

# Post-Nargis Joint Assessment



A report prepared by the Tripartite Core Group comprised of Representatives of the Government the Union of Myanmar, the Association of Southeast Asian Nations and the United Nations with the support of the Humanitarian and Development Community.



July 2008



*This report is inspired by, and dedicated to, the people  
living in the areas affected by Cyclone Nargis.*

## FOREWORD

On 2 and 3 May 2008, Cyclone Nargis struck the coast of Myanmar and moved inland across the Ayeyarwady Delta and southern Yangon Division, causing many deaths, destroying livelihoods, and disrupting economic activities and social conditions. This report describes the human loss and assessment of damage to physical assets, the subsequent losses sustained across all economic activities, and the impact of the disaster on both the national economy and household-level activities and well-being.

On 25 May 2008, at the ASEAN-UN International Pledging Conference organized in the aftermath of the cyclone in Yangon, agreement was reached to form a Tripartite Core Group (TCG) to coordinate relief efforts, bringing together the Government of the Union of Myanmar, the United Nations, and the Association of Southeast Asian Nations (ASEAN). On 31 May, the TCG agreed to conduct a Post Nargis Joint Assessment (PONJA) to determine the full scale of the impact of the cyclone and requirements for both immediate humanitarian assistance needs and medium to longer term recovery.

This assessment, conducted in the Ayeyarwady and Yangon Divisions from 10 to 19 June 2008, is significant in the cooperation of humanitarian and development actors to bring together relief, early recovery and longer-term recovery in one assessment, and the role of ASEAN in the humanitarian field.

A comprehensive methodology was used to estimate humanitarian needs, damage to assets, changes in economic flows, and impacts on social and economic conditions. The estimates were based on information collected by the joint assessment teams during field surveys in the aftermath of the disaster. The assessment consisted of two components – the Village Tract Assessment (VTA) focusing on humanitarian needs, and the Damage and Loss Assessment (DALA) focusing on damage and losses.

The analysis of the data has identified the needs and quantified financial requirements that will facilitate formulating comprehensive relief and early recovery actions, as well as medium- and long-term recovery plans, including disaster risk management. A continuation of the partnership between the Government of the Union of Myanmar, ASEAN and the international community that has marked this joint assessment will be essential to address these needs in the near, medium and longer term.

This report has been jointly prepared by the Government of the Union of Myanmar, the United Nations and ASEAN, with the support of the humanitarian and development community. The Tripartite Core Group appreciates the collaborative spirit and the contributions from all partners to this important process.

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Staff from 18 government ministries were involved in the assessment through field visits, the provision of data and its interpretation. We are grateful to them for their vital support.

Some 70 persons condensed this wealth of data into the present report, making its findings accessible to a broader audience, and in the processing telling the stories of those who survived Cyclone Nargis.

It is to the survivors of this storm, to their resilience and courage, that this report is dedicated.

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**LIST OF ABBREVIATIONS AND ACRONYMS**

|       |  |
|-------|--|
| ADB   | Asian Development Bank   |
| ADPC  | Asian Disaster Preparedness Center                                     |
| AHTF  | ASEAN Humanitarian Task Force for the Victims of Cyclone Nargis        |
| ASEAN | Association of Southeast Asian Nations                                 |
| DALA  | Damage and Loss Assessment   |
| DRM   | Disaster Risk Management   |
| DRR   | Disaster Risk Reduction  |
| EC    | European Commission  |
| ECLAC | United Nations Economic Commission for Latin America and the Caribbean |
| FEC   | Foreign Exchange Certificate   |
| FY    | Fiscal Year  |
| GDP   | Gross Domestic Product   |
| IMF   | International Monetary Fund  |
| INGO  | International Non-Government Organization                              |
| ISDR  | International Strategy for Disaster Reduction                          |
| MIMU  | Myanmar Information Management Unit                                    |
| NDPCC | Natural Disaster Preparedness Central Committee                        |
| NGO   | Non-Government Organization  |
| OCHA  | United Nations Office for the Coordination of Humanitarian Affairs     |
| PONJA | Post-Nargis Joint Assessment   |
| TCG   | Tripartite Core Group  |
| UN    | United Nations   |
| UNDAC | United Nations Disaster Assessment and Coordination                    |
| VTA   | Village Tract Assessment   |

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## Section I: The Disaster







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## SECTION I: THE DISASTER

### LIVING WITH NATURAL DISASTERS

Myanmar is the largest country in mainland South-East Asia with a total land area of 676,578 sq km, and a population of 51.5 million. Its long coastline of about 2,000 km covers almost the entire east coast of the Bay of Bengal. Being a heavy rainfall country, floods occur regularly during the mid-monsoon period (June to August) in areas traversed by rivers or large streams. The country is also prone to cyclones, landslides, earthquakes, and drought.

#### 1.1. CYCLONE NARGIS

The category 3 Cyclone Nargis struck Myanmar on 2 and 3 May 2008, making landfall in the Ayeyarwady Division, approximately 250 km southwest of Yangon, and affecting more than 50 townships, mainly in Yangon and Ayeyarwady Divisions, including Yangon, the country's largest city.<sup>1</sup> With wind speeds of up to 200 km/h accompanied by heavy rain, the damage was most severe in the Delta region, where the effects of the extreme winds were compounded by a 12 foot (3.6 meter) storm surge.

Nargis was the worst natural disaster in the history of Myanmar, and the most devastating cyclone to strike Asia since 1991.

#### 1.2. THE HUMAN TOLL

As of June 24, the official death toll stood at 84,537 with 53,836 people still missing, and 19,359 injured. Assessment data shows that some 2.4 million people were severely affected by the cyclone, out of an estimated 7.35 million people living in the affected townships. Assessments also indicate that more women than men died, distorting social structures. Child deaths are also believed to have been substantial, although fatalities disaggregated by age are not available. Estimates suggest that the number of people displaced by the cyclone may have been as high as 800,000, with some 260,000 people living in camps or settlements throughout the Delta in the initial days after the cyclone. There has been widespread devastation, with the near-total destruction of fields and shelter in areas that were directly hit by the cyclone, in addition to downed power and communication lines and other loss of infrastructure affecting a much bigger area.

37 townships were significantly affected by the cyclone in Ayeyarwady and Yangon Divisions. The cyclone-affected area of the Ayeyarwady Delta covers some 23,500 square kilometers, almost twice the size of Lebanon.

The disaster caused widespread destruction to homes and critical infrastructure, including roads, jetties, water and sanitation systems, fuel supplies and electricity. A large number of water supplies were contaminated and food stocks damaged or destroyed. The winds tore down trees and power lines, while the accompanying storm surge submerged countless villages.

Damage was most severe in the Delta region, also known as the country's rice bowl, where the effects of extreme winds were compounded by a sizable storm surge, devastating most of the fertile areas. Nargis struck just as the Delta's paddy farmers were at the very last stage of harvesting the so-called "dry season" crop, which accounts for about 25 percent of the annual production in the affected area, and destroyed several rice warehouses and their stocks. The city of Yangon also sustained a direct hit, which downed power and communications lines and inflicted major damage to buildings and communications. Many roads into and out of the city, as well as vital roads into the Delta region, were blocked by flooding or debris.

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<sup>1</sup> Myanmar is administratively divided into seven States and seven Divisions. Yangon Division includes both the city of Yangon as well as rural areas. Ayeyarwady Division is mainly rural, covering the area of the Ayeyarwady Delta.

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### 1.3. SOCIAL AND ECONOMIC BACKGROUND OF THE AFFECTED AREAS

#### LIVELIHOODS

The people of the Delta area are primarily farmers, fishermen and laborers, with a smaller proportion engaged in service industries and as traders. Approximately 50-60 percent of families in the Delta are engaged in agriculture.<sup>2</sup> Over time, there has been an intensification of agriculture in the Delta region, facilitated by ample water, relatively fertile soils, and rich aquatic life. Increases in production led to the spread of small businesses and traders. Some villagers are also craftsmen, including boat builders and carpenters.

The Delta is by no means one of the poorer parts of the country (29 percent of the population was poor in 2004-05, compared with 32 percent nationally). However, development is relatively limited, and life can be harsh, in particular when crops fail. 44 percent of agricultural households experienced floods in the last five years, and 43 percent experienced drought, figures above the national average.<sup>3</sup> As agriculture is the driving force in the Delta economy, these uncertainties impact on the incomes of households in other sectors. The table reflects how villagers rank themselves in terms of relative wealth.

**Table 1: Self-Ranking of Population in Different Wealth Groups in the Ayeyarwady Delta**

| Township       | Rich | Moderate | All poor | Poor | Very poor |
|----------------|------|----------|----------|------|-----------|
| Bogale         | 6    | 13       | 81       | 21   | 61        |
| Kyaiklat       | 9    | 18       | 73       | 16   | 57        |
| Labutta        | 5    | 12       | 83       | 22   | 61        |
| Mawlamyinegyun | 5    | 9        | 86       | 23   | 63        |
| Ngapudaw       | 3    | 7        | 90       | 22   | 67        |

Source: UNDP 2007.

Estimates from several townships showed more than half the population as being landless.<sup>4</sup> Landlessness is particularly high in Labutta and there is therefore a high proportion of people engaged in fishing. Overall in the Delta, 32 percent of the landless work in agriculture as renters/ sharecroppers, agricultural workers, or seasonal agricultural workers<sup>5</sup>, a figure above the 26 percent national average. The other two-thirds worked in other sectors including fisheries, salt production, trade, and transportation.<sup>6</sup>

The landless are more likely to be poor in the Delta region than elsewhere: 44 percent of the landless live below the government poverty line, compared with 33 percent nationally. Of the "poor" in the Delta, 31 percent were landless, while the "very poor" were almost always landless – 85 percent.<sup>7</sup>

#### THE SOCIAL STRUCTURE OF DELTA VILLAGES

Despite, or perhaps because of, the many challenges of Delta life, communities are relatively socially cohesive and have strong capacities for collective problem solving and decision-making. While the usual inter-group cleavages exist (including between those of different ethnicity and religion, between genders, between the young and old, and between different income and livelihoods type groups), village activities tend to cut across such boundaries.

There are a number of reasons for the strength of social capital. First, development resources from higher levels are scarce. This accentuates the importance of working together at the

2 UNDP, Ministry of National Planning and Economic Development, and UNOPS (2007). Integrated Household Living Conditions Survey in Myanmar, Poverty Profile. Unpublished. These, and the other figures in this section refer to Ayeyarwady Division, and hence do not include those in the more urbanized Yangon Division.

3 UNDP et al., op cit.

4 Mya Than (2001). Changing Faces of the Ayeyarwady (Irrawaddy) Delta (1850-2000). Singapore: Institute of Southeast Asian Studies, Singapore.

