

Agriculture and Livelihood Flood Impact Assessment in Myanmar



Jointly led by the Ministry of Agriculture and Irrigation; Ministry of Livestock, Fisheries & Rural Development; FAO and WFP under the framework of the Food Security Sector in partnership with UN Women, World Vision, CESVI, CARE, JICA and LIFT.



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Acronyms and abbreviations

AAP	Accountability to Affected Populations
CARE	Cooperative for Assistance and Relief Everywhere
CESVI	Cooperazione e Sviluppo
DMH	Department of Meteorology and Hydrology
FAO	Food and Agriculture Organization of the United Nations
FHHs	Female-headed households
FSS	Food security sector
JICA	Japan International Cooperation Agency
LIFT	Livelihood and Food Security Trust Fund
MoAI	Ministry of Agriculture and Irrigation
MoLFRD	Ministry of Livestock, Fisheries and Rural Development
NDMC	National Natural Disaster Management Committee
OCHA	Office for the Coordination of Humanitarian Affairs
UN	United Nations
WFP	World Food Programme

Executive summary

On 30 July 2015, Cyclone Komen made landfall in Bangladesh bringing strong winds and additional heavy rains to Myanmar, resulting in floods and landslides. According to the National Natural Disaster Management Committee, 122 people lost their lives and up to 1 624 000 people were displaced. In addition, 525 330 ha (1 306 791 acres) of farmland were inundated with reports of a significant impact on crop production, particularly rice which is considered the staple commodity in the country.

While OCHA coordinated a multi-agency initial rapid assessment (MIRA) to inform immediate humanitarian priorities, this Agriculture and Livelihood Flood Impact Assessment requested by the Ministry of Agriculture and Irrigation and the Ministry of Livestock, Fisheries and Rural Development focused on assessing the disaster impact of the cyclone on agriculture and rural-based livelihoods of affected populations.

The assessment was conducted in the six most-affected regions/states of Ayeyarwady, Bago, Chin, Magway, Rakhine and Sagaing. It was co-led by FAO and WFP under the framework of the Food Security Sector in partnership with UN women, World Vision, CESVI, CARE, JICA and LIFT.

The key findings of the assessment show that the disaster had a severe impact on the livelihoods of families that rely on agriculture. Most villages in the six regions/states reported that large parts of their agricultural land was affected by the floods, particularly in Ayeyarwady, Bago and Rakhine, where almost 400 000 ha of land were flooded, resulting in severe damage to cultivated crops, particularly rice. In fact, of the overall proportion of crops damaged by the floods, 89 percent consisted of monsoon paddy rice, which is likely to experience losses of production of at least 30% compared to the same time last year. The anticipated high production losses could expose an already vulnerable population to greater food insecurity and possibly malnutrition. Chin state was particularly affected by landslides which destroyed around 2500 ha of agricultural land. Overall, there was also a significant accumulation of sediment and debris on agricultural land due to the disaster. Heavy machineries are needed to rehabilitate the land.

Additional findings show that job opportunities such as agricultural casual labour, which is considered one of the most important income-generating activities for the rural population, have already diminished and will probably decrease even further during the upcoming monsoon harvest season. Women are expected to be more severely affected by this situation and the lack of work opportunities will have a significant impact on the livelihoods of many vulnerable women. Affected women's wages are already almost 20 percent lower than those of men, as reported in the results of the assessment.

Seeds, fertilizers and tools were also lost in the disaster. With additional damage to irrigation systems, many farmers risk missing the start of the upcoming winter and summer agriculture seasons starting in October and January respectively. The replacement of agricultural inputs and tools as well as the rehabilitation of irrigation schemes is crucial to ensure that affected populations can continue agricultural activities in the coming seasons.

The livestock sector was also severely impacted with the loss of more than 250 000 animals particularly poultry, cows, buffalo and pigs. Sagaing and Rakhine registered the highest

number of losses. Restocking of small livestock such as poultry should occur as soon as possible to avoid a fall in animal protein intake and allow farmers to have animal draught power for the upcoming winter season. This should be followed by the provision of animal feed and vaccines to support the survival of animals and prevent the spread of disease.

Fisheries and aquaculture have also reportedly been significantly disrupted by the disaster. Fishermen lost boats, nets and other fishing materials and more than 30 000 ha of fish and shrimp were affected resulting in losses of production, particularly in Rakhine and Ayeyarwady. River water levels are still high and fishing activities on open water have been considerably hampered. The incomes of people relying on fishing and aquaculture have been generally diminished with people now searching for other job opportunities. There is an immediate need to replace fishing gear and boats and rehabilitate fish ponds.

Additional findings of the assessment show that affected populations have begun to engage in distress coping mechanisms such as borrowing money and selling productive assets in order to access food. Levels of debt are escalating and affected populations will need to access cash as soon as possible in order to repay their debts. Cash-for-work programmes are considered critical to rehabilitate affected areas (e.g. drain irrigation systems, repair roads, remove debris from agricultural land, etc.) and allow for income-generation.

Although markets are performing as usual, prices of food commodities and agricultural inputs have generally increased due to rising transportation costs. On the other hand, demand for food commodities has generally decreased due to food assistance received in most of the affected regions/states. Market monitoring is critical and the results of the upcoming monsoon harvest season are very important to determine the availability and accessibility of both food commodities and agricultural inputs.

Currently, food assistance is ongoing in the most-affected districts and additional funds are required to continue this support as well as to provide the required agricultural livelihood rehabilitation support for the upcoming winter and summer agriculture season.

The assessment results reinforce the need to rapidly respond to this emergency situation. The support of the donor community is key to help provide relief and support recovery to build back better and strengthen the resilience of the affected populations.

The findings of this Agriculture and Livelihood Flood Impact Assessment are being complemented by a Post Flood and Landslide Needs Assessment (PFLNA), which will estimate the cost by sector and quantify the response needs in more detail. Furthermore, a joint Government, FAO and WFP-led Crop and Food Security Assessment Mission (CFSAM) is recommended to estimate the performance of agriculture for the upcoming market year and recommend measures to address the food security and nutrition implications.

1. Introduction

1.1 Background

The Republic of the Union of Myanmar is prone to multiple natural hazards including cyclones, floods, drought, landslides and earthquakes. Previously, a cyclone would make landfall and cause flooding in Myanmar about once every three years. However, since the year 2000, cyclones have crossed the Myanmar coast every year, drastically increasing the exposure of the country to natural disaster.¹

On 30 July 2015, Cyclone Komen made landfall in Bangladesh bringing strong winds and additional heavy rains to Myanmar, which resulted in a significant rise in monsoonal floodwaters in 12 regions or states, with Ayeyarwady, Sagaing, Magway, Bago, Rakhine, Yangon and Chin resulting the most affected in terms of the numbers of displaced people.²

This disaster—a combination of floods and landslides—mainly affected the rural areas of Myanmar where people rely heavily on agricultural activities to support their livelihoods. Myanmar is an agricultural country and the agriculture sector is the backbone of its economy, generating 23 percent of GDP and 20 percent of total export earnings and employing 61.2% percent of the labour force.³

As of 31 August, the National Natural Disaster Management Committee (NDMC) reported that 122 people had died due to floods and landslides. As of 6 September, the same Committee reported that 1 624 389 people had been displaced across 12 affected states and regions. A total of 489 897 houses were affected by flooding of which 21 221 had collapsed or been destroyed and 468 676 had minor or partial damage. A total of 525 330 ha (1 306 791 acres) of farmland were inundated at some point during the disaster which will result in a severe reduction in national crop yields, particularly for paddy production. The livestock sector was also significantly affected with nearly 250 000 animals reported to have died. The vast majority of these (230 000) were poultry (chickens and ducks).

Gender is a key element to consider in the context of disaster. Indeed, the 2014 Census indicates that 23 percent of the population live in female-headed households (FHHs), while 15.1 percent of people often rely on agriculture for their livelihoods.⁴ These FHHs are generally considered the most vulnerable members of the community from a socio-economic point of view.

July and August mark the beginning of the country's lean season, when agricultural households' food stocks run low until the main staple crops are harvested at the end of the year. In most of the affected areas, subsistence farmers and casual workers generally reduce the quantity of food in their diets as staple food becomes less available and more expensive in local markets.

¹ Source: Hazard Profile of Myanmar, 2009

² Source: National Natural Disaster Management Committee, *Situation report 5*, September 2015.

³ Source: Ministry of Agriculture and Irrigation Union of Myanmar, 2014. *Myanmar Agriculture in Brief 2014*.

⁴ Ministry of Agriculture and Irrigation. 2010. *Myanmar Census, of Agriculture of 2010 Supplementary Module SLRD*, Nay Pyi Taw.

1.2 Objectives of the assessment

The assessment was requested by the Ministry of Agriculture and Irrigation (MoAI) and the Ministry of Livestock, Fisheries and Rural Development (MoLFRD). In particular, the objectives of the assessment were as follows:

- 1) To obtain a realistic picture of the impact/effects of the disaster, including its gender impact on the agricultural sector and its sub-sectors particularly crop production, livestock and fisheries/aquaculture.
- 2) To assess the agricultural livelihoods of the affected population and their degree of vulnerability in the aftermath of the disaster.
- 3) To estimate the extent of the impact of the disaster on the functionality of local markets.
- 4) To identify priorities for recovery including for women who depend on agriculture for their livelihoods.

2. Methodology

2.1 Assessment design and data collection

This assessment was carried out from 6 to 21 September 2015 in six of the most affected regions/states namely Sagaing, Chin, Magway, Rakhine, Ayeyarwady and Bago (list of townships, villages and markets in Annex 2).

The assessment was based on the review of secondary data as well as the collection and analysis of field data to allow triangulation and validation. Reports, publications, newspaper articles and additional informative material produced by NGOs, international organizations, and development / humanitarian agencies were collected and analysed. Additional secondary data were collected from various ministries, particularly the MoAI and MoLFRD. The majority of documents used were statistical yearbooks, briefs and outline reports containing baseline information on crops, livestock and fishery production as well as irrigation. These ministries also produced post-disaster fortnightly reports on damages and losses which were additional sources of information for this report (e.g. area of land affected, type of crops affected and animal losses). Further primary data was collected by six teams led by WFP, FAO and UN Women, composed of two or three enumerators each, of whom seven were women.

Each team visited one region/state to collect data at a township, village and market level.

- 1) **Township level:** The assessment teams met with staff from the extension offices of the MoAI in two or three selected townships from each region assessed. The selection of townships was conducted in partnership with the Government and was based on the extent of damage caused by the disaster and the level of accessibility to the areas to be assessed. At this level, teams conducted key informant interviews with these officials in order to understand the broad impact of the disaster in the township assessed. Each team then produced a short report based on their discussion with these authorities which was used during the data analysis.
- 2) **Village level:** Teams conducted a questionnaire survey of members of village households. Two affected villages were selected in each township assessed. Villages were selected based on the same criteria as those used to select the most-affected townships. The questionnaire was answered by 10 to 15 people in a mixed group (half men and half women) representing three categories of villagers: poor, middle class and better off. At the conclusion of the mixed group discussions, a new group consisting of women only was formed to discuss similar questions and to cross-check whether their responses differed from those of the mixed group. Consistent with the Accountability to Affected Populations (AAP) principles, the scope of this village level questionnaire was designed to ensure that the response to the floods was based on the actual needs of affected populations.

- 3) **Market level:** In each township assessed or in the proximity of the village assessed (depending on which market the village relied) a key informant interview was conducted at market level. Vendors of food commodities (men and women) and agricultural inputs were interviewed separately using a questionnaire.

A transect walk was also conducted in each village visited to better understand the impact of disaster. At the conclusion of the walk, each team drew the results on a piece of paper.

Picture 1: Interview with affected community



2.3 Limitations of the assessment

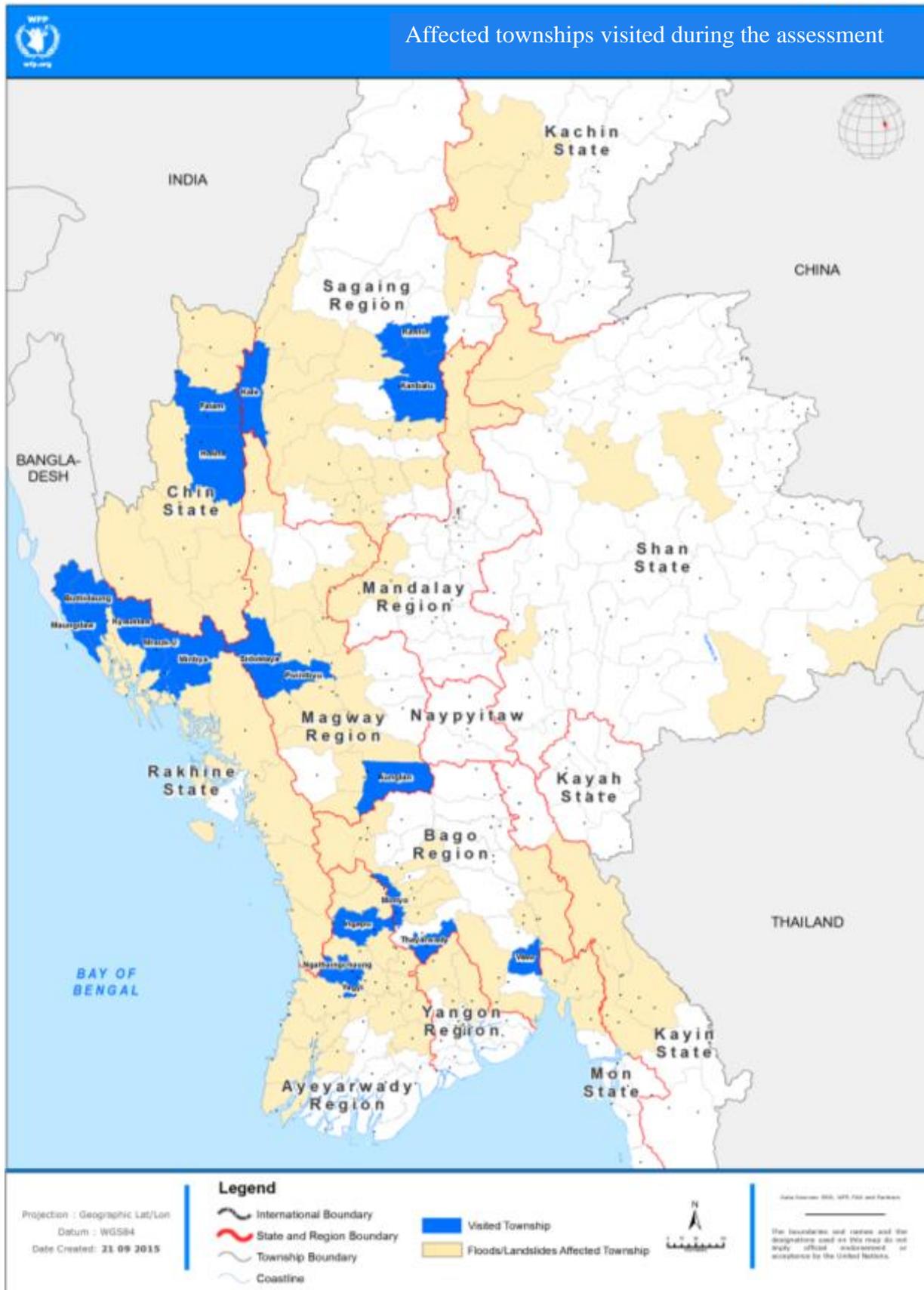
Due to time constraints and limited accessibility to some of the affected areas (e.g. damage to roads and bridges), the assessment could not cover all affected areas in the regions/states assessed. In addition to this:

- Purposive sampling of the most-affected townships and villages allowed for comparisons between each region/state, but results do not give a representative picture of the region/state as a whole.
- The compilation of this report relied heavily on a consistent use of qualitative information due to a lack of more reliable quantitative information. The utilization of data provided from the Government has been very useful, nonetheless there is a need to enhance the national information system in order to ensure proper data collection, analysis and dissemination as well as storage and management.
- Data from MoAI and MoLFRD are regularly updated and post-disaster figures may evolve. In addition, most of the data provided were in the Myanmar language and

needed to be translated into English, which was time consuming. Translation errors led to some delays in the process of data analysis and report writing.

