mr. Keo Vuthy, MRE should be provided double after flooding because there will be more and more mine/ ERW in people's farm that they will see when they go collect production and crops. He also proposed authorities and relevant agencies to provide some MRE Materials such as T-shirt and books for providing to those who report on mines because they usually expect for incentive when they report us.*

Meeting with MAG EOD Team in Pailin. (Photo: PFERNA Team)

Observation on the Photographs

It should be noted that photos in the CMAA/UNICEF and Dara Seng's field work report all show either ERW (such as the mortars above which have clearly been collected, and moved to a collection point to make destruction easier), or heavy metal mines (in the example above a POMZ casing). Neither ERW nor items like a POMZ casing, are likely to have been moved far, if at all by flood waters. They certainly are INCAPABLE of floating.

In Banteay Meanchey Province. *The flooding also affected some communities in Banteay Meanchey province. Ms. Teng Sovanphalla, head of coordination in mine action, Demining Unit1, CMAC explained that Mine Risk Education in Emergency has been provided to people, students in the target communities affected by flooding in Banteay Meanchey.*

11.2.13. Landmines - Secondary research, through mine action operators undertaken by the international mine action expert

In addition, information was provided by the team directly from the Mines Advisory Group country office, through its reporting chains to its local offices in Battambang and Banteay-Meanchay. Initial conversations with MAG suggested that the perceptions of widespread problems caused by 'floating mines' had been exaggerated. For example, MAG noted that one of its donors had requested that the organisation survey Bavel district in Battambang to assess the impact of the floods on the landmines sector. MAG reported that no discernible impact had been noted[58]. However, information received later, revealed that MAG's EOD teams had destroyed 8 AP mines and 23 items of UXO, during what are believed to be flood-related spot tasks in Bavel district during the second half of October, and the first week of November[59]. These reports show that to destroy these items MAG recorded no area cut (of vegetation), no area cleared (searched to national standard depth with detectors) and no area searched with a large loop detector, indicating these were 'spot tasks', referring to flood-related items that had been reported in areas previously considered safe[60]. Further, following requests from this team, MAG confirmed that in addition to the information reported above, *'….during October to November assuming flooding/ heavy rainfall period which considered the report of floating/ migrating* ***or emerging*** *of mines/ERWs during these time. In October 2013, It was, evidentially, the reports from CL teams were confirmed spotting:*

- 1 PMN2 in MnusKal village, Ou Da Commune, Kamriengdistirct,
- 1 Type 69 in DamnakDangkor village, KdolTahen commune, Bavel district,
- 1 UXO in Thnal Bot village, Stueng Trang commune, Sala Krau district
- 1Type 69 in Bar Taingsu village, Bar Yarkha commune Pailin district[61]

N.B. It should be noted that the last three reports above are not believed to have been referenced in any of the other information sources cited above, suggesting that a comprehensive picture of the impact has not yet been secured. Furthermore, emphasis on 'emerging' of mines has been added by the author of this report to stress that it is unclear whether these items have moved or emerged as a result of erosion.

HALO Trust work in Banteay Meanchay (and other areas of the north west), an area that appears from the current sources to have been less badly affected than Battambang and Pailin. Again initial reports from HT's senior management, based on discussions during a recent field visit to their operational teams, suggested that there was limited indication of movement of landmines, Wash out or indeed mines and ERW being exposed by flood-related erosion[62].

11.3 INFRASTRUCTURE

11.3.1 Water and Sanitation Assessment – Household questionnaire

Province:_____
District:_____

Commune:_____
Village:_____

58 *Phone interview with Alastair Moir, Country Programme Manager, MAG Cambodia, Saturday 30th November 2013*

59 *Email from Kong Chivin, Community Liaison Co-ordinator, MAG Cambodia, 20th December 2013*

61 *Email from Kong Chivin, Community Liaison Co-ordinator, MAG Cambodia, 20th December 2013*

62 *Email to Paul Davies from Matthew Hovell, SE Asia Desk Officer, HALO Trust, 9th December*

Type of Emergency - Flood

1. How many households are there in the affected areas? |___| households
2. Population in the affected areas? |_____|_____|_____|
3. What is the estimated coverage of accessible safe water supply among the affected population?

   Pre-emergency |__|% Post-emergency |__|%
4. What is the estimated supply of safe water for each household/day? |___| litres
5. Which population has no access to any treatable water source and where? |_____|
6. If access to water is limited, what are the main reasons? Distance |__| Source damaged |__| Others |__|
7. What are main sources of water supply? Piped water |__| Tube well/borehole |__| Dug well |__| Water from spring |__| Rain water collection |__| Surface water |__| Others |__|
8. Are water sources contaminated or at risk of contamination due to flooding? Yes |__| No |__| Don't know |__|
9. Do affected populations have enough water containers of the appropriate size and type? Yes |__| No |__| Don't know |__|
10. If not, how many is needed per household? |_____|
11. What are the high-risk practices for water and sanitation (eg: excreta disposal, solid waste and human/animal corpses among the affected population? |_____|
12. Are hygienic items available in the affected families? Soap |__| sanitary napkins |__| others |__|
13. Are vectors an immediate problem? Yes |__| No |__| Don't know |__|
14. If yes, how many people are affected? |_____| people
15. What population is currently affected by inadequate excreta disposal? |_____|
16. Is solid waste a problem? Yes |__| No |__| Don't know |__|
17. If yes, how many people are affected? |_____|
18. What types of solid waste is being produced? |_____|
19. How do people dispose their waste? |_____|
20. In which locations are the construction of new trench/pit latrines necessary and appropriate? |_____|
21. How many dug wells affected or damaged? district|_____| commune |_____| Village|_____|
22. How many boreholes affected or damaged? district|_____| commune |_____| Village|_____|