5 Kurosaki, Takashi (2004). "Crop Choice, Farm Income, and Political Control in Myanmar". Hi-Stat Discussion Paper Series No. 04-80. Institute of Economic Research, Hitotsubashi University.

6 UNDP et al., op. cit.

7 UNDP et al., op. cit.

community level and carefully prioritizing resources for public goods. Second, in the absence of a state or employer safety net, community members support each other in times of need, something particularly evident in their response to Nargis. Traditions of reciprocity, evident across Myanmar as in many other Southeast Asian cultures, encourage acquiescence from those providing help.

Unsurprising for such a diverse country, the Delta region is home to people of a number of different ethnicities.<sup>8</sup> There are three primary ethnic groups: the Bamar make up the majority of the population with smaller numbers of ethnic Karen and Rakhaing.<sup>9</sup> The latter live on the largely unaffected west coast whereas the Bamar and Karen are distributed throughout the Delta. Villages can be classified into those segregated by ethnicity, and those with an ethnic mix depending on settlement history. In addition to the Karen, there are small numbers of Mon who are Buddhist, and Indian Muslims.

## 1.4. MYANMAR'S VULNERABILITY TO NATURAL HAZARDS AND CLIMATE CHANGE

### 1.4.1. HISTORICAL HAZARD RISK PROFILE

The natural hazard risk varies from moderate to high across the country, characterized essentially by small and medium scale but frequent hazard events. Historical data indicates that between 1996-2005, urban fires constituted about 70 percent of disaster events, followed by floods (11 percent), storms (10 percent) and others (9 percent) including earthquakes, tsunamis and landslides. Between 1910 and 2000, there were at least 14 major windstorms, 6 earthquakes, and 12 major floods. More recent disasters have included the 2004 tsunami, the 2005 landslides in the mountainous region, and Cyclone Mala in 2006. However, Cyclone Nargis is by far the most devastating natural disaster in the country's history, and has brought to the fore the extreme vulnerability, in particular of the country's coastal regions, to such low-frequency but high-impact natural hazards.

### 1.4.2. HAZARD EXPOSURE IN THE DELTA REGION

Although the devastation caused by Cyclone Nargis in the Ayeyarwady Delta region has caught international attention, the region has had a history of severe tropical storms, recurring floods during the monsoon season, and fires in the dry season. The region is also exposed to low-frequency, high-impact events such as occasional cyclones and tsunamis. A broad overview of historical hazard events in the Delta region is provided below.

**Cyclones:** Over the last 60 years, 11 severe tropical cyclones hit Myanmar, only two of which made landfall in the Delta region. Cyclone Nargis, rated as the 8th deadliest cyclone of all time, was the first tropical cyclone to strike the country since Cyclone Mala made landfall in 2006.

**Floods:** The cyclone-affected region of Myanmar is highly exposed to flooding. Most of the region receives more than 400 cm rainfall annually. Concentrated spells of rain during the monsoon season cause floods in the Chindwin, Ayeyarwady, Thanlwin and Sittaung river basins. In the Delta region, when high rainfall is accompanied by high tide in the seas, extended periods of flooding are experienced in many settlements.

**Fires:** Although not an entirely "natural" hazard, fire incidents very frequently occur in the region, attributable mainly to prevalent housing patterns (dry thatch roofed houses) and local practices of indoor cooking on wood fired stoves.

**Tsunamis:** There is a recorded history of 11 tsunami events affecting the northeastern shores of the Indian Ocean (Bay of Bengal and the Andaman Sea) over the last 250 years. The 2004 Indian Ocean tsunami left more than 60 people dead and more than 2,500 homeless in Myanmar's coastal areas.

<sup>8</sup> There are 170 ethno-linguistic groups in Myanmar.

<sup>9</sup> The 1984 population census (latest) records 69 percent of the total Myanmar population as Bamar, and 6.8 percent as Karen. No sub-regional breakdown is given. As the low-land or Delta Karen are the second largest Karen population outside of the Karen state, they are likely to comprise a larger proportion of the Delta population.

### **1.4.3. PROJECTED IMPACTS OF CLIMATE CHANGE**

At present, the literature on the impact of climate change on Myanmar is limited. However, there appear to be some emerging climate change trends that have been researched by Myanmar's Department of Meteorology and Hydrology (DMH). These were presented in the form of initial, unpublished research findings by DMH at the recent ADPC-DMH Monsoon Forum, and include observations of a gradual warming, over the last 40 years, in the Bay of Bengal region close to the Ayeyarwady Delta, as well as a gradual southward movement of the monsoon trough that forms around the onset of the monsoon in the Bay of Bengal, from 20 degree N to 10 degree N near the Ayeyarwady Delta coast.

Within the context of a broader analysis of climate related hazards outlined above, there is a need to undertake a scientific diagnostic of Cyclone Nargis, which differed from historical cyclone tracks in the Bay of Bengal. The tropical depression that formed in the Bay of Bengal in the last week of April 2008 appeared to be headed towards the Rakhine coast, before being met with westerly disturbances two days before making landfall and moving eastwards, finally making landfall in the Delta region.

In addition, it is important to highlight that delta regions all over the world face special vulnerabilities to the impacts of climate change. This is an opportune time for dialogue between Myanmar and other countries that are contending with possible impacts of climate change in their delta regions. Such a dialogue can help exchange methodologies for assessing vulnerabilities and explore adaptation and risk management solutions that may be applicable in the Myanmar context.

### **1.5. MANAGING DISASTER RISK: KEY PRIORITIES**

Cyclone Nargis highlighted Myanmar's vulnerability to high-impact, low-frequency natural hazards, and also the need for the country to undertake a range of actions for reducing, mitigating and managing disaster risks in the future to avoid similar catastrophes. These actions would have to be carried out in the short, medium and longer terms, depending on the needs and priorities identified through a participatory and consultative process that involves a range of national, local, regional and international entities.

Priorities for improved disaster risk management and reduction over the short, medium and long terms, can be distributed across the following five pillars: (a) risk identification and assessment; (b) strengthening and enhancing emergency preparedness; (c) institutional capacity building; (d) risk mitigation investments, and; (e) risk financing and transfer mechanisms. The core underlying principle, however, remains that both loss of life and the economic impact of disasters can be reduced through advance planning and investment.

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## Section II: Sector Impact Assessment





## SECTION 2. SECTOR IMPACT

The Post Nargis Joint Assessment (PONJA) was designed as a comprehensive, rapid, joint effort that will provide the basis for humanitarian and recovery programs. The assessment is comprehensive in the sense that, in a rather exceptional way, it covers humanitarian as well as recovery needs. It was led jointly by ASEAN, the United Nations, and the Myanmar Government, with technical support from a range of humanitarian and development partners, including the Asian Development Bank, World Bank, and many non-governmental organizations. The team completed the assessment in less than 5 weeks.

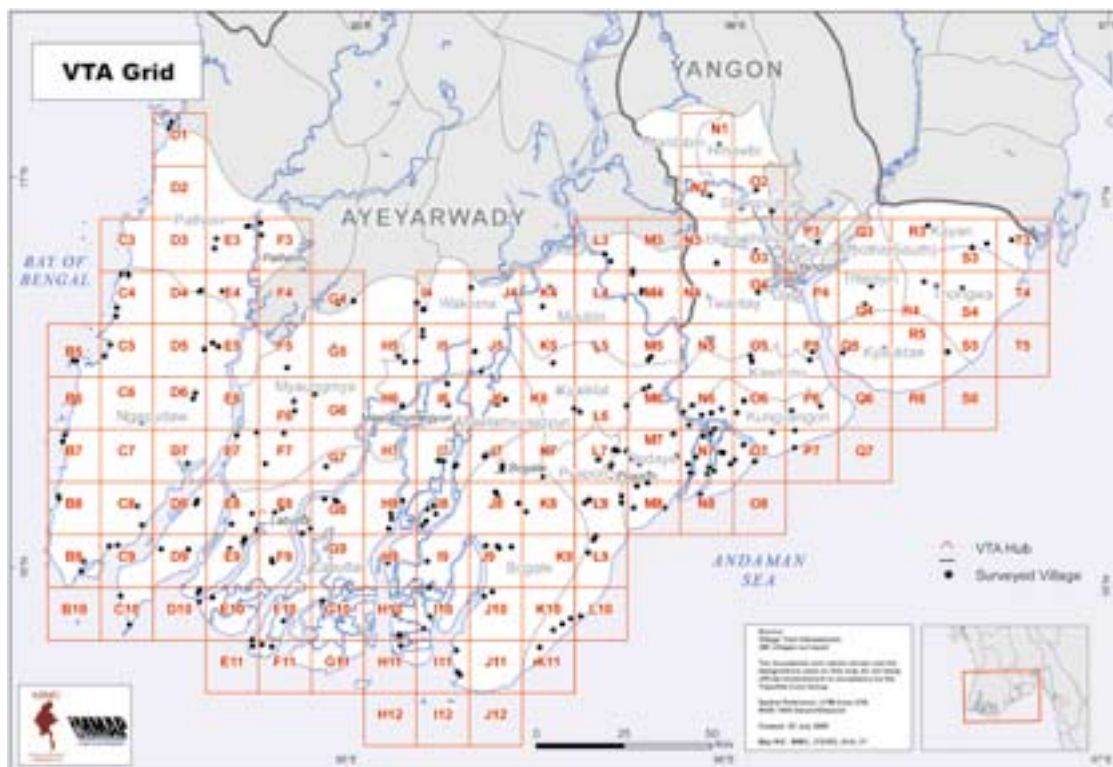
### 2.1. ASSESSMENT METHODOLOGY AND DATA

The PONJA aims to assess: (i) the current vulnerabilities and needs of the population living in the most affected areas; (ii) the damage done to assets (for example, destroyed or damaged houses, sunken fishing boats) in all areas affected by the cyclone; and (iii) the losses of income caused by the cyclone that the Myanmar economy and households will experience until assets and livelihoods are restored to pre-cyclone levels.

The PONJA team relied on two approaches to gather the data for its analysis:

- **Primary data** were collected through the Village Tract Assessment (VTA), a survey of households, key informants (for example, teachers, village leaders), and focus groups in the worst affected townships. 250 enumerators visited 291 villages across 30 townships over ten days in early June 2008. The survey included questions on health, food and nutrition, education, women and children, water and sanitation, agriculture, livelihood, temporary settlements, and emergency shelter. A more detailed description of the VTA approach can be found in Annex 1. The map below shows the artificial grid that was used for sampling. It marks the location of each community that was assessed.

Map 1: Sampling grid used for the VTA survey



Source: VTA survey.