- A more in-depth assessment to verify the nutritional status of the affected population will be required to complement the information provided in this report which is mostly qualitative.
- The timing of the assessment did not allow for realistic harvest estimates to be included. A Crop and Food Security Assessment (CFSAM) should be undertaken to assess agricultural production for the upcoming monsoon season and the impact on food availability, accessibility and utilization at a national, regional and state level.
- Data collected do not fully quantify the response requirements. Therefore further quantification will be required to prepare region/state-specific and local responses.

Map 1: Main regions/states affected by the floods and the townships visited during the assessment



3. Overview of the six most-affected regions/states

3.1 Myanmar agriculture

Myanmar has a tropical monsoon climate. Rainfall is highly seasonal and concentrated in the hot, humid months of the southwest monsoon (May to October). In contrast, the northwest monsoon (December to March) is relatively cool and almost entirely dry.

Agricultural production occurs on around 11.87 million hectares (ha), or 17.5 percent of Myanmar's total land area of around 68 million ha. Approximately 3.64 million ha are cultivated by small-scale farmers. The total average cultivated land holding for small-scale farmers is 2.21 ha. The main cultivated crops are:

- (i) rice, which covers around two-thirds of the total area under cultivation;
- (ii) beans and pulses, which have recently become major export crops and are grown on around 4.2 million ha;
- (iii) oilseeds, grown on 3.3 million ha; production is insufficient to meet national demand and about 200 000 tons of palm oil are imported annually;
- (iv) vegetables and chillies, grown on around 0.8 million ha, principally in the highland areas; and
- (v) other crops including maize, cotton, rubber, sugarcane, and tropical fruit.⁵

In addition to extensive land and forest resources which account for almost half of the total land area, the country has abundant water resources. Five major rivers flow through Myanmar, providing the basis for irrigation and hydropower. However, water availability is highly seasonal as 90 percent of rainfall occurs during the monsoon and significant parts of the country experience serious droughts during the dry season.

Associated with Myanmar's water resources are substantial fisheries in the major rivers, along the 1 900 km of coastline and in the 500 000 ha of mangrove swamps. By developing the potential for aquaculture in its delta region, the country tripled its fisheries production between 1998 and 2009. Fish and shrimp are now major export industries.⁶

Another significant component of the agriculture sector is livestock including cattle, buffalo, pigs, sheep, goats and poultry. Most rural households raise livestock which contributes significantly to household protein and supports the farm economy through draught power and by-products (hides and leather). Livestock production accounts for around 7.5 percent of overall GDP.⁷ Although commercial production has developed near the main cities in the country, most of the livestock production depends on family-based systems. The shortage of livestock for draught power is one of the constraints on agricultural production in Myanmar.

⁵ Source: Ministry of Agriculture and Irrigation Union of Myanmar, *Myanmar Agriculture in Brief 2014*

⁶ Source: Ministry of Livestock, Fisheries and Rural Development, *Fishery Statistics 2014*.

⁷ Source: Ministry of Livestock, Fisheries and Rural Development, *Livestock Statistics 2014*.

3.2 Importance of agriculture in the affected regions/states

The six affected regions/states fall under different agro-ecological zones where diverse climatic conditions, soil composition, geographical settings, water availability and other factors affect cropping patterns as well as the means of supporting livelihoods. Ayeyarwady and Bago are found in the delta region, Chin in the hilly and mountainous region, Sagaing and Magway in the central and dry zone and Rakhine in the coastal zone. Population density also changes across these regions/states with Ayeyarwady considered the most populated. The agriculture sector is considered to support a large portion of the population in rural areas (table 1).

Table 1 - Proportion of total households engaging in agriculture across the six regions/states assessed⁸

Region/state	Total number of households	% of female population	Female-headed households	Total number of households engaging in agriculture	Proportion of HHs engaging in agriculture
Ayeyarwady	1,506,545	51%	19%	711,575	47%
Bago	884,264	52%	23%	513,750	58%
Chin	105,272	52%	22%	94,714	90%
Magway	1,051,636	54%	24%	590,978	56%
Rakhine	618,545	52%	23%	289,850	47%
Sagaing	1,220,000	53%	25%	748,168	61%

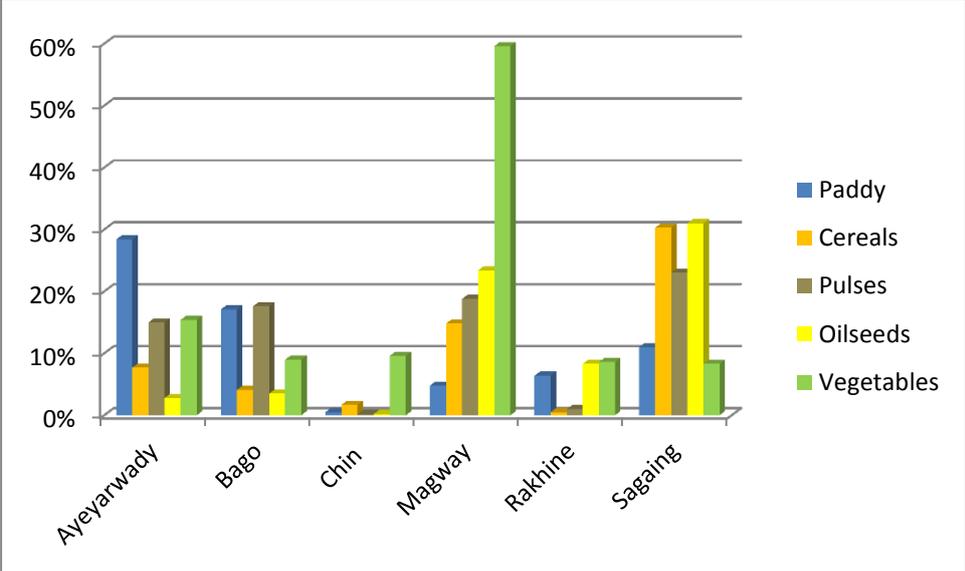
Paddy rice is the main staple crop cultivated across the regions/states. Rice is primarily kept for household consumption with any surplus sold for income. The assessed regions/states are among the major producers of monsoon paddy rice, oilseeds (sunflower and sesame), pulses (pigeon pea, black gram, cowpeas, etc.), cereal (maize, sorghum and wheat) and vegetable (chilli, clack pepper, onions and potatoes). These crops are used both for home consumption and for sale in international, national and local markets.⁹ Ayeyarwady contributes to 28.4 percent of the overall national monsoon paddy production, followed by Bago at 17.1 percent, Sagaing 10.5 percent and Rakhine 6.4 percent (figure1). Sagaing is the largest producer of cereals and seed oil crops representing 30.3 percent and 31 percent respectively of total national production. Almost 40 percent of national vegetable production is cultivated in Magway.¹⁰

⁸ Source: MoAI, *Crop production report*, March 2015

⁹ Source: Group discussions with villages in affected areas, Sept. 2015.

¹⁰ Source: Ministry of Agriculture and Irrigation, *Bimonthly Agriculture Sector Progress Report 15 July 2015*.

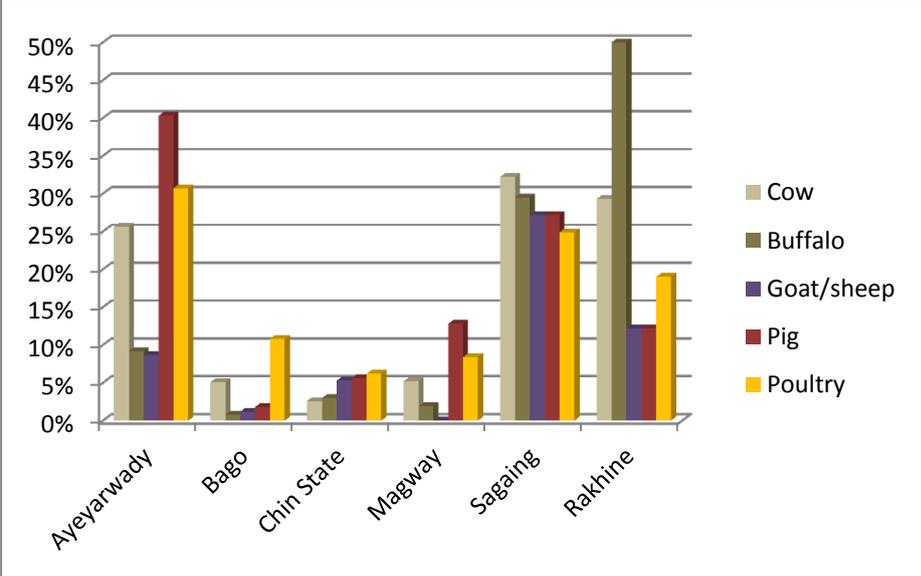
Figure 1: Relative contribution of the six regions/states assessed to national production of various crops



In the case of subsistence farming, farmers seldom have sufficient money to engage labourers and therefore depend on the combined labour of husband and wife; 92 percent of Myanmar women work on family lands.¹¹

Rakhine state and Sagaing region are considered the most important in terms of animal production (figure 2) among the six regions/states assessed. Rakhine alone hosts 55.5 percent of buffalo as well as 29.3 percent of the total number of cows, whereas Sagaing hosts 32.2 percent of cows. Ayeyarwady hosts 40.3 percent and 30.7 percent of the overall total number of pigs and poultry respectively.

Figure 2: Distribution of different types of livestock across the six regions/states assessed



¹¹ MCA, 2010

Livestock represents an additional source of income and nutrition for the majority of households; 4.3 million households raise livestock and/or poultry.¹² Women generally care for smaller livestock such as chickens, goats and pigs, while men look after larger animals such as buffalo, horses and cattle.

3.3 Gender aspects in agriculture

In Myanmar, the agriculture sector is responsible for 70 percent of national employment. Women constitute about 51 percent of the members of households dependent on agriculture. Of the national total of 5.4 million households with agricultural holdings, 15.1 percent are female-headed households, while almost one in every four HHs in the affected areas (23 percent) is headed by women.¹³ However, women are mostly viewed as agricultural labourers rather than as farmers. They undertake agricultural operations such as sowing, planting, weeding, harvesting and processing. Where women are employed as agricultural labourers, they are often paid less than men for the same work.¹⁴ Gender-based discrimination in Myanmar's agricultural sector goes beyond wages. According to Farmland Law, 2012 "Land registration, access to credit and access to training are directed at heads of households, mostly men. Only a small percentage of women are landholders, and land inherited by women may actually be registered in their husband's name."

Women are heavily involved in domestic work (cooking, cleaning and raising children). They are also involved in subsistence farming (kitchen gardening, animal husbandry, etc.), mainly for family consumption. It is well recognized and clearly reinforced by the findings of this assessment that female-headed households are particularly vulnerable in the affected areas due to their fragile socio-economic status. Nationally, women are engaged in various income-generating activities including agriculture and forestry (47.4 percent), trading (13.9 percent), casual labour, fisheries, small livestock raising and trading in markets.¹⁵

3.4 Main livelihood sources prior to the disaster in the six regions/states assessed

Among the villages assessed, 45 percent and 43 percent reported crop production and subsistence farming respectively as their main livelihoods (figure 3).

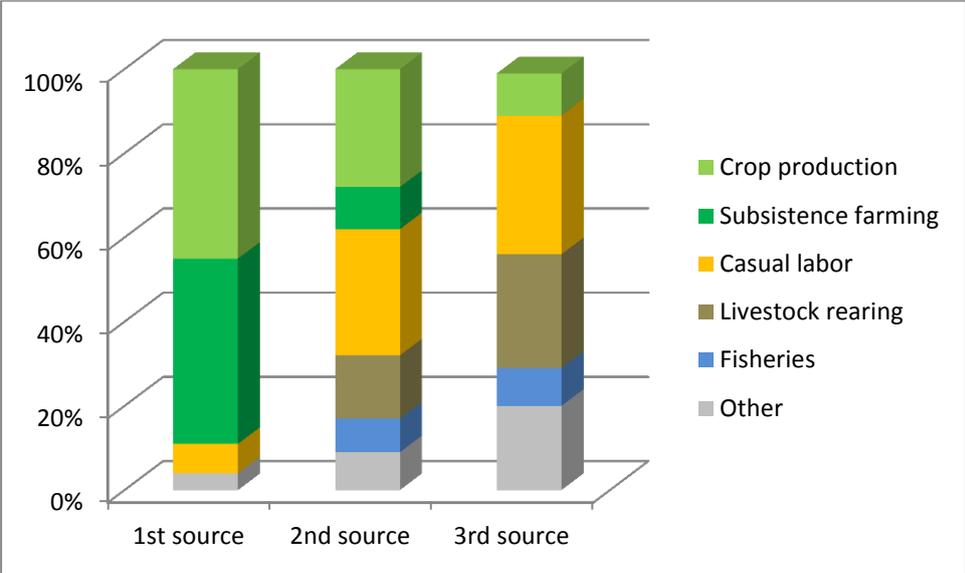
¹² Ministry of Agriculture and Irrigation. 2010. *Agricultural Census in Myanmar 2010 Supplementary Module SLRD*. Nay Pyi Taw

¹³ Source: Ministry of National Planning and Economic Development, Planning Department, 2014

¹⁴ Source, Small-scale farmers in the country's dry zone, OXFAM, 2014

¹⁵ IHLC Survey 2010, Poverty profile.

Figure 3: Percentage of village reporting on main source of livelihood ¹⁶



Casual labor and crop production are the second most important livelihoods according to 30 percent and 28 percent respectively of visited villages. In particular, casual unskilled labour appears to be crucial for women, with 57 percent of female respondents identifying it as the most important source of income for families belonging to the group of households classified as ‘poor’. Women’s heavy reliance on this form of income exposes them to a higher degree of vulnerability since opportunities for casual labour tended to diminish considerably in the immediate aftermath of the floods. Livestock breeding represents the third most important livelihood for around 30 percent and 27 percent of villages respectively. Fisheries and livestock breeding are particularly important in Rakhine state where a high percentage of households rely on these sectors as their main livelihoods. As part of other livelihood sources respondent reported to rely on petty trade as well as small shops mainly.

¹⁶ Source: Results of the survey conducted with villages members in the six Regions / States assessed.

4. Impact on crops and agricultural land

Key messages:

- 80 percent of the cultivated flooded area in Ayeyarwady was completely destroyed, followed by Magway with 52 percent and Sagaing with 34 percent, resulting in total loss of production in these areas.
- Although replanting was conducted in some regions/states the expected yield will be lower due to the delay of the sowing and the impossibility of using good agricultural practices.
- Of the overall area fully destroyed by the floods, 79 percent was monsoon paddy, resulting in total loss of production in these fields.
- A more in-depth assessment is needed to estimate the real expected losses of production and giving a clearer picture of how this will impact on affected communities.
- Most of the assessed villages reported that agricultural land is still covered by water as well as mud, sand and debris. This situation might hamper winter and summer crops production.
- In addition to the flood, almost 2 500 ha of agricultural land have been affected by landslides, mostly in Chin State.

4.1 Introduction

As already outlined, crop production is reported to be the most important livelihood among households affected by the disaster in the six regions/states assessed. The disaster occurred at the end of July, when most of the monsoon crops—particularly paddy—had already been sown or transplanted and were in the early growth stage.