11.3.2 Rapid Road Needs Assessment

ROADS & BRIDGES

Mission Location :

Date :

Province :

Compiled by :

Email :

Phone :

Checklist for Road Assessment Activities	Done	Comments	
1	List any map of roads within the emergency / affected zone. Are they available ?		
2	Is there available a distance and time matrix for various types of vehicles that now use the roads by type (National/Provincial/Rural) a. Before the flood event b. Present condition		
3	Is there a consolidated list of bridges that lists: 1. Location (GPS) 2. Span 3. Bridge type 4. River Name 5. Condition assessment		
4	Is there a consolidated list of road locations that lists flood related damage ? : 1. Location (GPS/Chainage/Km) 2. Type of damage 3. Traffic movement possible / restricted 4. Road classification (National/Provincial/Rural) 5. Condition assessment		
5	Has the NCDM and Ministry of Roads/ Transport/ Infrastructure been informed to initiate repairs to damaged roads and bridges that are presently unpassable ?		
6	Does the provincial authority have construction cost estimates for reconstruction of roads for : 1. Sealed National Roads 2. Unsealed Rural Roads 3. Labour Intensive Community / Village roads		

Road Network Spot Sampling Assessment

Road Assessment				
From/to (names)	From: ☐ NAME: ☐ GPS Waypoint:	To: ☐ NAME: ☐ GPS Waypoint:		
Total Distance (kms)	**Is the route passable?**	**Normal travel time (hrs/ days)**	**Current travel time (hrs/ days)**	**Is there an alternate route?**
	☐ Yes ☐ No			☐ Yes ☐ No via
What type of vehicles can travel this route?	☐ Truck + Trailer (>20 T) ☐ Heavy Truck (<20 T) ☐ Light Truck (<10 T) ☐ 4WD (<3.5 T) ☐ Motorbike ☐ Non-motorized traffic			
What is the type of the road?	☐ Paved ☐ Unpaved ☐ Gravel ☐ Compacted - Rough ☐ Uncompacted – dry			
Are their axle load limits on this route?	☐ Yes ☐ No If yes please list			
Traffic management	Is there any mechanism to control axle load limits ☐ Yes ☐ No If yes please list			
Are there any other vehicle dimensions limitations?	☐ Weight If ticked please indicate the limitation ☐ Width If ticked please indicate the limitation ☐ Length If ticked please indicate the limitation ☐ Height If ticked please indicate the limitation			
What particular constraints are there on the route	☐ Bridges ☐ Restricted depths (rivers) ☐ Steep hills ☐ Floods ☐ Landmines ☐ Seasonal/weather factors ☐ Other (please indicate)			
How is the present volume of traffic compared to the one before the event?	☐ Hardly any ☐ less than usual ☐ Normal ☐ More than usual			
How can we explain the difference?	☐ Disaster related ☐ Weather ☐ Road Condition			
What bottlenecks/impassable locations exist? What damage location exist ?				
1. Location (between x and y/distance from town)				
Nature of bottleneck (damage to bridge, road, landslide)				
What possibilities are there for re-opening and/or increasing movement capacities?				
What materials, equipment, expertise would be required?				
What would it cost and how long would it take?				
2. Location (between x and y/distance from town)				
Nature of bottleneck (damage to bridge, damaged road) exist on the road				
What possibilities are there for re-opening and/or increasing movement capacities?				
What materials, equipment, expertise would be required to reopen closed roads?				
What would it cost and how long would it take to reopen the closed roads ?				
3. Location (between x and y/distance from town)				
Nature of bottleneck (damage to bridge, road damage, land slide)				
What possibilities are there for re-opening and/or increasing movement capacities?				
What materials, equipment, expertise would be required?				
What would it cost and how long would it take to reopen closed roads ?				
Any additional information on route?				

11.3.3 HV & LV ELECTRICAL NETWORK ASSESSMENTS

Province:_____District _____

Line Ministry Responsible :

Focal Point at Province :

Focal Point at National :

Type of Emergency - Flood

1. How many HV distributions lines are in the province and what is capacity of those lines ?

|___| Number |___| kV

2. How many HV towers were damaged in the flood event ? |_____|

3. How many open air switch yards are in the province , their location and were the switchyards affected by the flood waters ? |___| Number |_____| Locations

4. Has an inventory and damage assessment been conducted on HV transmission towers and structures and LV poles and wires in the affected area? |___| Yes |___| No

5. Is there a consolidated list of open air switch yard locations ? |___| Yes |___| No

6. Were all open air switch yard transformer and equipment platforms above the flood level |___| Yes |___| No

7. How many LV distribution lines and poles were affected by the flood event? |___| Lines |___ | Poles

8. What is the estimated coverage of LV lines and poles in the affected area?

   Pre-emergency |__|% Post-emergency |__|%

9. Was the electrical supply interrupted by the flood event? If so, for how long?

   |___| Yes, |___ | No |___ | Days Duration

10. Which towns were affected by the power interruption?

    |_____|

    Towns & Durations (Days)

11. What percentage of large commercial operations DO NOT HAVE UPS generator sets ?

    |__|%

12. What percentage of SME (Small Medium enterprises) DO HAVE generator sets ?

    |__|%

13. For households off grid, what are the main sources of electricity? (percentage of households)

    Personal Generators |__| Solar |__| Hydro |__| Bio Fuel |__| Others |__| Non |__|


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