- **Secondary data** were provided by a range of Ministries, UN agencies, past household surveys, satellite imaging, and other sources and form the basis for the Damage and Loss Assessment (DaLA – see Annex 2 for more details on the DaLA approach). These data were validated through a series of tests: field visits covering the whole Delta, triangulation with the primary data collected through the VTA and by comparison with other countries' benchmarks, and consultations with communities and local stakeholders. Because the team did not have access to centralized damage data throughout this exercise, it relied on data provided by several sectoral Ministries. This work was also handicapped by the lack of reliable time series for most sectors in Myanmar.

### Box 1: SOME TERMINOLOGY

Throughout this report, the following terminology will be used to assess the impact on each sector:

- **Damage** is defined as the estimated replacement value of totally or partially destroyed physical assets;
- **Losses** are the estimated changes in the flow of the economy that arise from the temporary absence of the damaged assets; they include losses in production and higher costs in goods and services.

**Relief response** is the provision of assistance during or immediately after a disaster to meet the life preservation and basic subsistence needs of those people affected.

**Early recovery** refers to a multidimensional process of recovery that begins in parallel to relief efforts. It aims to generate self-sustaining, locally owned, resilient processes for post-crisis recovery. It encompasses initial activities provided as part of a humanitarian programme to restore basic services, livelihoods, shelter, environment, and social dimensions, including reintegration of displaced populations.

**Medium-term recovery** completes and complements early recovery activities to provide a full picture of recovery needs. Recovery is strongly focused on community-driven priorities and processes, and assistance which goes directly to disaster-affected households. While disaster recovery does not cover long-term development activities such as the upgrading or expansion of infrastructure, recovery activities include full restoration of access to basic services such as education and health, sustainable revitalization of economic livelihoods for the poor, durable and resilient repair/rebuilding of destroyed or damaged physical structures such as schools, houses and religious buildings, and the restoration of social and cultural life.

Strategies presented in this report aim to address the immediate humanitarian needs of the population affected by the cyclone, while supporting their recovery efforts to rebuild their lives and livelihoods. This recovery effort is sequenced: the provision of humanitarian relief that is aimed at life-saving support and meeting basic needs is accompanied by early recovery efforts that aim to augment the relief efforts, provide some basic livelihood means to the people, support their spontaneous recovery and lay the foundation for longer term recovery. Given the magnitude of damage caused by the cyclone, many of these efforts to help the people of the Ayeyarwady Delta rebuild their assets and livelihoods will likely last two to three years.

## 2.2. FULFILLING BASIC NEEDS AND RESTORING BASIC SERVICES

### 2.2.1. FOOD AND NUTRITION

The cyclone not only destroyed physical assets in villages and inundated paddy land with sea water, but also washed away household assets, including food stocks from the most recent harvest



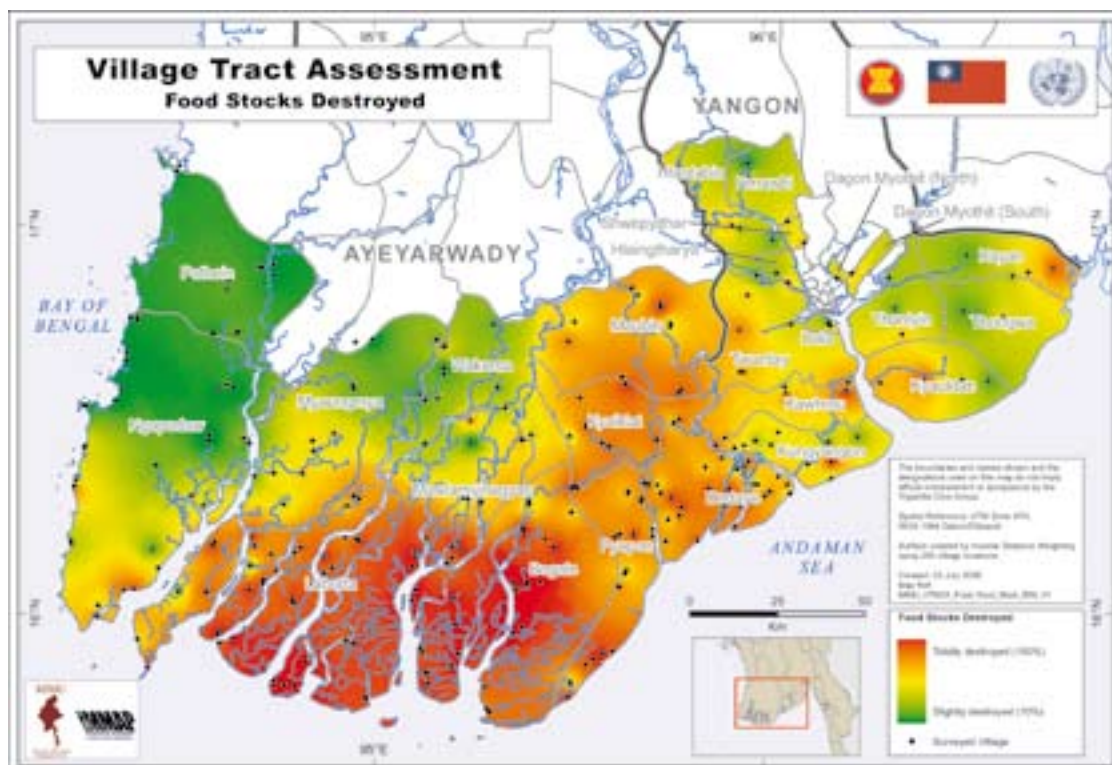
(April/May), livestock, seeds and tools. This left many people in a situation of food insecurity.

More than half of the households living in the most affected townships reported having lost all food stocks during the cyclone (see map 2). On the day of the survey (i.e., early June), 55 percent of households declared having one day of food stocks or less. While more than half of households reported that they were able to source food from local markets, this does not preclude their dependence on humanitarian assistance.

As of 30 June, 676,000 people had been reached with food commodities, yet it remains urgent to meet the basic food needs of some 924,000 vulnerable persons on a systematic basis in Ayeyarwady and Yangon Divisions, until the October/November harvest lowers the requirement for food assistance.

Following the cyclone, the population also shifted its diet to a less varied one: consumption of fish and eggs – the main sources of protein and fat – dropped by 25 percentage points; consumption of vegetables and fruits – one of the main sources of vitamins and minerals – decreased by 9 percentage points. At the same time, disruption of infant feeding practices poses a major threat to the survival, nutrition and development of children under 5 years of age. As a result, the affected populations face an increasing risk of acute malnutrition and micronutrient deficiencies, particularly among infants, young children and pregnant/lactating women.

**Map 2: Food stocks destroyed by the cyclone in the Delta**



Source: VTA survey.

### 2.2.2. HEALTH

According to the VTA, Cyclone Nargis damaged close to 75 percent of health facilities in the affected townships. Most damage occurred in the lower Delta (see map 3). Almost all the destroyed facilities were primary health facilities, including station hospitals, rural health centers and sub-centers. While the value of the damage to these facilities may not be as large as that for hospitals, it has a tremendous impact on the access of the rural population to health services.

There are significant health impacts following the cyclone at the village level including: (i) a range of health risks that will require the health system to be vigilant with respects to potential

disease outbreaks; and (ii) health needs which require treatment and care through the health service delivery system.

More than 65 percent of households surveyed reported health problems among household members during the 15 days preceding the survey, i.e. early June. Among the most commonly reported diseases were cold, fever and diarrhoea with 39, 37 and 34 percent, respectively. Injuries ranked surprisingly low at 8 percent. 23 percent households reported mental problems among household members due to the cyclone, with a large variation across townships from 6 to 51 percent.

The danger of a rise in gastro-intestinal diseases is clear. The proportion of households using pit latrines has decreased from 77 to 60 percent due to the cyclone, whereas it has doubled from 23 to 40 percent for unsanitary defecation practices such as open defecation, floating latrines and trenches. The increase in floating latrines from 3 to 7 percent in combination with the still common use of riverwater as a source of drinking water as well as the low usage of soaps poses a particular health concern in the months ahead.

**Map 3: Damaged health facilities in the Delta**



Source: VTA survey.

The total damage and losses to the health sector due to cyclone Nargis are estimated at about K19 billion.<sup>1</sup> Some two-thirds of damages and losses are incurred by the public sector, and one-third by the private sector.

In the health facilities, health staff report a considerable decline in health service provision, in particular for immunization and communicable diseases with decreases from 83 to 66 and from 43 to 34 percent, respectively. Of particular concern is also the drop in health care services for birth delivery from 81 to 71 percent. Access to medicines has also worsened due to the cyclone with a 10 percent decline in health staff saying their health facility had essential medicines, and a 21 percent increase in those saying that the facility did not have them.

<sup>1</sup> An exchange rate of Kyat 1,100 per USD 1 is used throughout this report. For more detail on Myanmar's exchange rate, see boxed text in section 3.1., Macro-Economic Impact.

**Table 2: Damage and Losses Estimates in the Health Sector in Yangon and Ayeyarwady Divisions**  
(Kyats million)

|                          | Public        | Private      | Total         |
|--------------------------|---------------|--------------|---------------|
| Damage                   | 11,545        | 1,236        | 12,781        |
| Losses                   | 1,141         | 4,971        | 6,113         |
| <b>Damage and Losses</b> | <b>12,686</b> | <b>6,208</b> | <b>18,894</b> |

Source: PONJA Team estimates

### 2.2.3. EDUCATION

According to the 2005 Human Development Report, Myanmar scored 0.76, just below the world average (0.77), on its Education Index. The Education For All (EFA) Mid Decade Assessment 2007 reported 2005/06 net enrollment levels at 82 percent for primary education and 34 percent for secondary education. These figures are roughly congruent with the Integrated Household Living Conditions (IHLC) survey 2004 that places primary net enrolment rate at 85 percent.

These aggregate figures mask significant variations across income levels. According to the 2000 Multiple-Indicator Cluster Survey (MICS), almost 20 percent of children from the poorest quintile never enroll in school, compared to less than 5 percent of their wealthier counterparts who do not enroll. By the age of 11, approximately 60 percent of students in the richest quintile transferred to middle school, while only 10 percent of students in the poorest quintile continued to middle school.

Cyclone Nargis had a significant impact on the education sector. An estimated 50 to 60 percent of public schools, including monastic ones, were destroyed or damaged. This information is drawn from Government administrative data, UN agencies, and the VTA survey. Administrative data show a range of 43-48 percent schools totally or severely damaged; the VTA shows 63 percent but focused on the 30 most severely affected townships (see map 4).

**Map 4: Damaged school buildings in the Delta**



Source: VTA survey.

The total damage and losses in education are estimated at about K 116 billion, including K 25 billion from the damage to educational materials.