The impact of the disaster will most likely result in a reduced yield in all affected areas and no production in areas where paddy fields were entirely washed away. Reduced production will lead to greater food insecurity as well as lower household income which will diminish access to agricultural inputs (mainly seeds and fertilizers) necessary for the upcoming winter and summer agricultural seasons.

The decrease in agricultural activity will also reduce demand for casual agricultural labour which is considered to be another important livelihood source, as discussed later in this report. This situation will all have repercussions through to the next monsoon season when farmers will again need cash to invest in agricultural production (figure 4).

Figure 4: Likely impact of the disaster on agricultural activities (seasonal calendar).

													Agricultural summer season		Harvest			
													Agricultural winter season				Harvest	
Agricultural monsoon season				Harvest									New monsoon					
		Disaster	Disaster impact															
Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun						
2015							2016											

4.2 Impact on crops and production

Data from the MoAI were collected in order to calculate an estimate of the total crop area destroyed and damaged in each region/state assessed (Annex 3).

Ayeyarwady is the most affected region in terms of destroyed crops with more than 100 000 ha of cultivated land washed away due to floods and a total loss of crops. Sagaing is the second most affected state with over 30 000 ha of cultivated land washed away, followed by Bago and Magway (Table 2). Bago is the most affected region in terms of crop damage with over 85 000 ha of cultivated crops affected which will result in reduced production.¹⁷ Sagaing is the second most affected with almost 35 000 ha of cultivated crops damaged, followed by Sagaing with nearly 30 000 ha damaged.

Table 2: Total number of ha of crops flooded, replanted, damaged and lost¹⁸

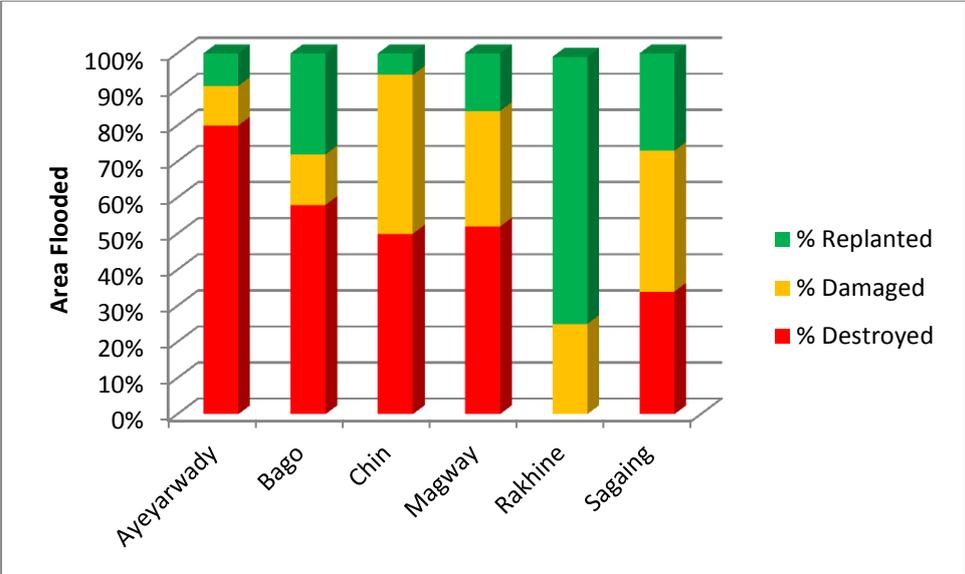
States/Regions	Total Area Cultivated	Flooded Area	Replanted	Destroyed	Damaged
Ayeyarwady	834,409	128,053	12,506	101,814	13,732
Bago	1,811,743	151,331	42,282	21,278	87,771
Chin	118,968	2,332	150	1,158	1,024
Magway	1,026,412	38,932	6,166	20,309	12,457
Rakhine	605,301	117,070	86,748	585	29,737
Sagaing	1,679,423	89,880	25,035	30,219	34,627
Grand Total	6,076,256	527,598	172,887	175,362	179,349

¹⁷ The 'damaged' areas represent the total ha of land where a reduction of yield is anticipated by at least 30% compared to a 'normal year'. This estimation comes from discussion held with MoAI. In these areas, conditions were not optimal for growing crops and the stress caused by the floods will have an impact on total production. The 'destroyed' areas consist of the total ha of land where cultivated crops were washed away by the floods and production is not possible.

¹⁸ Source: MoAI, Agricultural Land Management and Statistics Department, 16 September 2015.

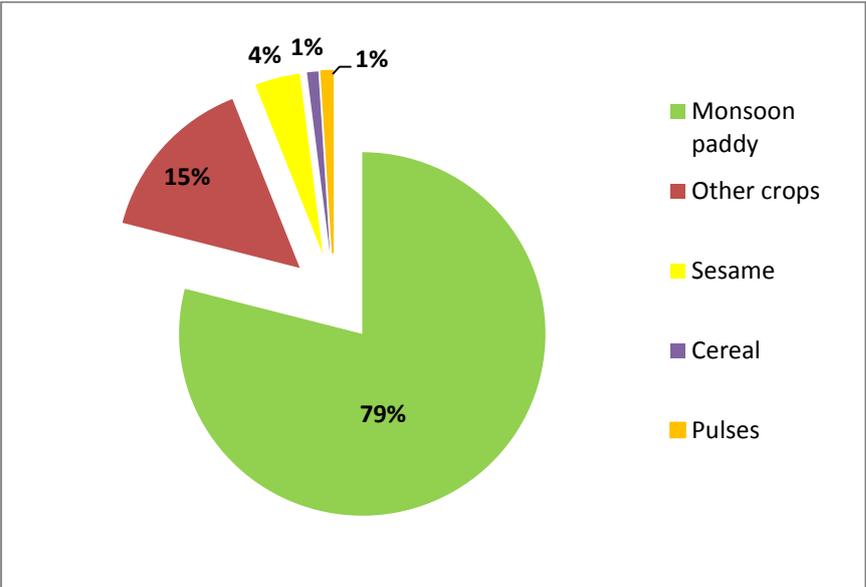
In most of the areas where the water has receded replanting of new crop was possible. In Rakhine State, 72 percent of the damaged crops were replanted followed by Bago with 28% (figure 5). Despite this, the floods are still expected to have a negative impact on yield. In fact, regular agricultural practices such as land preparation and the adoption of suitable planting techniques including transplanting could still not be implemented and will likely result in lower yield in these replanted areas.

Figure 5: Proportion of crop destroyed, damaged and replanted as a percentage of the overall land flooded



Monsoon paddy was the most affected crop in terms of hectares destroyed across the six regions/states assessed. Of the overall crop area fully destroyed by the floods, 79 percent was monsoon paddy, followed by 15 percent consisting of vegetables, perennial and oilseed crops, four percent with sesame crops, and one percent with cereal crops and pulses (Figure 6).

Figure 6: Proportion of specific types of crops destroyed as a percentage of total crops destroyed¹⁹



¹⁹ Source: MoAI, Agricultural Land Management and Statistics Department, August 2015.

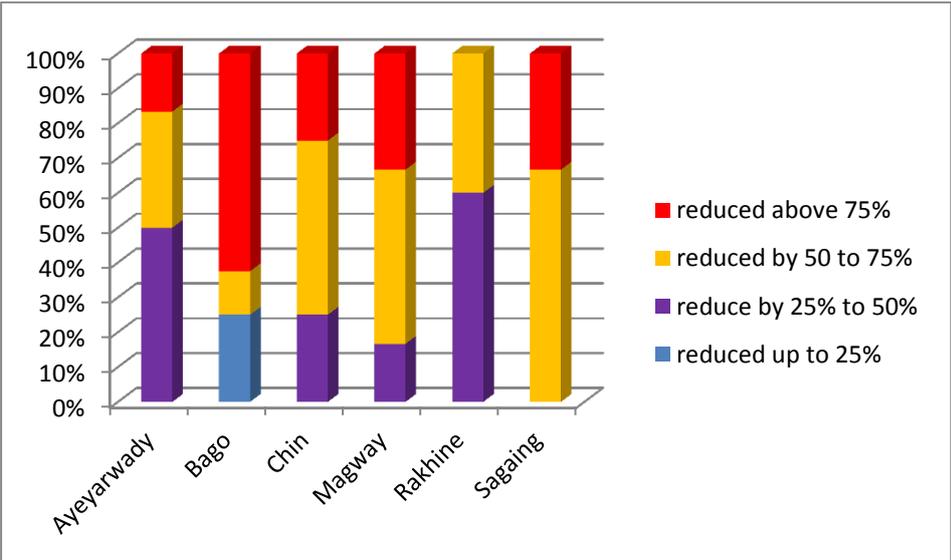
In addition, of the overall proportion of crops damaged by the floods, 89 percent consisted of monsoon paddy rice, which is likely to experience losses of production of at least 30% compared to a normal year.²⁰ The losses are due to plant stress resulting from the flooding.

Picture 2: Paddy field damaged due to floods



Most of the villages interviewed across the six regions/states confirmed the expected decrease in their monsoon paddy production as indicated in Figure 7. The production decrease will have longer-term impacts on household income and food consumption which may lead to increased economic vulnerability and food insecurity.

Figure 7: Percentage of villages reporting on expected reductions in yield in the upcoming monsoon season²¹



²⁰ Source: MoAI, Agricultural Land Management and Statistics Department, 31st August 2015.

²¹ Source: Results of the survey conducted with village members in the six regions/states assessed.

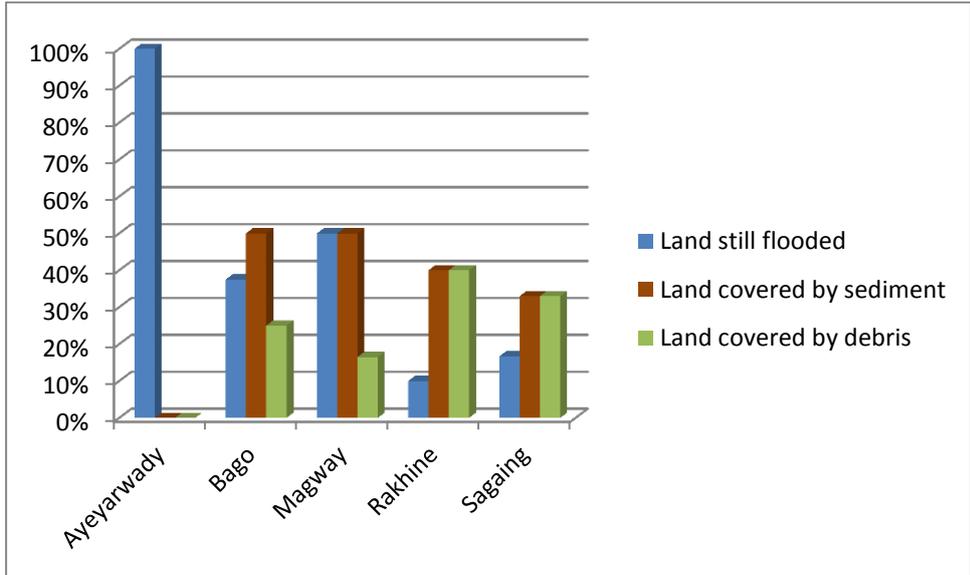
It will be extremely important to conduct a more in-depth assessment during the upcoming harvest season to determine the realistic reduction in production and the possible implications for the affected population and therefore the necessary response interventions.

4.3 Impact on land

According to the village interviews, most of the land affected by the disaster in Ayeyarwady was still flooded. In Magway and Bago 50 percent and 37.5 percent respectively of villages reported the same situation. Villages in Bago, Magway, Rakhine and Sagaing also reported land covered by sediment (mainly sand and mud) (Figure 8). Sediment deposits typically increase soil fertility. However, it is difficult to rehabilitate lands affected by sand deposits. More specific analysis is needed to understand changes in soil composition after the floods.

Nonetheless, land still covered by water, sediment and debris might not be ready for cultivation for the upcoming winter/summer season unless the water recedes in time or heavy machineries are used to facilitate drainage, leveling and land rehabilitation.

Figure 8: Percentage of villages reporting on the situation of agricultural lands after the floods²²



Although the villages visited in Chin did not report major issues with water, sediment and debris, about 95 percent of the total agricultural lands affected by landslides (2 154 across all six districts) were in this State.²³

These landslides caused total losses of cultivation. Paddy was the most affected crop with 47 percent of cultivated land covered by landslides, followed by maize plantations (43 percent of cultivated land) and other crops (pulses, vegetables and tea) covering 10 percent of cultivated land. These landslides are also expected to have a longer-term impact on crop production as

²² Source: Results of the survey conducted with village members in the six regions/states assessed during the second week of September.

²³ Source: MoAI, Agricultural Land Management and Statistics Department, 31st August 2015.

some of the affected lands will not be recoverable and rehabilitation activities are required to restore recoverable land for the coming agricultural seasons.

Picture 3: Agricultural land covered with debris



5. Impact on seeds, agricultural inputs, tools and infrastructure

Key messages:

- Impact on stored seeds, tools and facilities is significant. Fertilizers are usually not stored therefore losses of fertilizer were lower compared to seeds.
- Seed losses will affect both the winter and summer season starting in October and January respectively, as well as the next monsoon season beginning in June 2016.
- Coping mechanisms such as borrowing money from the informal market and purchase on credit will be employed to replace lost assets, leading to a likely increase in debt.

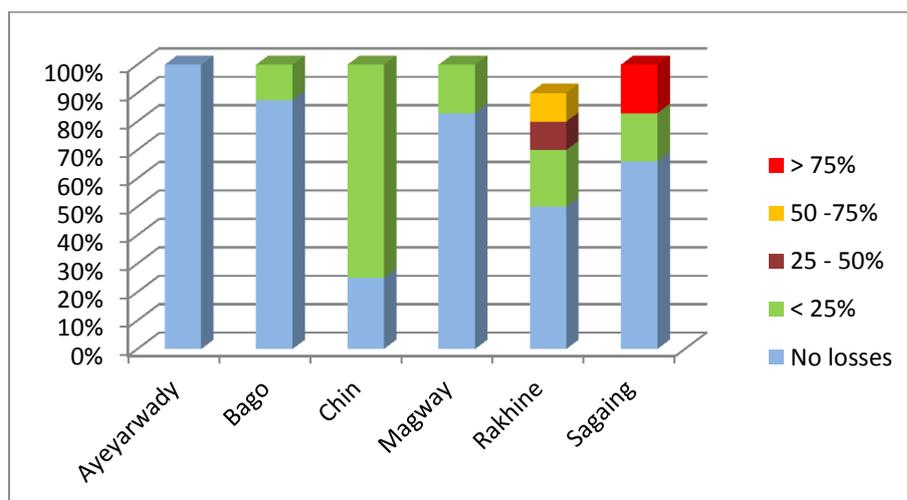
5.1 Introduction

Seeds, tools and agricultural inputs such as fertilizers and pesticides are key assets for farmers. The lack or loss of these assets has serious repercussions for those farmers who depend on agriculture for their livelihoods.

5.2 Losses of stored seeds and agricultural inputs

Across all affected states/regions most villages reported to have lost seeds due to the floods. In Sagaing region half of the villages interviewed reported that more than 75 percent of households had lost seeds. Rakhine, Magway and Chin were also affected by seed losses. Bago and Ayeyarwady were less affected in terms of seed losses (Figure 9). The impact of the floods varied considerably between villages.

Figure 9: Percentage of villages reporting on households having experienced seeds loss ²⁴

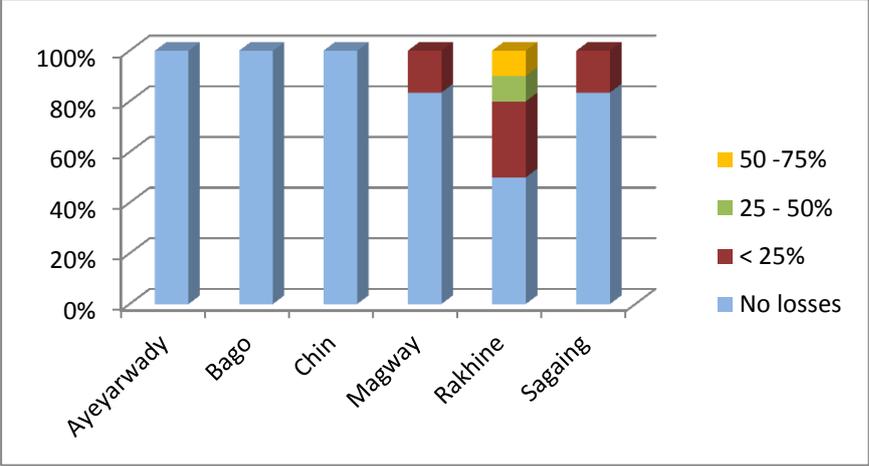


Rice, pulses and sunflower seeds were among the main varieties of seeds lost. Farmers now need to restock seeds for the upcoming winter and summer agricultural seasons as well as the next monsoon season.

²⁴ Source: Results of the survey conducted with village members in the six regions/states assessed.

Losses of agricultural inputs—mainly fertilizers and pesticides—were relatively lower compared to losses of seeds. Losses of inputs were only reported in Magway, Rakhine and Sagaing (Figure 10). In fact, discussions with communities indicated that the majority of the farmers using agricultural inputs usually apply them as soon as they are purchased.

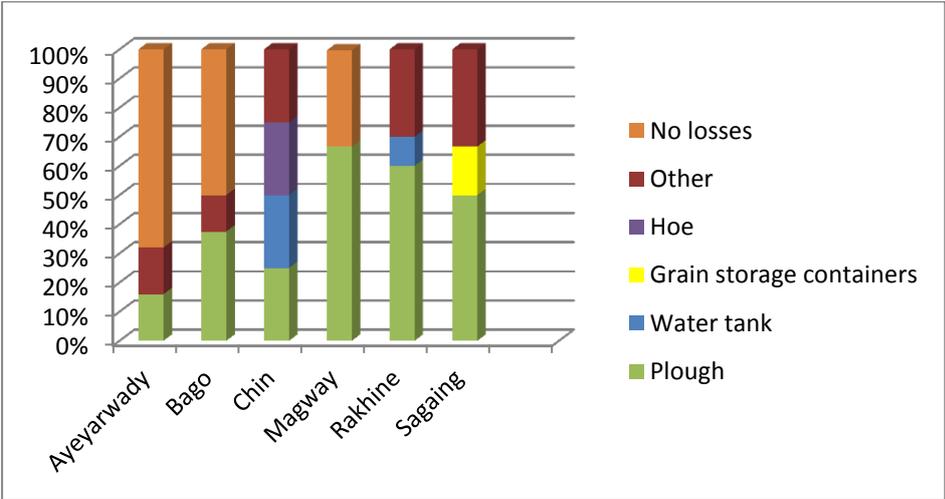
Figure 10: Percentage of villages reporting on households having experienced agricultural input losses²⁵



5.3 Damaged and lost agricultural tools and infrastructure

Most of the villages visited reported to have lost some of their agricultural assets due to the disaster, particularly agricultural tools. Ploughs were reportedly the most commonly lost tools, mainly in Magway, Rakhine and Sagaing (Figure 11). Most farmers typically leave these assets, particularly hoes and ploughs, close to their agricultural land. Most cultivated plots are usually some distance from their houses and instead of carrying the tools it is preferable to leave them in the fields, in simple storage facilities made of bamboo. When the floods struck, the tools were washed away.

Figure 11: Percentage of villages reporting on households having experienced loss of assets



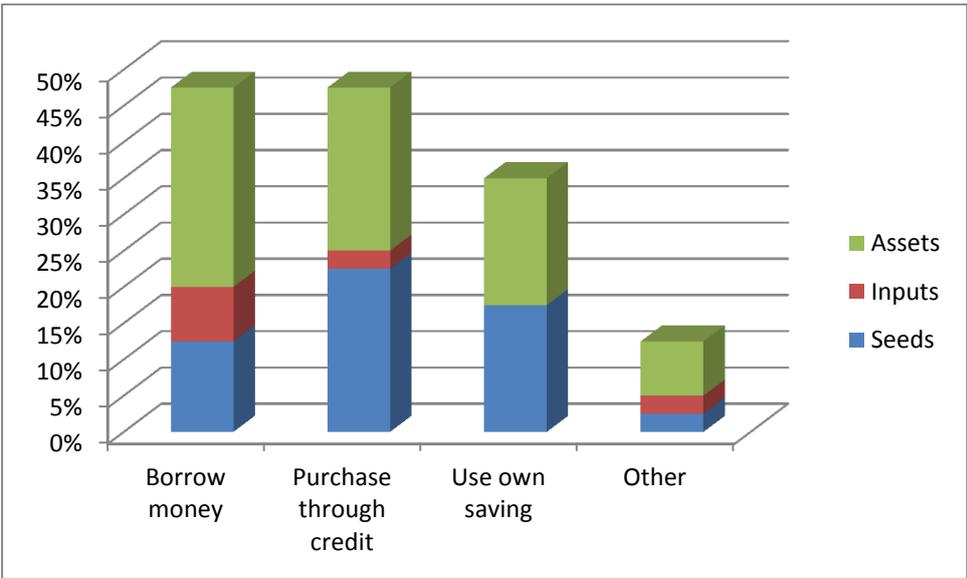
²⁵ Source: Results of the survey conducted with villages members in the six Regions / States assessed.

Other small assets such as bamboo baskets and plastic containers were also lost across most villages visited. Some infrastructures were reportedly damaged as well, including small silos and grain storage facilities, mostly in Sagaing. In Chin and Rakhine, water tanks were also lost.

5.4 Main strategies to replace losses of assets, seeds and other inputs

The replacement of seeds and assets lost (both tools and storage facilities) is considered to be a priority, followed by the replacement of fertilizers and pesticides. The main coping strategies currently adopted by famers to replace lost inputs and assets are borrowing money, buying on credit and using their own savings (Figure 12). These strategies, particularly borrowing and buying on credit, often come with a high interest rate (greater than 10 percent) and therefore increase household debt. In addition, if farmers use their savings to replace lost assets and seeds, it could have a negative impact on households’ overall economy as they generally use these savings for education, health and emergency needs.

Figure 12: Percentage of villages reporting on main coping strategies utilized to replace losses of assets, seeds and agriculture inputs



6. Impact on irrigation

Key messages:

- Damage to irrigation systems and infrastructure was reported in most areas assessed.
- Irrigation schemes need to be rehabilitated in time for the summer season starting in January which mainly relies on irrigation.
- Women, particularly from Chin state, reported problems with accessing clean drinking water because of damaged water sources.

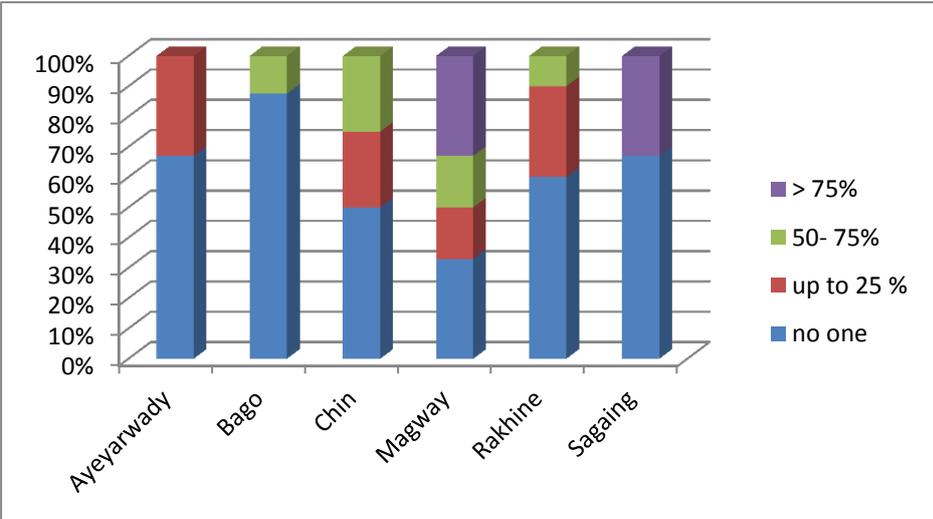
6.1 Introduction

Irrigation is mainly used during the dry season to support summer production (January to June). It is also used at the start of the monsoon season to support the growth of the paddy seedlings and germination of other cereal crops such as maize, wheat and sorghum.

6.2 Access to irrigation

In the majority of villages surveyed only a small proportion of households had access to irrigation and most relied instead on rainfed agriculture. In all regions/states more than 60 percent of households do not have access to irrigation. Only a small proportion of households have access to water for agricultural use. In the assessed villages in Bago, Ayeyarwady and Sagaing, 88 percent, 67 percent and 67 percent of households respectively have no access to irrigation (Figure 13). In Magway access to irrigation seemed to be higher, with only 33 percent of village households reporting no access to irrigation.

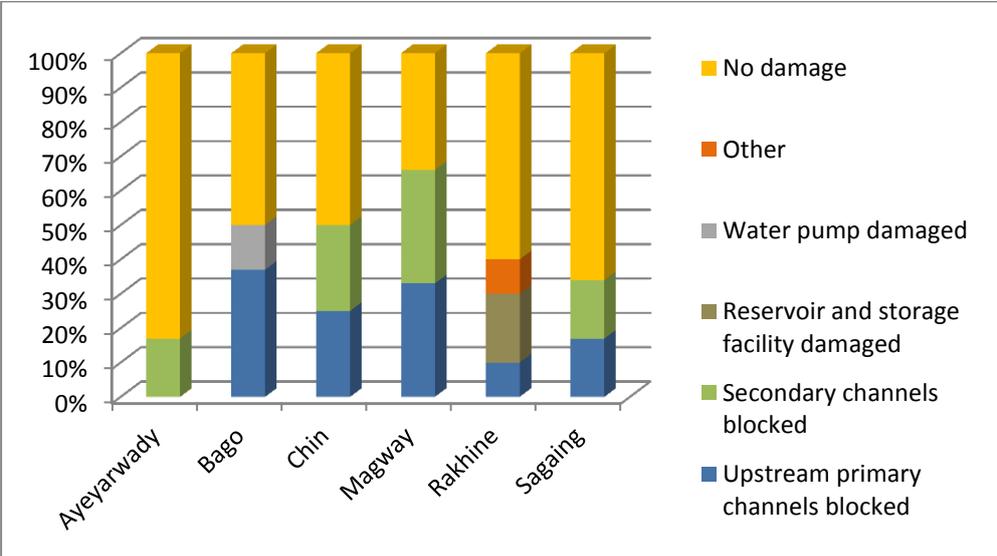
Figure 13: Percentage of villages reporting on access to irrigation



6.3 Damage to irrigation schemes, reservoirs, infrastructure and equipment

Among those villages accessing irrigation, most indicated that the disaster damaged their irrigation schemes and infrastructure. The main problem experienced in all regions/states assessed, with the exception of Ayeyarwady, was the blockage of primary upstream channels as a consequence of mud and other accumulation of solid material (Figure 14). The blockage of secondary channels was also reported in Chin, Ayeyarwady, Bago and Sagaing, leading to the malfunctioning of irrigation schemes. Water reservoirs and storage facilities such as tanks were also damaged, particularly in Rakhine, and damage to water pumps was reported in Bago. Six percent of villages in Rakhine also reported other damage such the collapse of canal banks.

Figure 14: Percentage of village reporting on main damages caused by the flood



Respondents in Rakhine and in Sagaing emphasized the urgent need for technical support to repair irrigation systems and divert drainage systems to avoid water flowing into the villages. Women reported problems with accessing clean drinking water due to damaged water sources, particularly in Chin state. Lack of clean drinking water could lead to disease and put further pressure on community health, particularly in nutrition-scarce times, and increase the workload for families in already difficult circumstances.

7. Impact on livestock

Key messages:

- More than 240 000 livestock including cattle, pigs, goats and poultry have been lost among the six regions/states assessed.
- Significant loss of small livestock will particularly impact on women's livelihoods.
- Rakhine and Sagaing suffered the highest livestock losses.
- Livestock feed and a large number of livestock shelter facilities were also destroyed, including pens for small livestock kept by women.
- Nutrition could deteriorate due to reduced consumption of animal protein.

7.1 Introduction

In the regions/states assessed, livestock ownership is widespread. Cows and buffalo are utilized for agricultural land preparation and for animal products, primarily meat. Pigs, goats, chickens and ducks are mostly used for meat production. Poultry are also kept for egg production. The poorest households mainly breed their own chickens, ducks and pigs. Other households prefer to invest in cattle, followed by poultry and pigs.²⁶

7.2 Livestock losses

Livestock losses (deaths) were registered in all assessed villages with some variation in the amount and species of animals lost. While some villages reported that animal carcasses were washed away by the flood, 45 percent disposed the animal carcasses in the nearest rivers, while 20 percent buried them and eight percent consumed those that were still edible. Only three percent sold the carcasses to third parties.

Rakhine is recorded to have been the most affected in terms of non-poultry animal losses with about 20 000 head of cows, buffalo, pigs and goats killed. The regions/states most affected by losses of poultry are Sagaing, Rakhine and Ayeyarwady (Table 3).

Table 3: Total number of livestock losses (death)²⁷

State/region	Cows	Buffalo	Goats	Pigs	Poultry	Total animals lost
Ayeyarwady	183	15	5	543	33,293	34,039
Chin	54	n/a	67	99	890	1,110
Magway	129	n/a	215	442	15,745	16,531
Rakhine	5,080	2,969	4,029	4,858	77,720	94,656
Sagaing	334	25	26	870	95,371	96,626
Grand Total	5,780	3,009	4,342	6,827	223,019	242,977

²⁶ Source: Result of informal talk with members of the villages assessed.

²⁷ Source: MoLFRD, *Livestock sector post-disaster report*, September 2015.

According to figures from MoLFRD, in Bago Region only fifteen pigs were registered killed due to the flood. Further verification is ongoing.

While the proportion of animal death is relatively low compared to the total livestock population in the states/regions affected (Table 4) most of the deaths were concentrated in areas where people were heavily relying on livestock both for generation of income and in term of animal proteins intake.

Table 4: Animal deaths in proportion of total livestock population

State / Region	Cow	Buffalo	Goat	Pig	Poultry
Ayeyarwady	0.03	0.03	0.01	0.07	0.63
Bago	n/a	n/a	n/a	n/a	0.04
Chin	0.1	n/a	0.2	0.1	n/a
Magway	0.10	n/a	0.24	0.17	1.56
Rakhine	0.67	0.85	1.86	1.93	2.50
Sagaing	0.04	0.01	0.01	0.16	1.19

The loss of livestock could have an negative impact on the nutritional status of the affected population due to the reduced consumption of animal products, particularly meat and eggs. In addition, the loss of large animals such as cows and buffalo could also limit the capacity of affected households to prepare land for the upcoming agricultural winter season. Women were particularly affected by small livestock losses. In the case of female-headed households, many women were unable to rescue livestock since they had no access to boats. As many of these women are largely dependent on small livestock, these losses will particularly impact on their livelihoods.