**Table 3: Damage and Loss Estimates in the Education Sector in Yangon and Ayeyarwady Divisions** (Kyats million)

|               |                |
|---------------|----------------|
| <b>Damage</b> | 115,300        |
| <b>Losses</b> | 1,023          |
| <b>Total</b>  | <b>116,323</b> |

Source: PONJA Team estimates

In addition to the many casualties and trauma suffered by children, the use of schools as emergency shelter sites (if not damaged) further strained limited educational resources. Restored school facilities are helping children to return to class, and contributing to overcome trauma by providing child-friendly spaces to meet peers. Government, private sector organizations, NGOs and international donors have provided funding estimated at close to K 5 billion for the repair of primary and secondary schools with damaged roofs.<sup>2</sup> The Ministry of Education has delivered textbooks and some educational materials to schools in affected areas, while NGOs and international partners supported government efforts to reopen educational establishments or set up temporary learning spaces with a minimum set of educational inputs.

## 2.3. RESTORING ECONOMIC ACTIVITY / LIVELIHOODS

### 2.3.1. AGRICULTURE, LIVESTOCK, AND FISHERIES

The agriculture sector – encompassing crops, plantations, livestock and fisheries – generated close to 45 percent of the national GDP in 2007, and about a third of the regional GDP of Ayeyarwady and Yangon Divisions. The sector is the mainstay of the rural economy in the Ayeyarwady River delta area. About 30 percent and 20 percent of the rural population in Ayeyarwady and Yangon Divisions respectively are landless; they rely on fishing, home gardens and agricultural casual labor for their livelihoods.

Paddy is the major crop. Other important crops include pulses, sesame, jute, and groundnut; and plantation crops such as mango, coconut, banana, and betel nut and leaf. Livestock is important both as a source of food and as draught animals for agriculture. Cattle, pigs, goats, chickens and ducks provide an important source of farm income and subsistence production. Fisheries and aquaculture are also essential, as both a subsistence food source for rural communities and for commercial production.

The devastation caused by Nargis has impacted heavily on the availability of food stocks, as well as seeds and tools for the June-July (main) planting season. Overall, only 25 percent of villages along the affected areas reported having enough seeds. As observed on map 5, villages in the townships of Labutta, Bogale, Pyapon, Dedaye, Kyaiklat (marked in red) are among the worst affected and do not have enough seeds for the upcoming season. Food security and risk of acute malnourishment is, therefore, of high concern. The total damage and losses estimated for the agriculture sector range from K570,000 million to almost K700,000 million.

**Table 4: Estimates of Damage and Losses in the Agriculture Sector** (Kyats million)

|                   | Disaster Effects |                           |                           | Ownership by Sector |                           |
|-------------------|------------------|---------------------------|---------------------------|---------------------|---------------------------|
|                   | Damage           | Losses                    | Total                     | Public              | Private                   |
| Field Crops       | 65,336           | 159,929 to 283,000        | 225,265 to 348,336        |                     | 225,265 to 348,336        |
| Farm Equipment    | 24,046           |                           | 24,046                    |                     | 24,046                    |
| Plantations       | 22,043           | 65,209                    | 87,252                    |                     | 87,252                    |
| Livestock         | 45,190           | 30,775                    | 75,965                    |                     | 75,965                    |
| Capture Fisheries | 25,609           | 99,932                    | 125,541                   |                     | 125,541                   |
| Fish Farms        | 4,120            | 29,394                    | 33,514                    |                     | 33,514                    |
| <b>Total</b>      | <b>186,344</b>   | <b>385,239 to 508,310</b> | <b>571,583 to 694,654</b> | <b>0</b>            | <b>571,583 to 694,654</b> |

Source: PONJA team estimates.

<sup>2</sup> According to Government estimates, at least 50 percent of schools with roofs and minor damages have already been repaired.



**Crops and Plantations:** Damage was also reported to about 16,200 ha of the standing summer paddy crop, equivalent to 80,000 MT of production, and to paddy and milled rice in farmers' storage, estimated at 251,000 MT. Damage to farm equipment amounted to close to K 25 billion. About 34,000 hectares of plantation crops worth K 22 billion were damaged.

The cyclone's timing, just prior to the start of monsoon paddy planting season, will likely result in significant future production losses due to erosion and damage to paddy land, low viability of rice seed, loss of draught animals and farm equipment, farmers' inability to afford fertilizer purchases, and the reduced availability of labor due to home rebuilding requirements, out-migration of casual labor, and the large number of dead. Losses in crops could range from K 160 billion to about K 283 billion. Given the time required to re-establish tree crops to production (typically 3-5 years), the losses in terms of foregone production are significant, amounting this year to an estimated K65 billion. Losses due to foregone paddy production are estimated at between 40-70 percent of pre-Nargis levels, or between 0.8-1.5 million metric tons.

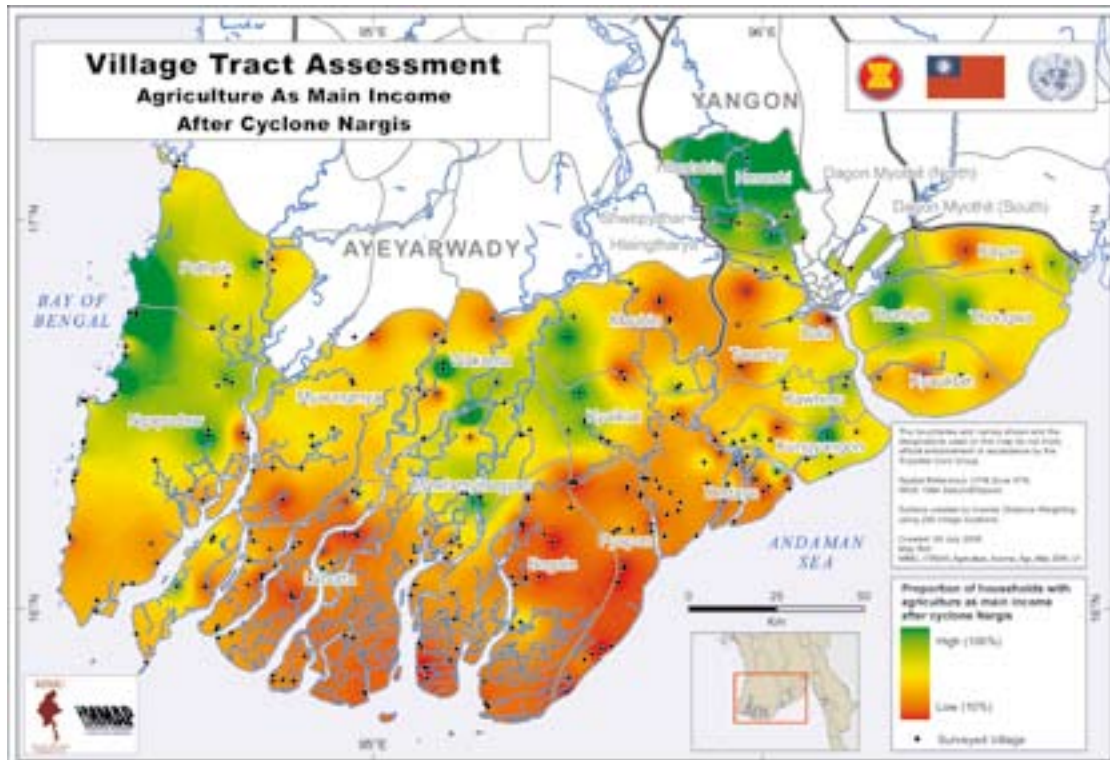
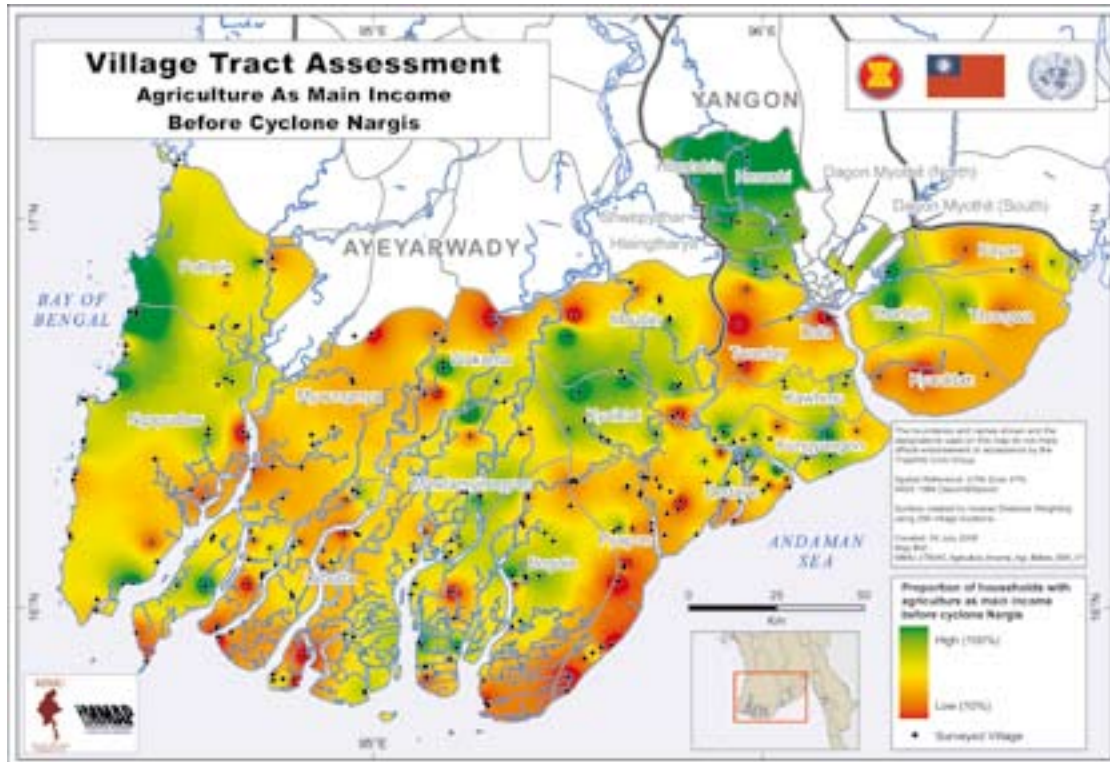
**Map 5: Seed stocks availability as reported in the VTA survey**



Source: VTA survey.

According to data collected by the VTA, before Nargis, 27 percent of all households in the affected areas reported agriculture as their main sources of income. Only 18 percent reported agriculture as their main source of income throughout the region after Nargis, but as observed in the maps 6 and 7 below, the townships of Twantay, Labutta and Maubin were the most severely affected.

Maps 6-7: Agriculture as main source of income before and after Cyclone Nargis



Source: VTA survey

**Livestock:** Approximately 50 percent of the buffaloes and 25 percent of the cattle died in the worst-affected townships. The high mortality of small livestock, including pigs, sheep, goats, chickens and ducks is affecting many small and marginal farmers and landless agricultural workers. Total damage and losses to livestock amount to about K 75 billion.

**Fisheries:** The impact on capture fisheries, both marine and inland, and aquaculture included damage to fisheries infrastructure such as ponds, hatcheries and jetties and damage to equipment



such as boats and nets. Post-harvest capabilities were also damaged, i.e. the loss of ice production plants and cold storage facilities, fish processing, marketing and transport infrastructure. Total estimated damage in fisheries is close to K 30 billion while total losses from foregone production are projected to be around K 130 billion.

### 2.3.2. INDUSTRY AND COMMERCE

Industry (manufacturing, mining and energy, and power) generated about 20 percent of the national GDP in 2007. It accounts for a third of Yangon Division's GDP, but only 7 percent of Ayeaywady Division's GDP.

The main components of the industrial sector in the two affected divisions are: salt farms, dried fish/shrimp and fish paste production, rice mills, factories located in industrial parks, other small and medium industrial enterprises, and micro-enterprises. The commerce sector includes: wholesale and retail markets, along with trading firms, many of which are micro-enterprises engaged in small-scale retail commerce.

Industry and commerce are two of the most affected sectors by Cyclone Nargis. Total damage and losses in industry account for almost K 2,000 billion, of which economic losses are K 1,484 billion and damages are slightly above K 500 billion. Nearly 45 percent of industry losses are attributable to the larger firms located in several industrial parks in Yangon division.

Total losses in commerce are estimated at around K 483 billion while damages amount to slightly more than K 37 billion.

Both industry and commerce include many micro-enterprises that typically represent easy entry, subsistence activities of poor households, including those headed by women. The salt production and fish processing industries in particular, concentrated in the Delta region, also suffered extensive losses of human life. Small-scale retail trading, often used by women and poor households to supplement incomes, will suffer from reduced earnings over several months. The socio-economic impact of damage and losses to industry and commerce is therefore wide ranging, with a severe impact on poor families.

**Table 5: Summary of Damage and Losses: Industry and Commerce (Kyats billion)**

|          | Damage | Losses | Total |
|----------|--------|--------|-------|
| Industry | 513    | 1,484  | 1,997 |
| Commerce | 37     | 483    | 521   |

Source: PONJA team estimates.

## 2.4. INFRASTRUCTURE

### 2.4.1. HOUSING

There are two types of housing in the Delta region: traditional houses and modern (solid) houses. Traditional houses are generally a combination of wooden and bamboo structures. Before the cyclone, it is estimated that about 50 percent of all housing units were built of wood and bamboo with wooden or bamboo floors on stilts. About 35 percent were all wooden and about 15 percent were brick or concrete. The construction technology most commonly in use is representative of traditional knowledge and skills.

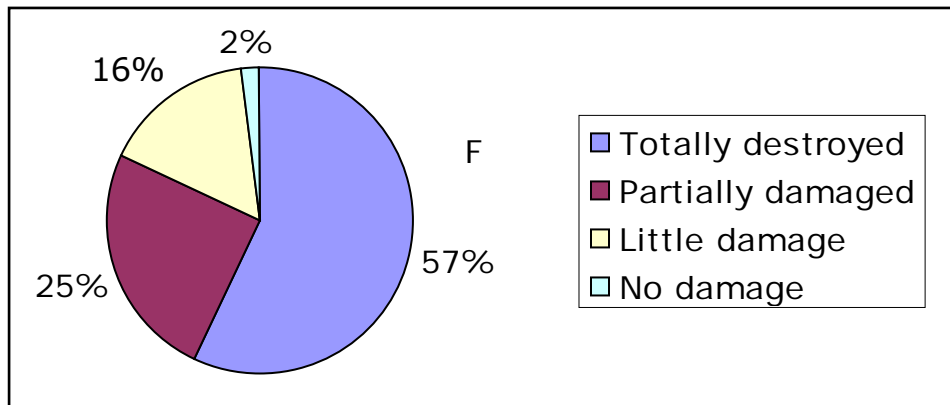
It is estimated that Nargis affected approximately 800,000 housing units: around 450,000 units are estimated to have been totally destroyed and around 350,000 units were more lightly damaged. The total damage and losses are estimated at around K 686 billion.

**Table 6: Damage and Losses in the Housing Sector (Kyats million)**

| Disaster Effects |        |         | Ownership by Sector |         |
|------------------|--------|---------|---------------------|---------|
| Damage           | Losses | Total   | Public              | Private |
| 660,000          | 26,000 | 686,000 | -                   | 686,000 |

Source: PoNJA team estimates.

The figure and map below (see map 8) show the proportion of households with severely or totally damaged houses. As expected, the geographical pattern of shelter destruction follows the path of the cyclone from West to North-East through the lower Delta region, up to Yangon.

**Figure 1: Shelter damage due to the cyclone in the most affected townships**

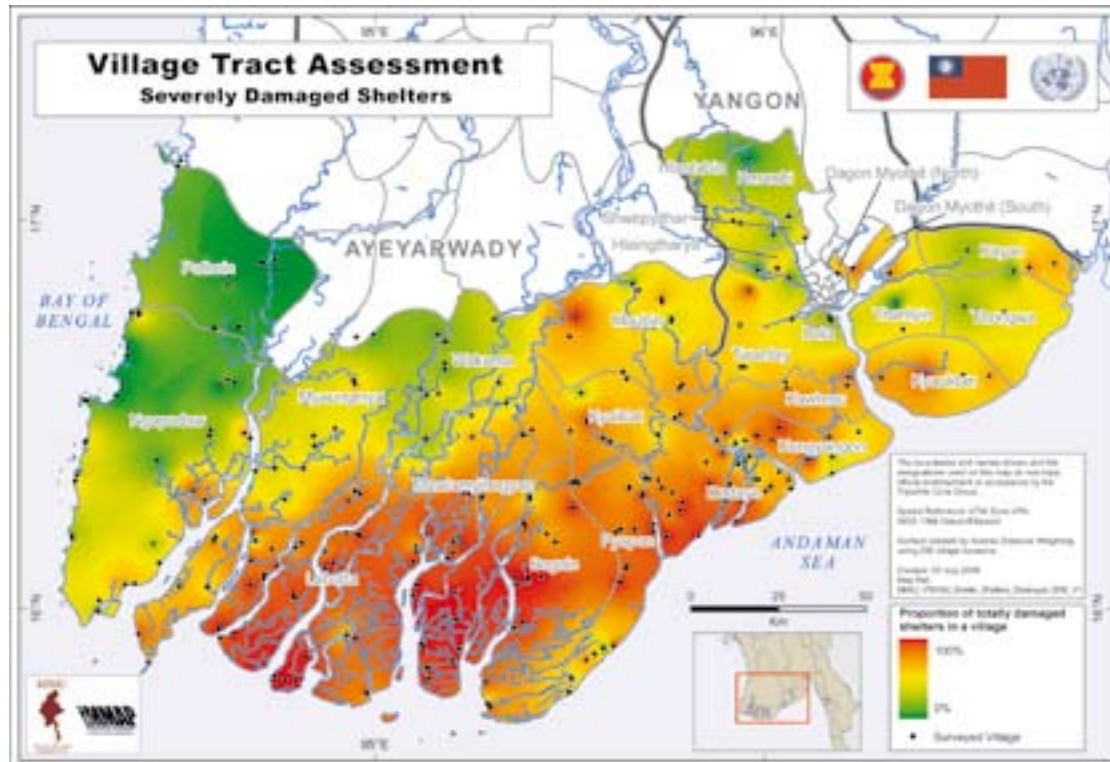
Source: VTA household survey

To address this need for shelter, tents, tarpaulins and non-food items have been provided to over 195,000 cyclone-affected households living in Ayeyarwady and Yangon Divisions, representing over 30 percent of families in need of shelter assistance.

People have made a tremendous collaborative effort and partially rebuilt an estimated 80 percent of houses already. Given the communities' meagre resources, there has been a significant shift to smaller bamboo houses; these are generally less stable and have a shorter life.

In the immediate aftermath of the cyclone, many people sought shelter with extended family, friends and neighbours, as well as in relief camps, creating a total displaced population of up to 800,000. Although many camps and settlements have been dismantled and people have started to return to their communities of origin, 14% of the affected villages had temporary settlements in mid June, with displaced persons bereft of their material assets and in need of support until their housing and income situations are stabilized.

Map 8: Proportion of houses totally damaged in the Delta



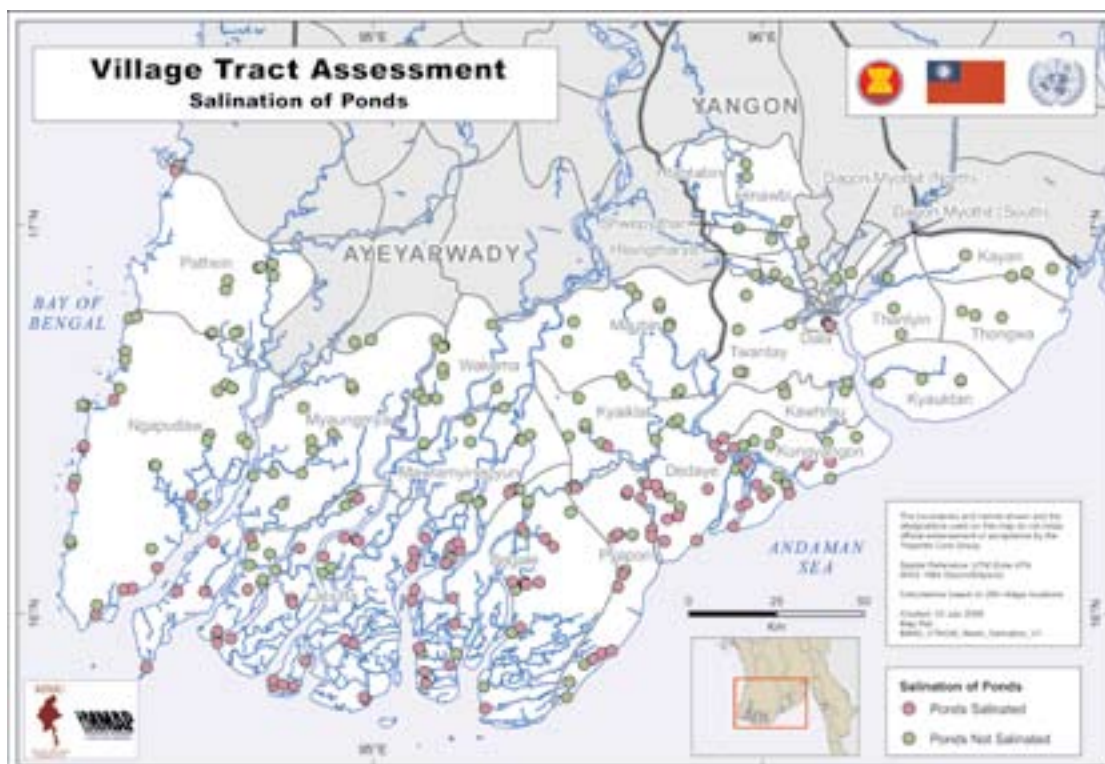
Source: VTA survey.