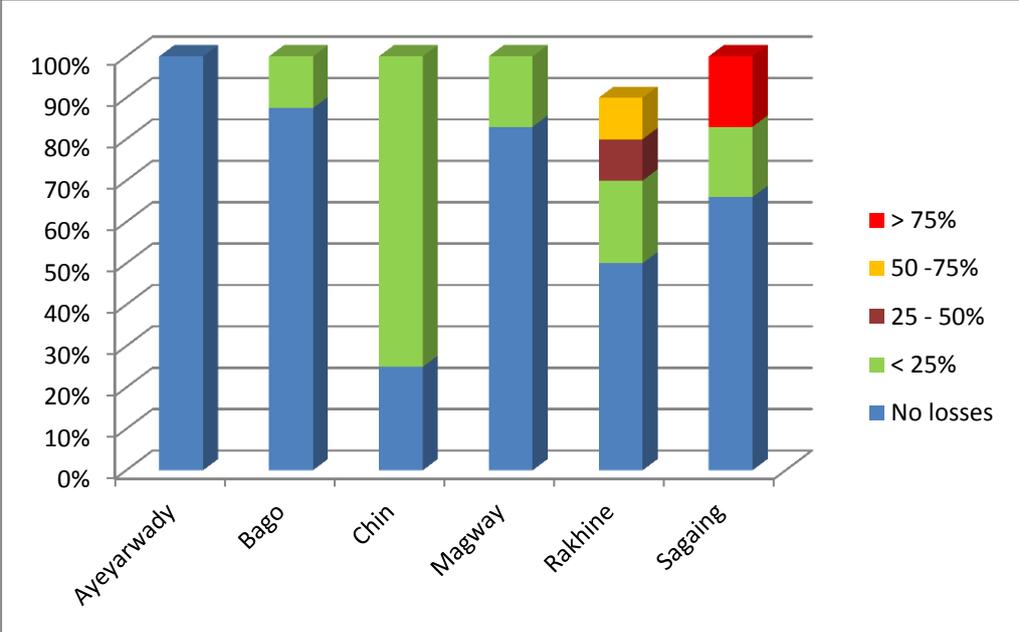
Picture 4: Livestock rescued during the floods.



7.3 Impact on livestock shelter, animal feed and pasture

Villages in Chin, Rakhine and Sagaing reported significant damage to livestock shelters (Figure 15). In addition, women in flood-affected areas reported losses of feedstock for small livestock (poultry, pigs and goats) as well as the pens in which the animals were kept, which had been destroyed or washed away.

Figure 15: Percentage of villages reporting on having experienced livestock shelter damages

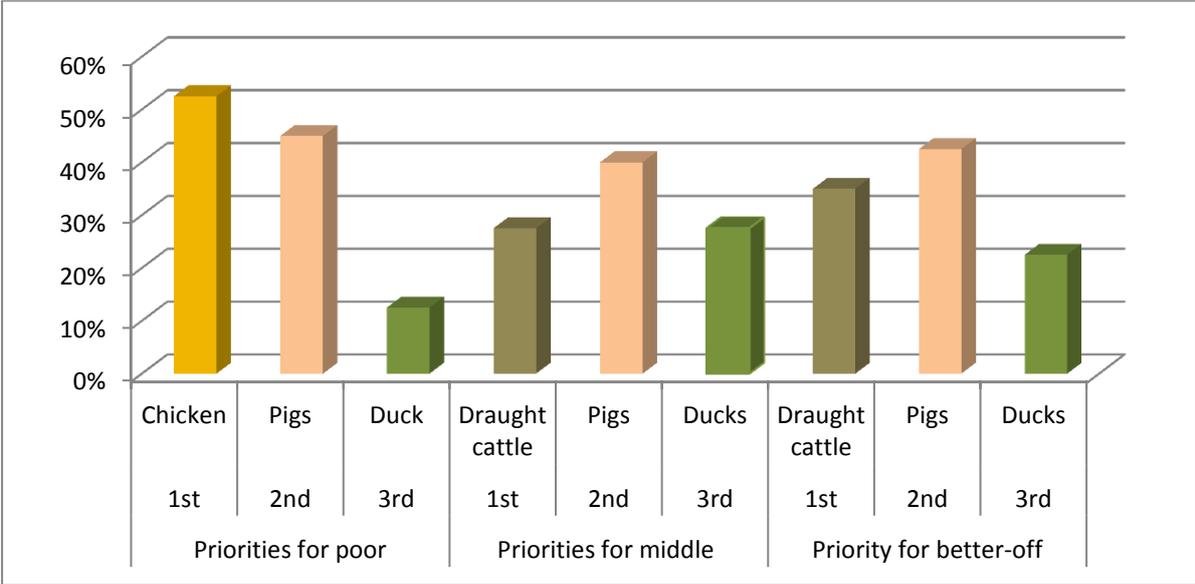


7.4 Restocking, needs and types of assistance required

A total of 40 percent of assessed villages identified animal feed as the most important need due to the impact of the disaster on pasture and a lack of income to purchase replacement animal feed. The second most important need was restocking, reported by 25 percent of assessed villages. Only two percent of villages identified a need for additional services (e.g. shelter reconstruction, veterinary services and mineral supplements.) Thus, the restocking of small livestock should be accompanied by support through the provision of animal feed.

In terms of restocking, the results of the survey show differences between socio-economic groups. The priority for poorer households is to replace lost chickens while others prefer to replace draught cattle as a priority (Figure 16). Pigs and ducks are the second and third priorities respectively, across all socio-economic groups.

Figure 16: Percentage of village reporting on main priority for livestock restocking by wealth groups

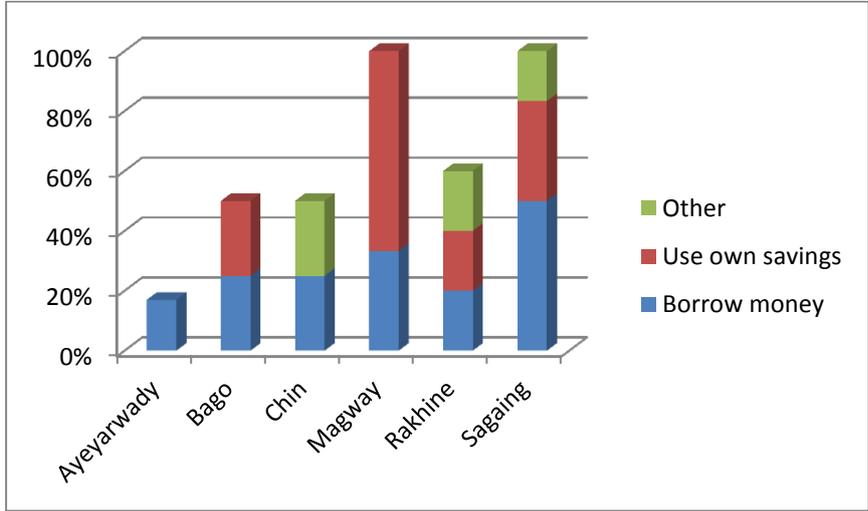


Even if services such as vaccination were not reported as a priority, this activity should automatically be included in the response in order to avoid the spread of disease and further animal losses, particularly when animals are purchased and then transported between areas.

7.5 Main coping strategies to replace lost livestock

The most common coping strategies used by villages to replace lost livestock were borrowing money, drawing on household savings and other measures such as using remittances. Borrowing money was generally identified as a strategy across all affected regions/states (Figure 16). The use of savings was mainly reported in Sagaing, Chin and Rakhine by 25 percent, 20 percent and 17 percent respectively of villages surveyed. As identified in the previous section, engaging in such strategies (particularly borrowing money) attracts high interest rates and is likely to lead to higher debt across the regions/states assessed.

Figure 17: Percentage of villages reporting on main coping strategies utilized to restore livestock losses



8. Impact on fisheries and aquaculture

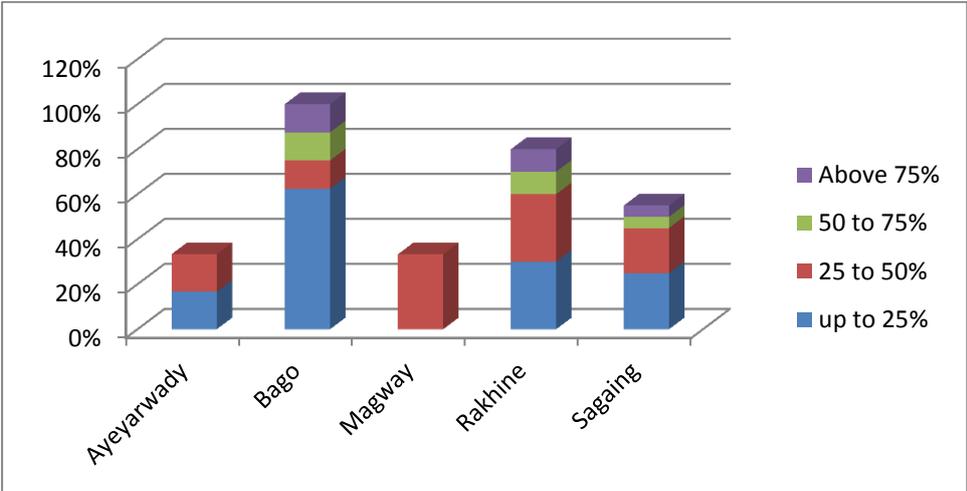
Key messages:

- Floods and landslides caused the loss of almost 30 000 ha of fish and shrimp ponds causing a loss of income and food which is likely to lead to a decrease in nutrition.
- Fishing equipment such as nets, traps, boats and engines were reported by both men and women to be lost/damaged.
- Women who engage in inland fishing were differently affected to men who mostly engage in open-water fishing.

8.1 Introduction

Fishing is considered to be an important livelihood for many households in the villages assessed. Bago and Rakhine reported the highest number of people engaging in fishing activities, followed by Sagaing (Figure 18). No significant fishing activities were reported in Chin.

Figure 18: Percentage of villages engaging in fishery activities

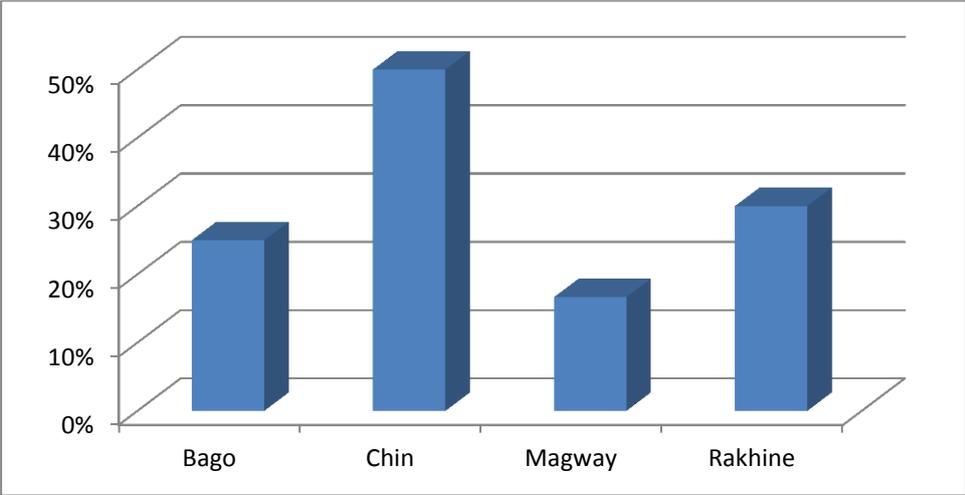


Men primarily catch fish on the open water, while women mostly catch small fish for home consumption in smaller rivers close to their houses or in paddy fields, using kayaks and home-made fishing nets. Women are also responsible for other activities such as fish drying and selling, as well as the mending of fishing nets used by men. Most of villages visited rely on open freshwater fishing in the rivers.

Aquaculture activities are present in some of the regions/states assessed with the exception of Ayeyarwady and Sagaing (Figure 18).²⁸

²⁸ N.B.: Not all townships affected by the floods/landslides could be assessed. As such, data for Sagaing and Ayeyarwady in Figure 17 might not reflect the overall situation as both are reported to have suffered from aquaculture losses (Figure 18).

Figure 19: Percentage of villages conducting aquaculture activities



8.2 Damage and losses in fisheries and aquaculture

Most of the impacts of the disaster on open freshwater fishing were due to rising water levels in the rivers, which prevented fishermen from continuing their fishing activities. Villages also reported the loss of fishing equipment such as traps and nets and significant damage to fishing boats and motors. Women repeatedly stressed that they had lost small kayaks and fishing nets and were unable to fish in the floods, leading to a loss of income, food and nutrition.

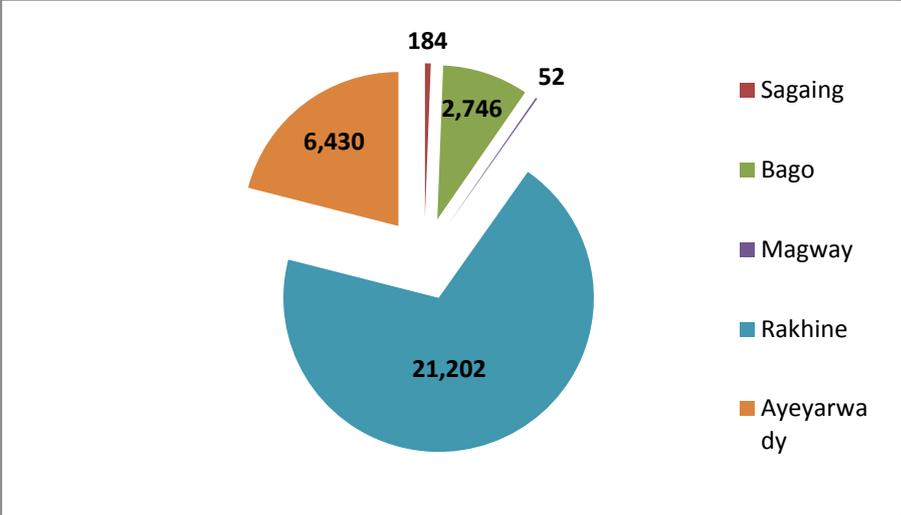
Picture 5: Increased water level in the river due to heavy rain



In addition, several fish ponds were flooded and most of the farmed fish escaped, resulting in high production losses. In Rakhine alone, more than 20 000 ha of shrimp ponds were affected, followed by Ayeyarwady with almost 6 500 ha of fish ponds and Bago with more than 2 700 ha. In the other regions/states, losses of fish ponds were much lower (Figure 20). Women in

Chin state reported on the need for rehabilitation of fishponds, which are considered an important source of family protein and a secondary source of income.

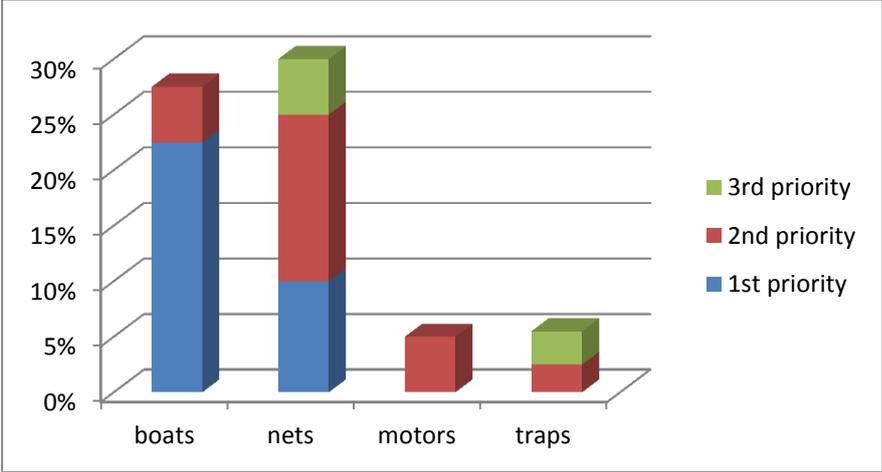
Figure 20: Total ha of fish/prawn ponds experiencing loss of production due to the floods²⁹



8.3 Need for recovery in fishing and aquaculture industries

The first priority to restore fishing activities, as identified by households in the assessed villages, is the replacement or repair of boats and motors. The replacement of nets is a second priority, followed by the replacement or repair of motors. Some villages ranked the replacement of nets and traps as a third priority (Figure 21).