#### 2.4.2. WATER SUPPLY AND SANITATION

Prior to the cyclone, water supply for rural communities in the affected areas consisted primarily of household-level rain water harvesting tanks, communal rain water ponds, open wells, tube wells, and rivers. Most households had a roof-rainwater harvesting system that collected rainwater through a gutter into large earthen pots as the main source of water during the rainy season, while in the dry season communal ponds that collected rainwater served as the primary source of water, with most communities having at least one or two ponds. Only a small percentage of communities were connected to piped water supply networks.

Ponds and household rainwater harvesting systems were most impacted by the disaster. The cyclone, and the flooding that followed, damaged close to 13 percent of ponds in Yangon and up to 43 percent of ponds in Ayeyarwady Division. The map 9 shows the extent of the salination of pond water throughout the Delta.

Map 9: Pond salinated following the cyclone



Source: VTA survey.

This salination led many households to shift water sources from ponds to rain water tanks.

**Table 7: Sources of water before and after cyclone in Yangon and Ayeyarwady Divisions**

| Water source    | Yangon Division |       | Ayeyarwady Division |       |
|-----------------|-----------------|-------|---------------------|-------|
|                 | Before          | After | Before              | After |
| Hand pump       | 23%             | 21%   | 2%                  | 2%    |
| Tube well       | 14%             | 15%   | 4%                  | 4%    |
| Pond            | 48%             | 40%   | 42%                 | 24%   |
| Rain water tank | 25%             | 30%   | 16%                 | 30%   |
| Water truck     | 6%              | 5%    | 1%                  | 2%    |
| River           | 2%              | 2%    | 21%                 | 19%   |
| Open dug well   | 8%              | 8%    | 21%                 | 19%   |
| Other           | 6%              | 0%    | 8%                  | 0%    |

Source: VTA household survey

Sixty-three percent of people surveyed consider their current access to clean water to be inadequate, with approximately 1.8 million severely affected people in need of improved water supply. To reduce the risk of water-borne diseases among affected populations, relief interventions are focusing on the provision of an adequate supply of safe water, and on supporting hygiene and sanitation measures. Initial recovery activities will help families to reacquire earthen pots with which to harvest rainwater, the dominant source of clean drinking water.

The damage and losses in the water sector resulting from Cyclone Nargis are estimated at around K 8.5 billion.

**Table 8: Damage and Loss Estimates in the Water Supply Sector**

(Kyats million)

|                   | Total |
|-------------------|-------|
| Damage            | 8,136 |
| Losses            | 380   |
| Damage and Losses | 8,516 |

Source: PONJA Team Estimates

Sanitary facilities, including both pit and open or floating latrines, existed in most communities in both Yangon and Ayeyarwady Divisions. Most latrines that existed prior to the cyclone have collapsed or are now unsafe for use due to flooding. Open defecation has increased, and unsafe excreta disposal with direct drop latrines, without pits, is common. The proportion of households practicing unsanitary defecation – open defecation, floating latrines or trenches – almost doubled to 40 percent.

The proportion of households practicing unsanitary defecation, which includes open defecation, the use of floating latrines as well as trenches. The shift to unsanitary defecation practices is strong in the lower Delta area. In particular, the combination of households using river water as a source for drinking water and the rise in the use of floating latrines poses stark health risks in this area.

### 2.4.3. RELIGIOUS INFRASTRUCTURE

The Delta, like the rest of Myanmar, is home to a large number of monasteries, pagodas, churches, and mosques. These buildings play an important part in the life of the communities. The religious community has been at the forefront of efforts to bring assistance to cyclone survivors during May and June and has provided aid to all faiths on an equitable basis. The damage to religious buildings amounts to around K 150 billion. Most of these damages occurred in Ayeyarwady Division.

### 2.4.4. TRANSPORT AND COMMUNICATIONS

The transport and communications sectors include road, rail, water and air transport, and post and telecommunications.

The total damage is estimated to be above K 120 billion and the total losses at close to K 65 billion. It should be noted that the public sector prices in the transport and communications sector are generally low or subsidized in Myanmar. As these sectors are dominated by the public sector, the damage and loss estimates may be lower than the actual resource costs.

**Table 9: Damage and Losses in Transport and Communications (Kyats million)**

| Sector                       | Disaster Effects |               |                | Ownership by Sector |               |
|------------------------------|------------------|---------------|----------------|---------------------|---------------|
|                              | Damage           | Losses        | Total          | Public              | Private       |
| Road Transport               | 12,609           | 28,033        | 40,642         | 18,216              | 22,426        |
| Water Transport              | 99,929           | 30,887        | 130,815        | 76,186              | 54,629        |
| Rail Transport               | 2,357            | 140           | 2,497          | 2,497               | 0             |
| Air Transport                |                  | 23            | 23             | 23                  | 0             |
| Post and Tele-communications | 7,073            | 3,621         | 10,694         | 10,694              | -             |
| <b>Total</b>                 | <b>121,968</b>   | <b>62,703</b> | <b>184,671</b> | <b>107,616</b>      | <b>77,056</b> |

Source: PONJA Team estimates

**Road Transport:** Cyclone Nargis caused damage to some lower standard secondary roads and bridges, as well as trails and bamboo foot bridges that were close to the coastline. The flooding,



fallen trees and fallen telephone/electric power posts also caused some minor damage to other roads. Damage to roads and bridges in Yangon was minimal. Subsequent to Cyclone Nargis, the high traffic volumes and heavy loads of trucks bringing relief goods and supplies to the Delta have caused some damage to the main road network and some minor damage to bridges. In total, approximately 15 percent of the network length suffered damages. These damages are estimated at about K 13 billion.

Losses regarding primary and secondary road networks are mainly incurred in the form of higher vehicle operating costs and longer freight and passenger travel time associated with the worsened road conditions. Losses in tertiary roads and bridges are considered minimal, as either transport volumes are so low that the amounts are effectively negligible or are handled by inland water transport services which have partially resumed. The losses are estimated to be close to K 30 billion.

**Water Transport:** Almost all townships and sub-townships in the Delta rely heavily on inland water transport for freight and passenger transport. Inland water transport infrastructure in the Delta townships is rudimentary, basically consisting of wooden jetties and occasionally floating pontoons.

Cyclone Nargis has caused substantial damage to the jetties, vessels and boats, and relevant buildings. Many jetties and pontoons sank, broke, or collapsed. A large number of vessels and boats sank, capsized, were blown/washed to shore, or lost at sea. Yangon ports suffered the heaviest damage in terms of asset value. The total damages are estimated at K 100 billion.

Substantial revenue losses have been incurred due to service interruption, and further losses are expected due to lower level of services caused by a shortage of vessels and boats. In the Delta region, the publicly provided inland water transport services were resumed just a few days after the cyclone, but the service supply has fallen short of demand due to the heavy losses of vessels and boats. Moreover, the private sector freight tariffs and passenger fares have increased. This situation will continue for an extended period of time, as a year of time would normally be required to build a medium- to large-sized vessel and at least two-months time for a small boat. The total losses are estimated to be slightly more than K 30 billion.

**Post and Telecommunications:** Cyclone Nargis caused major damages to the post offices, fixed-line telephone systems and a few microwave towers. Fortunately, the mobile phone systems were largely unaffected. The total damages are estimated at about K 7 billion. Service to most towns was restored within one to three weeks. Reconstruction of the telecommunications network is already underway for all Nargis-affected townships and should be completed within a few months.

**Rail and Air Transport:** The rail and air transport facilities are mainly located in Yangon City, and much of the railway network is beyond the areas affected by the cyclone. Except for some damages to buildings, both rail and air transport infrastructure largely managed to weather the storm. A few days interruption caused moderate revenue losses.

#### **2.4.5. ELECTRICITY**

Although more than four million people were directly affected by lack of electricity after Cyclone Nargis, the effect of the cyclone on the electricity sector was modest from a national perspective. Total damage and losses in the sector amounted to slightly more than K 15 billion. Most of the distribution and transmission system had been reconstructed by 30 June but, in places, to a standard below generally accepted technical specifications.

#### **2.4.6. PUBLIC INFRASTRUCTURE**

The physical damages to the infrastructure of the 'combined offices' (su paung yone) of the Ministry of General Administration, where several government departments often have their offices within common premises, together with the General Administration Department Office amount to close to K 70 billion.

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## 2.5. CROSS-CUTTING ISSUES

### 2.5.1. COASTAL ZONE MANAGEMENT AND ENVIRONMENT

The Ayeyarwady and Yangon Divisions of the Ayeyarwady Delta are among the most exposed areas along Myanmar's southwest coast. These low-lying areas, interspersed with many tidal waterways, are naturally exposed to storms and monsoon winds blowing from the southwest. However, their vulnerability to natural hazards had been significantly enhanced by losses of natural forest cover and coastal vegetation that have accompanied transformation of the land for paddy cultivation.

The damage assessment for the environment is conservatively estimated only on the basis of replacing the damage to existing mangrove forests, both natural forests and plantations, and the loss is based on the loss of environmental services in the natural forests. Some 17,000 ha of natural forest and 21,000 ha of forest plantations were damaged, with an estimated cost around K 14 billion. Loss of environmental services of the natural mangrove forests is estimated at about K 46 billion.

The loss of mangrove forests and associated ecosystem goods and services will have a significant impact on those segments of the rural population that are heavily or partially dependent on forestry for their livelihood. Besides cash employment from the forestry sector, villagers obtain lots of construction material and food (fish especially) from the mangrove forests. This loss, which usually does not enter the cash economy, can be substantial for many forest-dependent people.

Despite the use of salvage materials in rebuilding activities, the recovery activities will increase the demand for materials, including wood for the rebuilding of houses, boats, and jetties. The environmental assessment recommended by the PONJA should include the development of detailed recommendations to ensure that these recovery activities are environmentally sustainable.

## 2.6. SUMMARY OF DAMAGE AND LOSSES

### TOTAL EFFECTS OF THE DISASTER

In addition to the tragic loss of life, the total amount of damage and losses caused by Cyclone Nargis in the affected areas of Myanmar is estimated at about K 4,500 billion (USD 4,057 million)<sup>3</sup> (See Table 10). The value of damages, which is an expression of the destruction of physical assets by the disaster, amounts to almost K 2,000 billion (or 43 percent of the total effects of the disaster). Losses, on the other hand, which reflect the reduction in economic activity after the cyclone, amount to about K 2,500 billion (57 percent of the total).

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<sup>3</sup> The aggregation of damage and losses presented here differs slightly from the arithmetic summation of damage and losses described for each and all sectors of the economy taken separately, since special care has been taken here to avoid double accounting and also to include disaster effects in the food-production chain that cross several sectors of the economy. An exchange rate of 1,100 Kyat per US Dollar has been used throughout.

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Table 10: Overall Summary of Damage and Losses

| Sector                      | Sub sector                        | Damage       | Losses                | Total                 |                       |
|-----------------------------|-----------------------------------|--------------|-----------------------|-----------------------|-----------------------|
|                             |                                   |              |                       | Kyats billion         | USD million           |
| <b>Infrastructure</b>       |                                   | <b>831.5</b> | <b>89.3</b>           | <b>920.8</b>          | <b>837.1</b>          |
|                             | Housing                           | 686          | 25.9                  | 711.9                 | 647.2                 |
|                             | Transport and Communications      | 122          | 62.7                  | 184.7                 | 167.9                 |
|                             | Water Supply                      | 8.1          | 0.4                   | 8.5                   | 7.7                   |
|                             | Electricity                       | 15.4         | 0.3                   | 15.7                  | 14.3                  |
| <b>Social Sectors</b>       |                                   | <b>128</b>   | <b>7.2</b>            | <b>135.2</b>          | <b>122.9</b>          |
|                             | Education                         | 115.3        | 1                     | 116.3                 | 105.7                 |
|                             | Health                            | 12.7         | 6.2                   | 18.9                  | 17.2                  |
| <b>Productive Sectors</b>   |                                   | <b>736</b>   | <b>2,352 to 2,475</b> | <b>3,088 to 3,211</b> | <b>2,806 to 2,918</b> |
|                             | Agriculture, Livestock, Fisheries | 186.3        | 385 to 508            | 571 to 694            | 519 to 630            |
|                             | Industry                          | 512.5        | 1,483.50              | 1,996.00              | 1,814.5               |
|                             | Commerce                          | 37.2         | 483.4                 | 520.6                 | 473.3                 |
| <b>Cross-Cutting Issues</b> |                                   | <b>234.2</b> | <b>46.1</b>           | <b>280.3</b>          | <b>254.8</b>          |
|                             | Environment 1/                    | 16.8         | 46.1                  | 62.9                  | 57.2                  |
|                             | Public Buildings 2/               | 217.4        | 0                     | 217.4                 | 197.6                 |
| <b>Total</b>                | In Kyats billion                  | <b>1,930</b> | <b>2,495 to 2,618</b> | <b>4,424 to 4,547</b> |                       |
|                             | In USD million                    | <b>1,754</b> | <b>2,268 to 2,380</b> |                       | <b>4,022 to 4,134</b> |

1/ Includes damage to embankments (estimated at K 2.8 billion).

2/ Includes damage to administrative buildings as well as religious buildings.

Source: Estimates by PONJA Team (using secondary data as of June 27, 2008)

Most of the losses that have been estimated will occur in the present calendar year. Some production losses will occur in subsequent years – for example, in permanent plantations that will take more than one year to recover, together with corresponding processing and marketing losses.

It is to be noted that the value of damage and losses is equivalent to 21 percent of the country's gross domestic product in the previous fiscal year, providing an additional illustration of the magnitude of the disaster. Worse still, the equivalent magnitudes for the Ayeyarwady and Yangon Divisions are 74 and 57 percent of their respective gross domestic product, figures that are high in themselves, and that are comparable to the magnitude of the 2004 tsunami in different areas of the affected countries.<sup>4</sup>

<sup>4</sup> As a comparison, magnitudes of the 2004 tsunami were as follows: Aceh, 80 percent of GDP; Maldives Islands, 84 percent; Phang Nga, Krabi and Phuket provinces in Thailand, 90, 69 and 68 percent, respectively.

## Section III: Economic and Social Impact







## SECTION 3: THE ECONOMIC AND SOCIAL IMPACT

### 3.1. MACRO-ECONOMIC IMPACT

#### 3.1.1. THE ECONOMY PRE-NARGIS

Myanmar's economy since 2002 has been characterized by modest growth and relatively high inflation. Official statistics estimate double-digit growth rates since 2000. These statistics, however, are constrained by weaknesses in the underlying data in terms, for example, of completeness and timeliness. Other estimates from publicly available independent sources show growth rates to be 3.9 percent and 3.3 percent in 2006 and 2007 respectively, with comparable projections for the near future.

Myanmar's estimated GDP per capita is USD 234 and population is 51.5 million (in 2007)<sup>1</sup>. In FY07 the agriculture sector accounted for 43.7 percent of GDP, with industry (including mining) comprising 19.8 percent, and services 36.5 percent of the economy. GDP growth in the past two years has been driven primarily by high exports, particularly natural gas, good agricultural performance, and high capital expenditures. Total export growth in 2007 was 37 percent, with a trade balance estimated at USD 3.3 billion. Record prices for energy exports have led to a steady strengthening of the external balance, and official reserves have grown rapidly. The strong external balance has resulted in a relatively stable parallel market exchange rate for the Kyat in the past 2 years in the range of K 1,100-1,300 per US dollar despite high inflation and monetary growth. The official exchange rate averaged K6.08 per US dollar in 2007.

#### Box 2: EXCHANGE RATE

Myanmar has a multiple exchange-rate system. The official exchange rate applies to the transactions undertaken by the government and state-owned enterprises and is used primarily for accounting purposes. Foreign Exchange Certificates (FECs) are also issued by the government, exchangeable at a market-determined rate. A large parallel market also exists that exchanges US dollars with Kyats at a small premium over the rate for FECs. This report utilizes the exchange rate used by the Government of Myanmar in its presentation of damages immediately following Cyclone Nargis at the ASEAN-UN International Pledging Conference in Yangon on 25 May 2008 (K 1,100/USD), which was consistent with the prevailing rate on the parallel market at the time of the assessment.\*

Tax revenues as a percentage of GDP have been rising since reforms undertaken starting in 2003, but continuing high expenditures have offset the revenue gains, driven primarily by large increases in civil servants' salaries in 2006 and ongoing large capital expenditures. The fiscal deficit has remained between 3 and 4 percent of GDP for most of the last decade. Fiscal deficits have been largely financed through borrowing from the Central Bank, putting upward pressure on prices. Resurgent and high inflation remains a source of concern. Inflation rates have been in double digits, at 26 percent and 34 percent, respectively, in 2006 and 2007.

#### 3.1.2. IMPACT OF NARGIS

Overall, Cyclone Nargis is expected to have a modest impact on GDP, resulting in lower growth in fiscal year 2008-09. The aggregate estimated loss in value added in the current fiscal year (FY08) from the cyclone amounts to approximately K 850 billion or USD780 million. The economic losses are estimated to be about 2.7 percent of the officially projected national GDP in 2008.<sup>2</sup>

<sup>1</sup> UNFPA, State of the World Population Report, 2007.

\* FEC and USD rates are fluctuating at present and should be kept under close review during the initial stages of the relief and recovery program: the upcoming Article IV consultations would be a good opportunity for review.

<sup>2</sup> The impact on GDP would not alter dramatically if independent estimates of GDP growth were used, increasing to 3.1% of GDP.

Table 11: Impact on GDP

|                         | Nominal GDP<br>2008 Kyat<br>billion | Gross Losses | Value Added<br>Coefficients | Value Added<br>Losses | Impact on<br>Sector/ Total<br>GDP |
|-------------------------|-------------------------------------|--------------|-----------------------------|-----------------------|-----------------------------------|
| Agriculture             | 10,632                              | 225          | 0.8                         | 185                   | 1.7%                              |
| Livestock and Fisheries | 2,330                               | 160          | 0.6                         | 98                    | 4.2%                              |
| Industry                | 5,130                               | 1,362        | 0.2                         | 239                   | 4.6%                              |
| Commerce                | 6,708                               | 461          | 0.7                         | 334                   | 5.0%                              |
| <b>Total GDP</b>        | <b>31,672</b>                       |              |                             | <b>857</b>            | <b>2.7%</b>                       |

Source: MOPED; PONJA team estimates.

The relatively high economic losses from Cyclone Nargis stem from the disaster's impact on assets, industrial production and commerce in the largest city in the country (Yangon) as well as a main agriculture producing region (Ayeyarwady Delta). Economic losses, concentrated in the Yangon and Ayeyarwady Divisions, are estimated to be around 11 percent of the region's economy. Within the productive sectors, rice crops in agriculture, small, informal retail sectors in commerce and larger firms in the industrial parks in Yangon suffered relatively larger losses in value added terms.

The impact on the external balance is expected to be modest, with a small decrease in the current account surplus.

A significant impact is expected to be on the government's finances and the budget deficit, given that the primary means of financing the budget deficit has been money creation. The government deficit is expected to increase due to expenditures related to the relief and recovery initiatives and increased capital expenditures towards reconstruction. Upcoming Article IV consultations with the International Monetary Fund would provide a mechanism to review the fiscal impact of the cyclone.