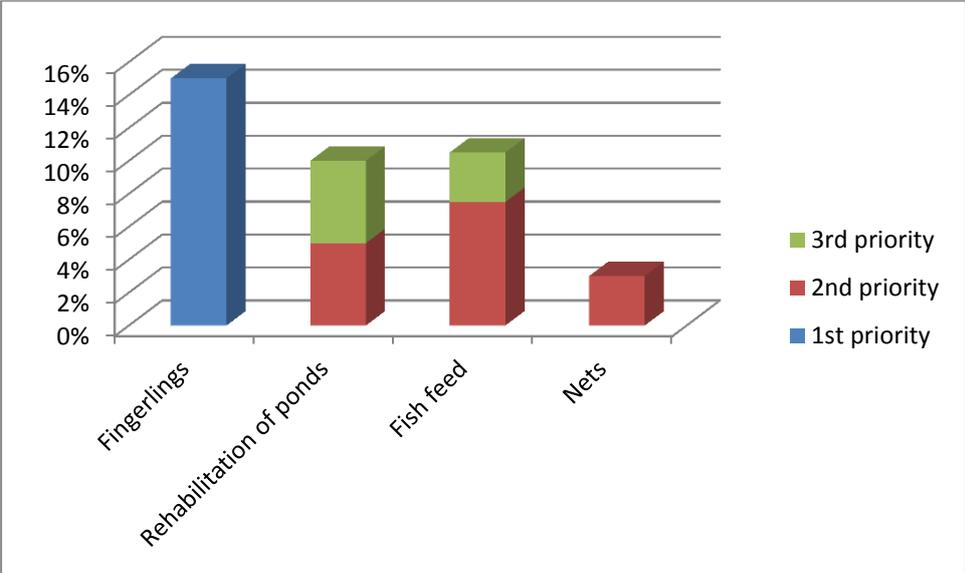
Figure 21: Percentage of village reporting on main priorities to restore the fishing activities



For the rehabilitation of aquaculture activities, the first priority is the supply of fingerlings, followed by the procurement of fish feed and nets. The second priority is the rehabilitation of ponds, particularly fish seed rearing ponds, to ensure the availability of fish stocks. The third and last priority is the supply of fish feed (Figure 22).

²⁹ Source: MoLFRD, Department of Fisheries, *Damage report on flood*, September 2015.

Figure 22: Percentage of village reporting on main priorities to restore the aquaculture activities



9. Impact on labour and income

Key messages:

- Seasonal agricultural labour is considered one of the most important sources of income for poor households including female-headed households.
- The impact caused by the flood significantly reduced seasonal job opportunities in the agriculture sector and these are expected to decrease even further during the upcoming monsoon harvesting season and the following winter season.
- Resulting reductions in yield will impact on income generation for all farmers.

9.1 Introduction

Agricultural activities during the monsoon season (e.g. sowing, transplanting, weeding, harvesting, etc.) generate need for casual labour, which is reported to be one of the most important sources of income for the poor rural population across the regions/states assessed.

The floods will significantly reduce job opportunities in the agriculture sector, particularly during the upcoming monsoon harvesting season (October to December) due to the predicted fall in yield which will in turn reduce demand for workers. This situation will likely continue into the winter season since much of the affected land will need to be rehabilitated before agricultural activities can resume.

Women are expected to be more affected than men, and the lack of seasonal labour opportunities will have a major impact on their livelihoods. Women's wages are already almost 20 percent less than those of men.³⁰ Field observations during this flood assessment further confirm this. For example, it was observed that men currently earn around 4500 MK (USD 3.60) for land preparation work, while women earn around 2000 to 2500 MK (USD 2) for agri-labour.

It is important to remember that wealthier farmers/landowners are the ones employing poorer and more vulnerable people. Their ability to resume agricultural activities for the next season is therefore key to the employment of large portions of the rural workforce.

Anecdote:

In one of the villages visited, 50% of households depended on remittances from daughters working in Thailand. Two of the nine women present at the group discussion had daughters who migrated irregularly to Thailand. Each of these daughters sent an average of 100 000 kyat (USD 80) a month back to their families.

³⁰ Source: [Small-scale farmers in the country's dry zone, Oxfam, 2014](#)

9.2 Impact on agricultural labour

Due to losses of their primary crops, farmers are now reluctant to invest in their fields. After the floodwaters receded, most farmers cultivated varieties of crops of a shorter duration, largely by spreading seeds on the land as opposed to transplanting and sowing. Farmers also lacked the cash to hire labourers for weeding. This deprived already impoverished families, particularly women, of income. Demand for casual labour is expected to further reduce up to and during the harvest.

9.3 Impact on income generation

Flood-affected farmers are likely to see sustained reductions in crop yield. The effect will vary depending on the type of farming (subsistence or marketing) and the variety of crop lost.

Most of the poorest women, including the 23 percent of female-headed households in the regions and states assessed, rely heavily on the demand for agricultural casual labour, which has significantly reduced in the affected areas.

Many women trade food commodities in local markets. Prices have risen since the floods, largely because disrupted road access made it harder to transport goods. Together with economic hardship in affected communities, this has resulted in reduced demand, which has impacted on traders in local markets.

To cope with the income loss, women are borrowing food and seeds from local markets, or taking out loans from money lenders at high interest rates (minimum ten percent). Many other women have not been able to borrow money from lenders because they have pre-existing debt, having already borrowed prior to the floods. In addition, agricultural banks do not provide loans to buy small livestock, which are an important economic asset for women.

10. Impact on markets

Key messages:

- The demand for market produce has fallen due to reduced income as well as high levels of relief assistance in many areas across the regions/states visited.
- Price hikes are mainly linked to increased transportation costs.
- In areas where people have access to markets and prices remain stable, cash-based interventions could be used.
- Price increases strongly affect women's ability to sell staple crops, fish and vegetables.

10.1 Physical impact on markets and transportation costs

Market infrastructure was not affected by the floods, except in Rakhine where traders reported having to rebuild or repair parts of their shops and storerooms.

However, the floods had a serious impact on road infrastructure, disrupting access between regions/states, markets and villages. While this access has almost returned to normal, transportation costs are reported to have increased in all assessed areas, particularly in Chin (up by more than 75 percent), Rakhine (more than 24 percent) and Sagaing (more than 14 percent).

Picture 6: A market in a flood-affected community



10.2 Impact on market access and demand

Generally, the numbers of people visiting markets had fallen by 40 percent in all affected areas, at the time of the assessment. The highest decreases were reported in Sagaing (75 percent), in Chin (55 percent) and in Ayeyarwady (50 percent). The decrease in the number of customers as reported by the agriculture and livestock inputs retailers is usually less significant than that reported by food commodities retailers. Customers still travel from the same villages as before, except for in the township markets of Sagaing, Magway and Ayeyarwady, where markets are no longer visited by customers from some specific villages (Table 5).

Female respondents in all three wealth categories (poor, middle and better-off) identified the sale of staple crops as a primary source of income. Therefore, increased prices and plummeting sales negatively affected the economic situation of many poor women selling small fish and vegetables at the local markets.

Table 5: Decrease in customers visiting township markets (source: retailer interviews)

Region/state	Decrease in % of customers (food commodities)	Decrease in % of customers (agriculture and livestock inputs)
Ayeyarwady	50%	31%
Bago	27%	20%
Chin	55%	67%
Magway	25%	42%
Rakhine	40%	37%
Sagaing	40%	39%

Demand has fallen for all the main food commodities and agriculture and livestock inputs in all the visited areas. For food commodities, the most significant reported decrease in demand was for rice. Demand for agricultural inputs has fallen at a greater rate than demand for animal feed and medicine.

The main explanation for the falling demand—and more specifically for rice—is the humanitarian assistance provided so far. Indeed, from the first days following the floods, affected villages have been supported with in-kind distributions provided by the Government, international humanitarian agencies including the International Committee of the Red Cross (ICRC), local NGOs and other local organizations. Another explanation provided by traders and villagers is the lack of income followed by access and transportation difficulties.

Table 6: Villages reporting that a lack of cash or transportation is preventing access to markets (source: key informants interviews)

Region/state	Lack of cash		Lack of transportation	
	No	Yes	No	Yes
Ayeyarwady	100%		100%	
Bago	100%		100%	
Chin	75%	25%	50%	50%
Magway	88%	12%	88%	12%
Rakhine	100%		100%	
Sagaing	33%	67%	100%	

10.4 Impact on market supply

The floods did not affect the total number of wholesalers in markets. The number of retailers in visited markets was also stable, although very small decreases were reported in specific townships in Ayeyarwady (Yegy), Magway (Pwint Phyu) and Rakhine (Minbya). The trend of a decrease in the number of retailers seems to mostly affect markets at a village level rather than those at a township level. The number of agriculture and livestock input retailers is stable.

Table 7: Supply trends in food commodities after the floods, compared to before the floods (source: retailer interviews)

Region/state	Rice	Oil	Pulses	Onions	Chili	Garlic	Salt
Ayeyarwady	<50%	<50%	<50%	<50%	<50%		50%
Bago	>75%	>75%	>75%	>75%	>75%		>75%
Chin	50%	50%	>50%	50%			
Magway	<50%	<50%	<50%	<50%	<50%		<50%
Rakhine	50%	<75%	50%	50%	>50%	<75%	
Sagaing	>75%	50%	50%	<50%	<50%		50%

While retailers are selling fewer goods than usual because of decreased demand, they are able to meet actual demand for key food commodities, except in Chin where one village reported limited availability of commodities.

Table 8: Supply trends in agriculture and livestock inputs after the floods, compared to before the floods (source: retailer interviews)

Region/state	Seeds	Fertilizers	Pesticides	Animal feed	Animal medicine
Ayeyarwady	50%	50%	50%	>75%	>75%
Bago	>50%	>50%	>50%	100%	100%
Chin	<50%	<50%	<50%	<50%	<50%
Magway	100%	<75%	<50%	100%	100%
Rakhine	<50%	50%	75%		
Sagaing	>75%	50%	<75%	50%	50%

10.5 Impact on market prices

While small price increases are common for this period, price increases due to the floods have been reported, primarily in Chin, Sagaing and Rakhine.

On average, food commodity prices have increased by 20 percent and agriculture and livestock input prices have increased by 11 percent, based on interviews with the retailers.

Regarding food commodities, villages in Chin and Rakhine reported the highest price increases of 35 percent and 25 percent respectively, while villages in Magway reported the lowest price increase of nine percent. The size and cause of the increases varies based on the area of production, the origin of the commodity and the impact of the floods on crops and road infrastructure.

Table 9: Percentage of villages reporting changes in food commodity prices compared to last year (source: village survey)

Region/state	Decrease	No change	Slight increase	Significant increase	Very high increase
Ayeyarwady		17%	67%	17%	
Bago		13%	38%	50%	
Chin				75%	25%
Magway			100%		
Rakhine			40%	50%	10%
Sagaing	17%		17%	33%	33%

Regarding inputs, the highest price increases were reported for animal feed (21 percent), pesticides (ten percent) and seeds (nine percent).

Table 10: Percentage of villages reporting changes in agriculture and livestock input prices compared to last year (source: village survey)

Region/state	Decrease	No change	Slight increase	Significant increase	Very high increase
Ayeyarwady		17%	83%		
Bago			38%	50%	13%
Chin				100%	
Magway			100%		
Rakhine			50%	50%	
Sagaing	17%		33%	50%	

The US dollar exchange rate is often mentioned as the main factor increasing the prices of commodities (e.g. palm oil) and inputs coming from abroad.

Table 11: Increase in food commodity prices as a percentage compared to July 2015

Region/state	Rice	Oil	Pulses	Onion	Chili	Salt	Average
Ayeyarwady	20%	4%	17%	78%	36%	0%	26%
Bago	13%	0%	37%	40%	27%	0%	19%
Chin	25%	28%	50%				34%
Magway	10%	8%	8%	0%	10%	3%	6%
Rakhine	14%	18%	37%	60%	30%	24%	30%
Sagaing	10%	3%	16%	20%	10%	10%	11%
Average	15%	10%	27%	40%	23%	7%	20%

10.6 Expected market evolution

Retailers expressed difficulties in predicting the market situation in the coming weeks. In general, they do not expect any particular change in demand or supply before the rice harvesting season and they are waiting to see the results of the monsoon harvest which will influence the prices they receive. Some said they were worried about the potential risk of a continuous increase in prices due to remaining transportation difficulties (road conditions and prices).

On average, retailers reported they could meet a 75 percent increase in current demand. Nevertheless, in some regions/states, this capacity would still not meet the demand that existed before the floods. The most critical situations are reported in specific townships of Sagaing, Chin, Magway, Rakhine and Ayeyarwady. Regarding agriculture and livestock inputs, retailers seem to be more confident that they can increase supply whenever demand increases. Retailers often identify a lack of access to credit as the main constraint in meeting a potential increase in demand. Most wholesalers typically sell food commodities on credit to retailers, however, this practice seems to have halted since the floods. Regardless, transportation difficulties and costs are still seen as one of the main factors preventing retailers from increasing their access to supplies.

11. Coping mechanisms

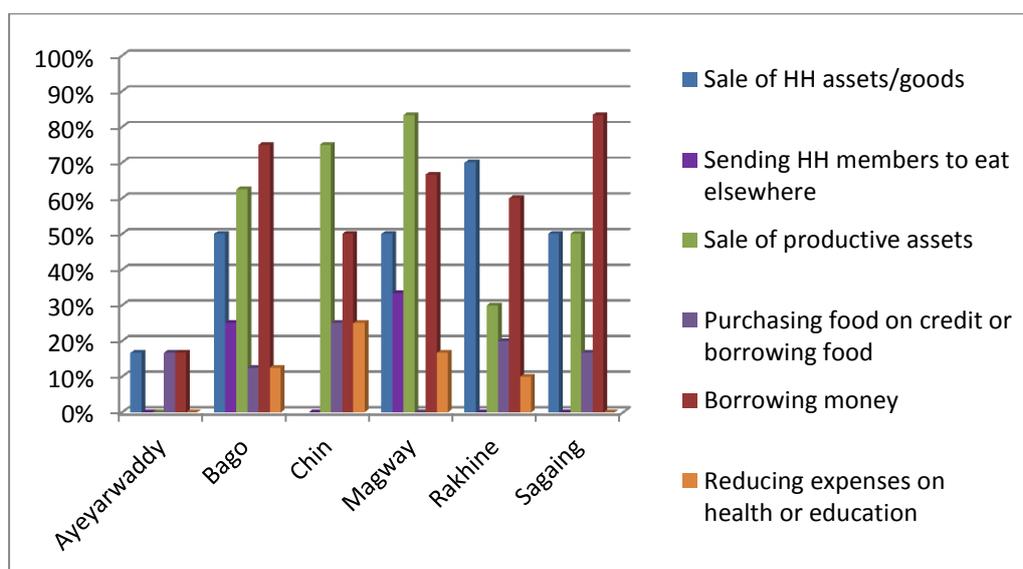
Key messages:

- Borrowing of money is the main coping mechanism to access food.
- Increases in the use of food-based coping mechanisms, compared to normal, was particularly marked in villages visited in Chin state.
- The sale of household assets was commonly reported as an additional coping mechanism. Women have also begun to sell valuables such as jewellery.

11.1 Changes in livelihood coping mechanisms

Across the villages visited in the six regions/states, there was a general reported increase in the borrowing of money.³¹ This was the main reported mechanism to increase access to food after the floods. This increase was marked in most villages visited, except for villages in Ayeyarwady region.

Figure 23: Percentage of villages reporting changes in livelihood coping mechanisms after the disaster



The second most reported coping mechanism was the sale of household goods and productive assets. The latter was observed in all regions/states, except Ayeyarwady. Both mechanisms—borrowing money and selling productive assets—are erosive and are expected to have long lasting impacts on livelihood recovery.

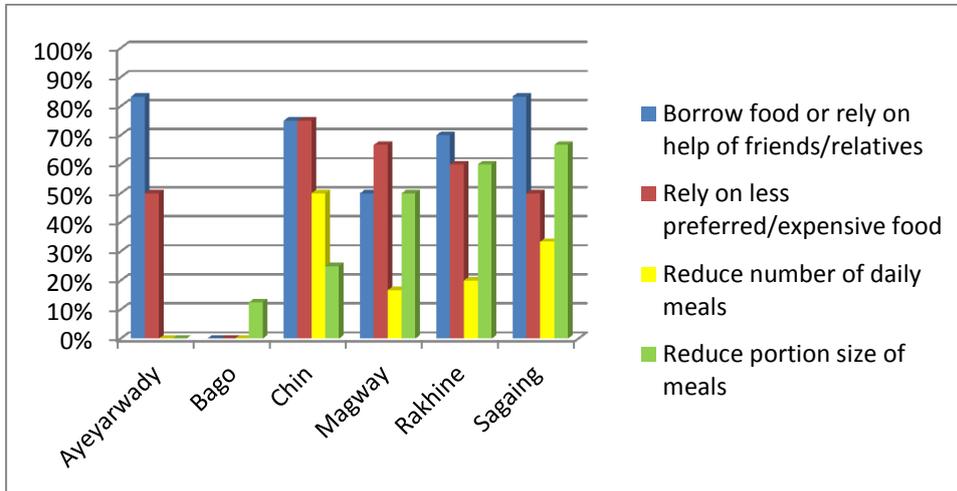
Many women have reported being distressed at having to sell household assets, including jewellery. Some have been helped by relatives and friends who have provided food and small amounts of capital to rebuild livelihoods. Women also report having to resort to begging, when borrowing was no longer an option.

³¹ Compared to the same period in a normal situation.

11.2 Changes in food-based coping mechanisms

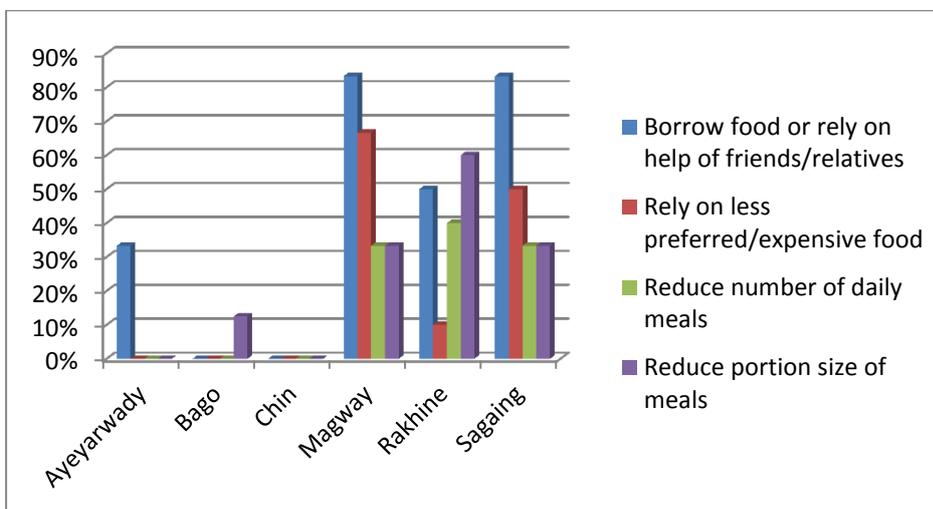
The increased use of food-based coping mechanisms, compared to normal, was particularly marked in villages visited in Chin state compared to the other states/regions.

Figure 24: Proportion of villages reporting an increase in the use of food-based coping mechanisms



In both townships visited in Chin state, villages affected by the floods and landslides reported an increased use of several food-based coping mechanisms such as borrowing food from friends and relatives, relying on less-preferred food, reducing the number of daily meals and reducing the quantity of food consumed. Up to 75 percent of the villages visited reported using such mechanisms, which they would not do in normal times. This highlights that, at the time of the assessment and despite external assistance, access to food in Chin state was still difficult. Twice as many women as men in the village group discussions reported reduced food intake and smaller portions consumed. This is a negative coping strategy which could have an impact on the nutrition and ultimately the health of the women concerned.

Figure 25: Percentage of villages reporting a current use of food based mechanisms



The remaining villages assessed in the other regions and states reported a much lower use of such coping mechanisms. Ayeyarwady region and Rakhine state reported borrowing more food and reducing the quantity of food consumed respectively.

Female-headed households are more vulnerable to disaster

Daw Hla Nu Yin is a widow whose husband passed away eight years ago, leaving her the family breadwinner. She made a living from selling Rakhine traditional snacks and fish paste in front of the school. She has three daughters aged 24, 15 and 11 years. The eldest daughter migrated to Thailand to support the family last year but her income is too low to be of support. During the floods, Daw Hla Nu Yin's house was under water for five days resulting in heavy damage to the roof and the walls. A total of 20 bags of salt, 20 portions of fish paste and the firewood stored at home were damaged. In addition, 24 chickens drowned. Daw Hla Nu Yin had never experienced floods before. She tried to hire a boat to move her belongings to a safe place but could not find one and felt desperate. Her brother took her and her daughters to his home, where she stayed for five days, returned when the floodwaters abated. Her living conditions are uncomfortable as she hasn't been able to repair the damaged roof and so water enters the house when it rains. Her brother provided her with three baskets of rice for family consumption and some capital to restart her snack sales business, and her sister gave her firewood for cooking. While all the villagers were affected by the floods, women such as Daw Hla Nu Yin who are poor and have no male family members, were particularly adversely impacted. "I had no boat to carry my belongings and my daughters and I did not know how to swim or row the boat," she said. "Owners of big boats were also affected by the floods but they could use their boats to escape. If I had a big boat and I could row, I could have taken my things to a safe place. My brother's boat was small – it only had capacity to carry me, and my daughters and I could not bring my possessions. I had never faced such an emergency situation and I found it really difficult."



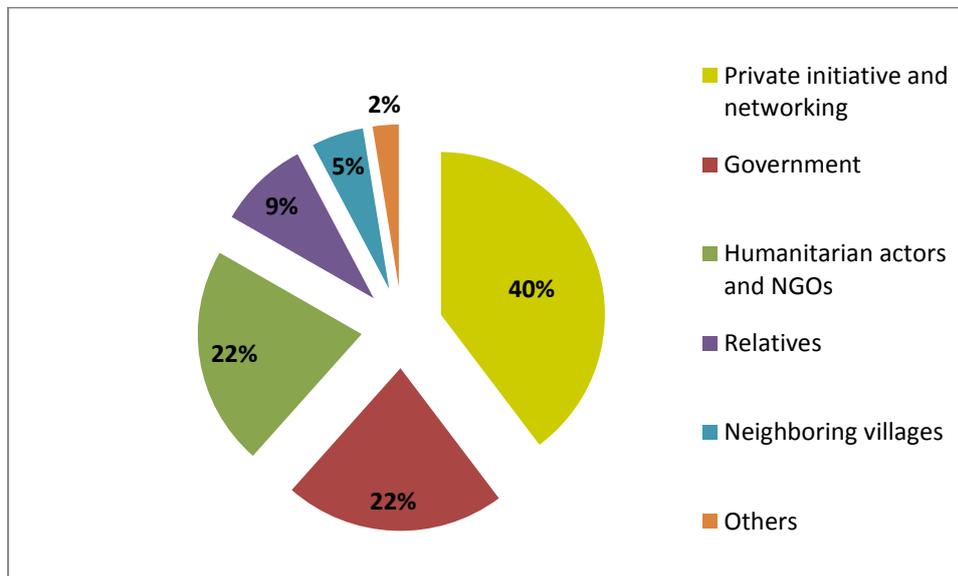
12. Recovery and rehabilitation needs and interventions

12.1 Introduction

The assessment shows that fewer than ten percent of villages received assistance, across the regions and states assessed. The main forms of assistance, reported by 40 percent of villages, came through personal initiative and networking among village members. Twenty-two percent of villages reported that households received assistance from the Government as well as humanitarian actors and NGOs.

Villages also reported assistance in the form of support from relatives, as well as from neighboring villages and from women's, youth and religious groups (Figure 26).

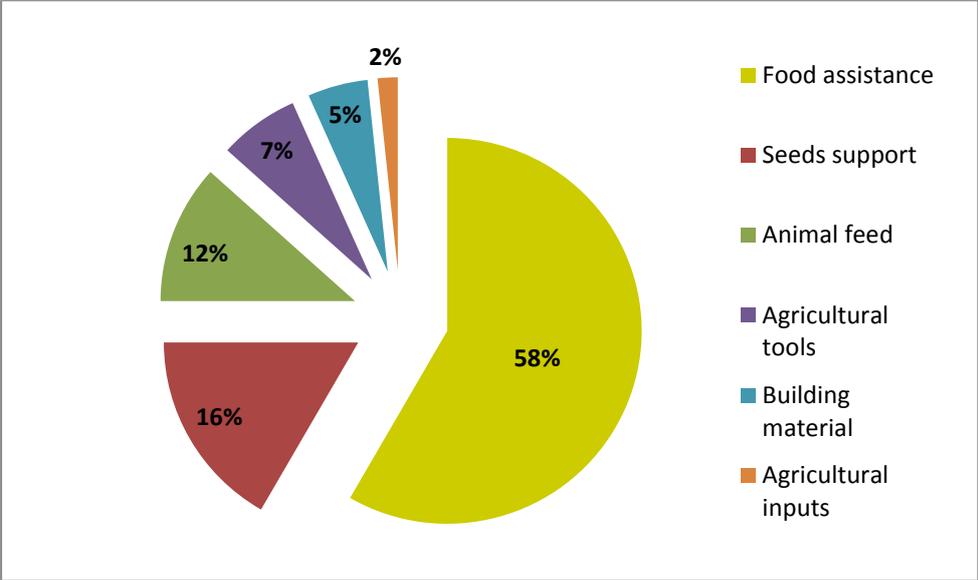
Figure 26: Percentage villages reporting on assistance received by the households after the disaster



Fifty-eight percent of villages identified food distribution as the main form of assistance received. In addition, 17 percent reported receiving seeds, followed by animal feed (11 percent), agricultural tools (seven percent) and building material (five percent). Only two percent reported receiving agricultural inputs.

In addition, the provision of blankets, clothes, mosquito nets and other types of assistance was registered but not taken into consideration as part of this report (Figure 27).

Figure 27: Percentage of villages reporting on the main type of assistance received by the households after the disaster

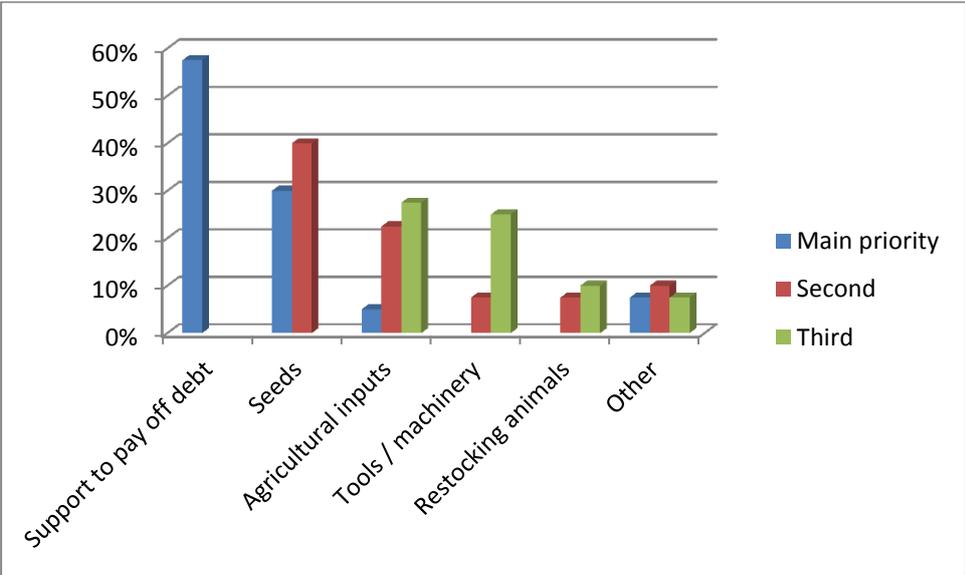


The assistance received so far was mainly relief assistance; however the disaster had a severe impact on the livelihoods of affected populations which will require more specific short-, medium- and long-term support as discussed in the next section.

12.2 Immediate needs

Although men and women identify debt relief as their most critical need, seeds and agricultural inputs are also priority needs considering the upcoming winter and summer cropping season (Figure 28).

Figure 28: Percentage of villages reporting on preferred short-term needs



Most affected populations reported having to borrow from money lenders at high interest rates in order to access food, seeds, fertilizers, and to replace lost tools. As already reported,

opportunities for casual labour are very limited and for the poorest households, it is difficult to repay loans.

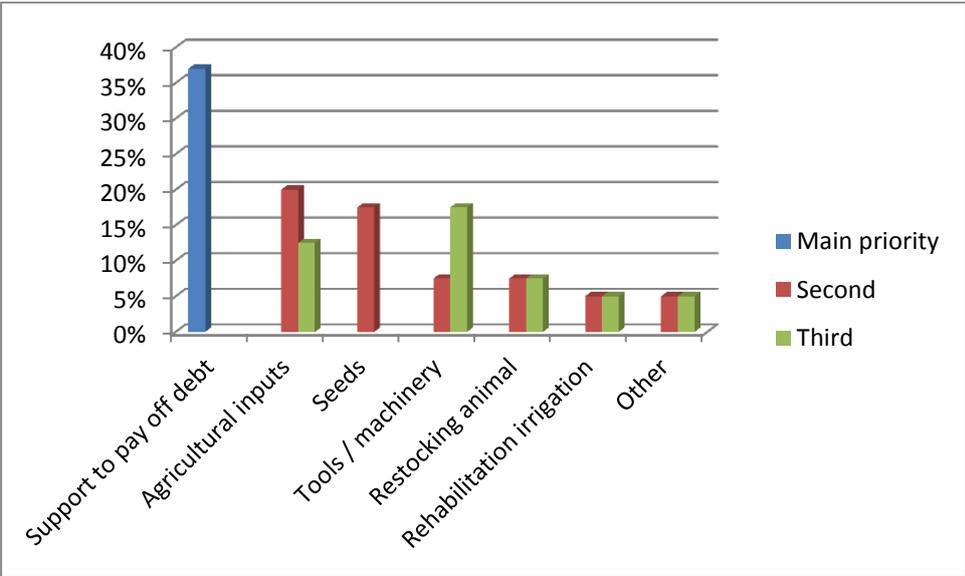
Restocking of small animals, particularly chickens, and the reconstruction of animal shelters are additional urgent requirements, particularly for the poorest female-headed households. Small animals would help these households to rebuild their capacity to sell livestock products (e.g. eggs and meat), increasing their income base and enhancing their animal protein intake and reducing the likely aggravating condition of poor nutrition. This should be supported by the provision of animal feed and vaccines to prevent the spread of animal diseases and ensure animals remain in good health.

Another immediate need is the rehabilitation of damaged agricultural land and irrigation schemes as well as fish and shrimp ponds, to continue food production and income-generating activities. In most affected areas, families have food stocks for a month or two. Considering part of the population will not be able to harvest crops until December, food support must be guaranteed for at least the next two months until the new crops are ready. This would also avoid further depletion of scarce household assets.

12.3 Medium and long term needs

The needs identified by affected populations are very similar to those for short-term interventions, with support to pay off debts being recognized as most important. At the same time, agricultural inputs and seed supplies are still considered critical to continue agricultural activities particularly for the next monsoon season starting in July 2016 (Figure 29).

Figure 29: Percentage of villages reporting on preferred medium term needs



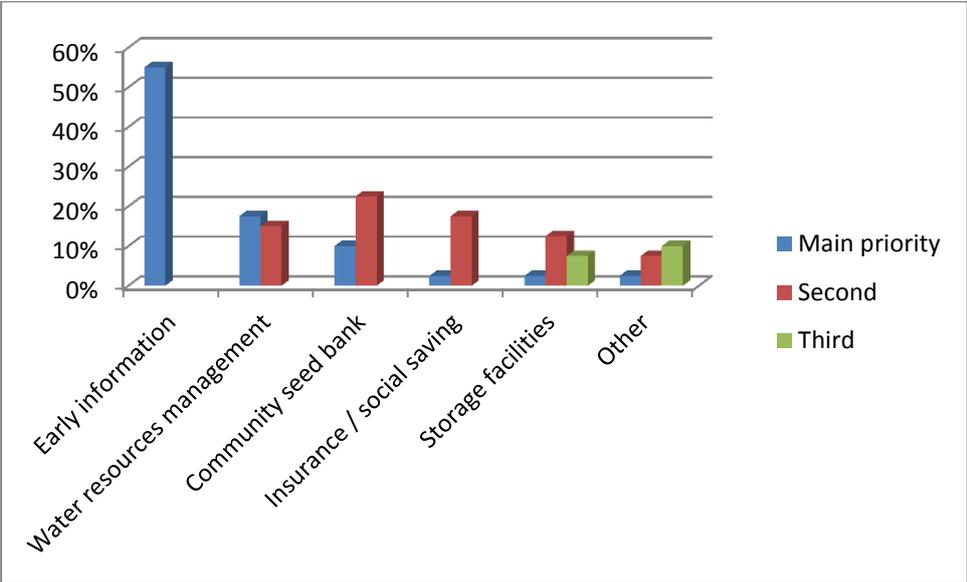
In the medium and long term, restocking of larger livestock such as cows, buffalo, pigs and goats needs to continue in the most-affected regions and states, however it will also be

important to ensure the construction of new animal shelters, and the provision of animal feed and vaccines.

Affected villages also identified a need for the restocking of fish farms with new fingerlings and fish/shrimps seeds, followed by fish feed. Respondents were also very keen to receive additional training on crop, livestock, and fish/shrimp production as well as increased provision of veterinary services.

All the affected communities, including women, prioritized the establishment and improvement of early warning systems to enhance their capacity to respond to natural disasters (Figure 30).

Figure 30: Percentage of villages reporting on preferred additional needs and required interventions



Improved water resource management, including the construction and rehabilitation of dams, drainage systems and improved access to irrigated land was also identified as a medium-to-long-term need to better control and utilize water resources, particularly rainwater. Many farmers emphasized the need to establish community seed banks, as well as crop insurance and social savings schemes which would help to offset the flood damage to their crops and assist a quick recovery from the disaster. The construction of storage facilities for harvested crops, agricultural inputs, tools and machinery were also identified as important requirements. Finally, the disaster opens a window of opportunity to ensure equal land rights for men and women in the form of joint titling for men and women or sole titling, in the case of female-headed households, as part of ongoing discussions around the draft National Land Use Policy, 2015.

12.4 Response mechanisms and interventions

A combination of response interventions/mechanisms should be employed in order to meet the short-, medium- and long-term needs of affected populations, including in-kind support, cash transfers and cash/food for work, as already discussed. This will support food and

productive assets and cash-in-hand will facilitate direct access to markets, reducing the need for negative coping mechanisms such as borrowing money.

In addition, in order to rapidly respond to the short-term needs identified by affected populations, it is very important to prioritize the response interventions as indicated in Table 11 below.

Table 12: Required immediate response interventions³²

Prioritization of immediate interventions							
Response interventions	Ayeyarwady	Bago	Chin	Magway	Rakhine	Sagaing	Intervention mechanisms
Agricultural tools and inputs distribution	High	High	High	High	High	High	In-kind/cash transfer
Provision of grain storage bags	High	High	High	High	High	High	In-kind/cash transfer
Rehabilitation of agricultural land	High	Medium	High	Medium	Medium	Medium	Cash/food-for-work
Rehabilitation of irrigation systems	Medium	Medium	Medium	Medium	Medium	Medium	Cash/food-for-work
Animal restocking (particularly poultry)	High	Low	High	High	High	High	In-kind/cash transfer
Provision of animal feed and vaccines and rehabilitation of animal shelters	High	Low	High	High	High	High	In-kind/cash transfer
Rehabilitation of fish and shrimp ponds	High	High	Low	Medium	High	Medium	Cash/food-for-work/ in-kind
Provision of nets and fishing equipment	High	High	Low	Medium	High	Medium	In-kind/cash transfer
Food assistance	High	High	High	High	High	High	In-kind/cash transfer
Additional Interventions	Conduct a Crop and Food Security Assessment Mission (CFSAM) in the upcoming Monsoon harvest season.						

Additional interventions are also needed, such as the collection of reliable primary information on the upcoming monsoon harvest and the impact on food security and nutrition. A Crop and Food Security Assessment Mission (CFSAM) should be conducted jointly with the Government and with the support of the Nutrition Cluster in order to collect more

³² The prioritization is based on the findings of the assessment. Further discussions with the Government and additional implementing partners should occur before implementing the suggested interventions. Targeting of the most-affected populations should be also considered as part of these discussions.

statistically representative data at a household level in all affected regions and states. This assessment should begin during the upcoming monsoon harvesting season.

While short-term interventions will help to rapidly restore the livelihoods of affected populations, additional medium- and long-term response interventions are needed to promote resilient livelihood recovery (Table 12).

RESILIENT LIVELIHOOD RECOVERY*

Indicative interventions to support recovery and build resilience of agricultural livelihoods affected by the floods and landslides

Table 13. Resilient livelihood activities

	Relief	Recovery	Resilience
Crops	Facilitate access to seeds, fertilizers and tools for the upcoming winter season particularly for the poorest households and female-headed households. Provision of bags and/or silos for grain storage to limit post-harvest losses.	Facilitate access to seeds, fertilizers and tools for the winter and summer season. Conduct an in-depth crop and food security assessment to gain a better picture of the crop production situation at the end of the harvest monsoon season thus determining the food security and nutrition situation.	Provision of seeds and tools (preferably through cash and vouchers) for the monsoon season. Technical support for improved cropping practices (e.g. integrated pest management, rice flood resilience, etc.). Establishment of seed banks at a village level. Crop diversification, especially focusing on these crops such as pulses which have high export demand.
Livestock	Restocking of small animals such as chickens and ducks together with animal feed. Rehabilitation or reconstruction of animal shelters.	Provision of veterinary services. Restocking of animals particularly pigs and goats together with the provision of animal feed.	Continued support for feed production through cropping and agro-forestry (in synergy with land stabilization). Technical support for improved breeding practices. Restocking of larger animals such as cows and buffalo (for households who have already rebuilt shelter and recovered capacity to access feed) with the introduction of improved adapted breeds.
Irrigation	Rehabilitation of irrigation infrastructure through cash/food for works.	Rehabilitation of irrigation infrastructure through cash/food for works.	Improve and extend access to irrigation particularly in areas subject to drought.
Fisheries	Rehabilitation of fish/prawn ponds through cash/food. Supply of nets and boats (preferably through cash grants).	Provision of fish feed and fingerlings Rehabilitation of fish/prawn ponds through cash/food for work.	Establishment of additional fish hatchery Technical support for sustainable aquaculture practices.

Land recovery and adaptation	Rehabilitation of land suitable for the winter and summer season through cash/food for work as well as adoption of heavy machinery where required.	Planting a combination of fast-growing and deep-rooted trees, through cash-for-work programmes to reduce deforestation and related problems such as landslides and floods. Technical support to assess changes in the cultivation of land damaged by the floods for various crops or fruit trees.	
Market	Rehabilitation of market access roads and paths through cash/food for work. Favor a cash-based approach when conditions are met.	Rehabilitation of market access roads and paths through cash/food for work.	Improve and expand national information systems in regards to crops, livestock and fisheries as well as the market (data collection, analysis, management, etc.). Facilitate access to loans for traders.
DRR		Implementation of early warning system. Facilitate the establishment of insurance and social saving schemes as well as access to credit. Enhance agricultural mechanization.	

*All these interventions shall consider equal wages between women and men and ensure that equal numbers of women are reached.

Annex 1: Assessment Team

- FAO:** Daniele Barelli, Agriculture Needs Assessment Specialist (co-leader)
Daniele.Barelli@fao.org
Oriane Turot, Food Security Analyst
Oriane.Turot@fao.org
- WFP:** Nuria Branders, VAM and Cash Consultant (co-leader)
nuria.branders@wfp.org
Nicolas Guillaud, VAM Officer (co-leader)
nicolas.guillaud@wfp.org
- UN Women:** Dilruba Haider, Coordinator Gender and Climate Change
dilruba.haider@unwomen.org
Khin May Kyi, National Project Officer, Myanmar
Khinmay.kyi@unwomen.org
- LIFT:** Nay MYO, Technical expert
NayM@unops.org
- JICA:** Kenichiro Kobayashi, JICA Advisor in MOAI
kobayashi.moai@gmail.com
- CESVI:** Adrien PEYRE, CESVI FS Sector Coordinator
myanmar.fs@cesviverseas.org
- CARE:** Pam Flowers, Head of Programme
Pam.Flowers@careint.org
- World Vision:** Saw Fulton, Food Programme Department Manager
saw_fulton@wvi.org

Annex 2: List of states, townships and villages visited

State/region	Township	Village
Ayeyarwaddy	Ingapu	Kaw nyin yoe
		Thet Kal Pyin
	Nga thaung Chaung	Ya Thar Gyi
		Yae Nant Thar
	Ye Gyi	Kone Tat
		Set Kwin
Bago	Monyo	Kyoet Pin Wine
		Ma Gyr Gome
		Thar Yar Gone Thapyay Pin
	Tharyarwadi	Lower Lat Pan Khan
		Phoe Groung
		San Yway
	Waw	Kan Myint
		Phoe Oo Sein
	Chin	Falam
Tili		
Haka		Cinkhua
		Man hnu
Magway	Aung Lan	Kan Ma Lay
		Sal laung
	Pwint Phyu	A nauk kaing
		Thayettow
	Say tatetokar	Aung
		Chin pyit kaing
Rakhine	Buthidaung	Kya Khat Bet/ Myoma Zay Di Toung
		Kya Khat Bet/ Oe Thei
	Kyaw Taw	Ah Paukwa - Buddhist
		Ah Paukwa - Muslim
	Maungdaw	Daunk Chaung Gyi village
		Maw Ra Waddy
		Tha Yai Kone Baung
		Ton Serk
	Mrauk Oo	Thakyar
		Zeezar
Sagaing	Kale	Maw Lite Kale
		Yay lwe oo
	Kanbalu	Kya Khat Aeik
		Pauk Sein Kone
	Kawlin	Sisone
		Ye Kan Thar

Annex 3: Agricultural land damaged or destroyed

Calculation of crop area (acre) spoilt and damaged by the floods

Initial data provided by the Government indicating the impact of the floods on overall crop cultivation.

State/region	Total flooded area (acre)	Receded area (acre)	Affected area (acre)	Damaged area (acre)	Replanted area (acre)
Ayeyarwady	318539	245483	245483	211323	31110
Bago	376446	371183	229989	152847	105180
Chin	5801	5801	5801	3253	372
Magway	96846	96846	96846	65858	15339
Rakhine	291219	291219	273154	217246	215792
Sagaing	223582	212219	179704	126083	62275
Grand Tot.	1312433	1222751	1030977	776610	430068

Flooded area = Total crop flooded area.

Receded = Area where water has receded after the floods.

Affected = Area where crops might have been damaged or destroyed.

Damaged = Area where cultivated crops were destroyed.

Replanted = Area replanted, replacing the destroyed crop.

N.B. According to the explanation of the MoAI, the crops cultivated in the receded areas (at the moment of the flood) will be able to produce as in the case of the crops in the replanted areas but production will likely be reduced due to the impact of the disaster or late planting. In affected areas, the damaged crops will still be able to produce, however the expected yield will again be reduced. On the other hand, those areas destroyed will not be able to produce at all.

After receiving this data the next step has been to calculate:

Areas still flooded = Flooded area – receded area.

Recovered area = Receded area – affected area.

State/region	Flooded area (acre)	Receded area (acre)	Affected area (acre)	Damaged area (acre)	Replanted area (acre)	Still flooded (acre)	Recovered area (acre)
Ayeyarwady	318539	245483	245483	211323	31110	73056	0
Bago	376446	371183	229989	152847	105180	5263	141194
Chin	5801	5801	5801	3253	372	0	0
Magway	96846	96846	96846	65858	15339	0	0
Rakhine	291219	291219	273154	217246	215792	0	18065
Sagaing	223582	212219	179704	126083	62275	11363	32515
Total	1312433	1222751	1030977	776610	430068	89682	191774

In areas still covered by water, all crops are lost. However, in recovered areas, some plantations have survived and will mature (October to December 2015) albeit with reduced production as in the earlier discussed cases.

The final step of the calculation has been to determine:

Total area spoilt = (Affected area + recovered area) – damaged area

Total area destroyed = (Damaged area + still flooded area) – replanted area

State/region	Flooded area (acre)	Receded area (acre)	Affected area (acre)	Damaged area (acre)	Replanted area (acre)	Still flooded area (acre)	Recovered area (acre)	Total damaged (acre)	Total destroyed (acre)
Ayeyarwady	318539	245483	245483	211323	31110	73056	0	34169	253269
Bago	376446	371183	229989	152847	105180	5263	141194	218336	52930
Chin	5801	5801	5801	3253	372	0	0	2548	2881
Magway	96846	96846	96846	65858	15339	0	0	30988	50519
Rakhine	291219	291219	273154	217246	215792	0	18065	73973	1454
Sagaing	223582	212219	179704	126083	62275	11363	32515	86136	75171
Total	1312433	1222751	1030977	776610	430068	89682	191774	446141	436224

In this case, the total damaged area represents the area containing all damaged cultivations which will reach maturation stage, albeit with lower yield. In the totally destroyed areas, crops are lost and there will be no production.

Annex 4: Currency equivalents and conversion table

(As of September 2015)

Currency		Equivalent
USD 1.00	=	Kyat (MMK) 1,270
Euro 1.00	=	Kyat (MMK) 1,450

WEIGHTS AND MEASURES		
1 acre (ac)	=	0.402 hectare (ha)
1 hectare	=	2.471 acres
1 kilogram (kg)	=	2.200 pounds (lb)
1 000 kg	=	1 metric tonne (t)
1 kilometre (km)	=	0.62 mile (mi)
1 metre (m)	=	1.09 yards (yd) or 3.28 feet (ft)
1 square metre (m ²)	=	10.76 square feet (ft ²)
1 millimetre (mm)	=	0.03937 inch (")
1 kg	=	0.61 viss