### 3.2. IMPACT ON LIVELIHOODS AND INCOMES

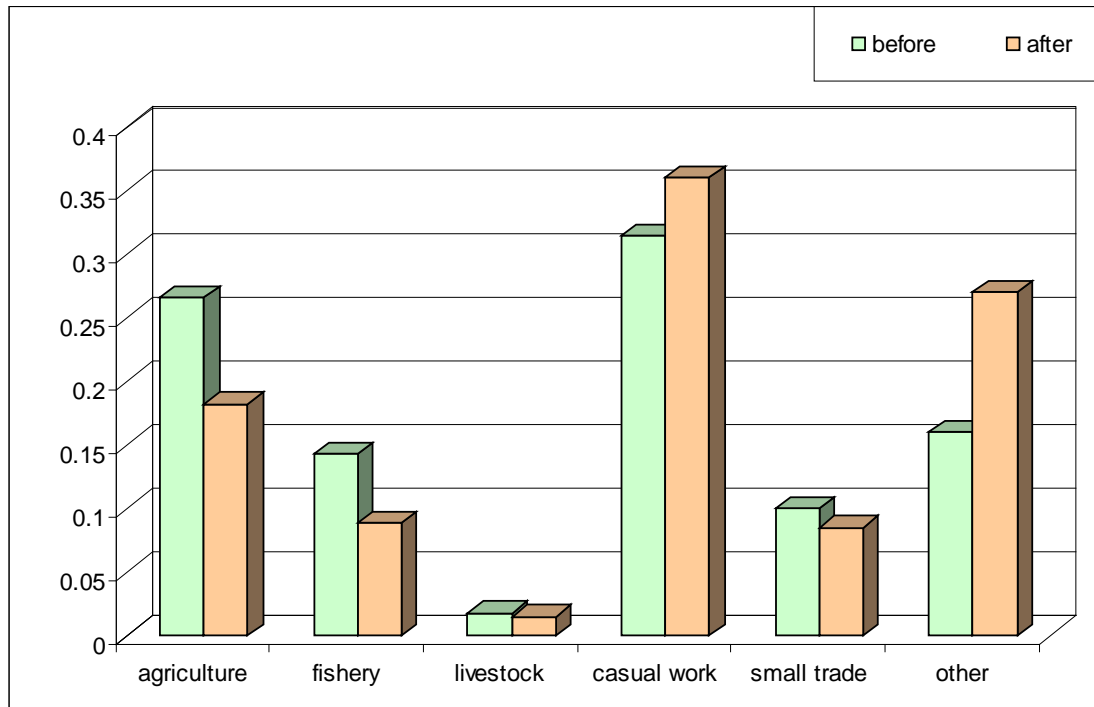
Cyclone Nargis caused extensive damage and loss of livelihoods, employment and income of the people living in the affected areas of the coastal zone, the agriculturally productive zone, and the urban and peri-urban area.

The meager asset base that poor people living in these zones depend upon for their livelihoods was severely damaged by the cyclone. Small holder farmers, communities dependent on small-scale inshore and offshore fishing, landless poor dependent on wage-labour in agriculture, and skilled workers previously employed in a wide-range of resource-based small and medium scale manufacturing and processing have lost income earning opportunities for a substantial period. These vulnerable groups will require urgent assistance in their struggle to revive their livelihood activities, while in the immediate term they will continue to need humanitarian and relief support.

Beyond the support to meet basic needs in the short term, early recovery activities will focus on helping people restore livelihoods, including through the provision of farming and fishing implements, as well as the provision of funds to self-reliance and livelihood groups. These programmes will pay special attention to single-headed households, those living with HIV, and the disabled, including through the promotion of employment opportunities.

The figure below illustrates the shift in occupation before and after Cyclone Nargis.

Figure 2: Changes in sources of income before and after cyclone in the Delta



Source: VTA survey.

Overall, about 200 million working days of labour are likely to be lost, resulting in a loss of earnings of around K665 billion. Job losses are largely in the informal sector such as seasonal jobs in agriculture, short-term jobs in community works, small-scale fishing, rice mills, fish processing, salt production, wood cutting, and other resource based economic activities. If the local economies do not fully recover in the next 12 months, it is likely that a large number of job seekers will be at risk of extreme poverty. Estimates of income losses in key sectors are summarized below.

**Agriculture.** The cyclone damage caused a total loss of 76 million working days for a total loss of earnings of K415 billion. Loss of earnings in agriculture includes forward projections for future yield losses. Ayeyarwady Division is worst affected, with job losses in Dedaye in the order of 7.5 million working days, Pyapon 19 million days, and Labutta 17 million days. In Yangon Division, Kyauktan sustained the worst loss in the order of 7.5 million working days.

**Fisheries.** The loss in employment is estimated at 10 million working days for an estimated income loss of K26 million in earnings. Sea and in-land fisher folk were affected by the loss of boats (canoes), fishing gear and other fishing equipment causing them to suspend their activities until they will be able to recover their assets. Fisheries workers have also lost their jobs due to the destruction or damage to large off-shore and in-shore boats and vessels which will disrupt fishery activities for up to one year.

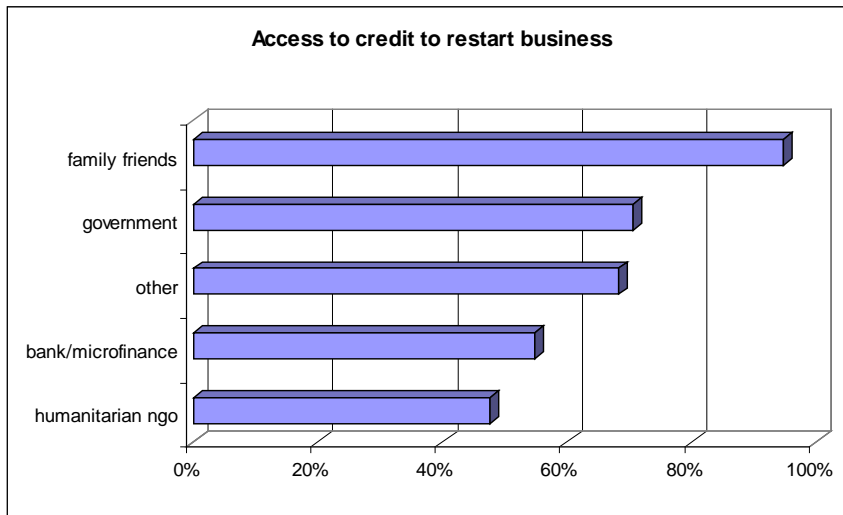
**Industry.** An estimated 23 million working days have been lost resulting in an income loss of K45 billion. Almost 5,630 establishments sustained partial or complete destruction to business premises, equipment and machinery, and inventories. Many of these enterprises had to suspend operations and will have to operate substantially below capacity for two to five months. A large number of informal enterprises and small and medium enterprises (SMEs) have also been damaged and unaccounted for in different sectors such as metal works, boat building, wood processing, furniture making, brick making, etc. An estimated 24,360 acres of salt farms have been damaged in the Delta. Assets of a large number of informal micro-enterprises and SMEs have also sustained total or partial damage, but the damage and loss is not yet accounted for.

**Commerce.** In this sector, micro-enterprises – representing almost the totality of the commercial establishments – have been most affected with a loss of 88 million working days. The total income loss is estimated at more than K175 billion. An estimated 20,000 establishments, mostly trading shops, have been completely or partially damaged. The cyclone inflicted destruction to livelihood

assets (equipment, tools and inventories) and income of the self-employed in micro-small trading, handicraft, water transport service and a wide range of trade skill services. These micro and small businesses had to sustain an interruption or reduction in their activities for one to two weeks, and are likely to operate at a substantially lower capacity for up to four to six months depending on their access to financial support or credit in the immediate term.

Only 27 percent of households in the affected areas reported to have access to small grants or credits to restart businesses according to VTA data. Of those who actually have access to such forms of financing, 95 percent obtain them from family and friends (see figure 3 below).

**Figure 3: Main sources of credit financing as reported by households in the Delta**



Source: VTA survey.

### 3.3. SOCIAL IMPACT

Analyzing how Cyclone Nargis has affected local patterns of life, social structures and institutions, and vulnerable groups is important in order to understand its impacts and to develop plans for effectively delivering post-disaster assistance.

Field visits during the PONJA observed a high level of unity and social cohesion among survivors, who have no doubt been brought together by their common efforts to survive and rebuild.

Though no visible tensions between ethnic and religious groups have so far arisen, inter-group relations could potentially worsen due to possible inequities in aid provision, depending on the nature of the relief and recovery effort. Conversely, there is the potential for the post-cyclone response to improve relationships between religious and ethnic groups. Religious leaders, who provided early aid, have emphasized the non-sectarian nature of their assistance. This outpouring of assistance from all faiths to all faiths may be a unifying force.

There is a risk of a redistribution of land away from small-scale farmers to those with larger holdings. Renewal of land user rights is contingent on productive use of land in the past year. This, along with a desperate need to ensure food security, appears to be a central reason why farmers were disproportionately likely to return to their villages soon after the cyclone, even to the most affected areas close to the coast. The loss of documentation recording land use history is problematic in this regard.

There is a risk that loan-based responses further indebted affected villagers, increasing poverty in the medium to long run. Besides providing relief, the government response has focused on asset replacement, with implements and seeds being provided in the form of loans. Such a strategy works against aid dependency. At the same time, it assumes a relatively smooth return to land cultivation, which is not likely to occur evenly across the Delta. The policy of provision of loans rather than grants may, therefore, lock community members into a cycle of poverty and debt that could be hard to break.

The recovery effort, if it is sizeable, will constitute another great shock on the social fabric of life in the Delta. Villages in affected regions received relatively little aid from outside prior to the cyclone. Interaction with the state and civil bodies at higher levels was limited. With some exceptions, local cultures and practices changed relatively slowly in response to outside influences and pressures. The response to the cyclone has the potential to change life in Delta villages for the better. Yet it also has the potential to result in negative consequences. This indicates the need to build in measures to address low absorptive capacity, in particular through community capacity building, as well as progress monitoring mechanisms.

Many of the critical areas identified, which require attention if recovery is to be sustainable, cannot be addressed through projects alone; policy decisions, including reforms, will be necessary. Key issues where policy attention is needed include land use and resettlement. Good practice from ASEAN Member States and elsewhere in addressing these issues include: (i) ensuring that an open consultative process is in place to establish the wishes of affected families and communities with regard to return and resettlement, providing families with appropriate assistance depending on their aspirations; (ii) ensuring that due process is established to protect the access of survivors to their families' land and to settle any land claim issues; (iii) minimizing changes to settlement and land use patterns, in particular avoiding transfer of land away from smaller farmers, which would tend to be regressive in impact.

### **3.3.1. VULNERABLE GROUPS**

Catastrophic events such as Cyclone Nargis can intensify the vulnerability of already marginalized members of the community, who are in normal times less likely to have access to services or control resources. These vulnerable groups are least likely to have the physical capabilities, social power or economic resources to anticipate, survive and recover from the effects of the disaster, or access services for recovery. As such, they depend on recovery programs that offer protection and address their needs.

#### **CAUSAL FACTORS**

Multiple factors may contribute to changes in social hierarchy, power dynamics, and social vulnerabilities of communities in post-disaster situations. These include disruption of family and traditional networks, changes in the demographic composition of affected communities, and pre-existing social marginalization. Three principal factors pose particular challenges for vulnerable groups in the aftermath of the cyclone: firstly, a loss of documentation of essential papers that can make it difficult for people to receive necessary assistance and restart their livelihoods; secondly, an inflow of predominantly male migrant workers that exacerbates a gender imbalance caused by the cyclone and increases vulnerabilities for women; and thirdly, a potential push into high-risk occupations in search of income.

#### **VULNERABLE GROUPS**

Women face special vulnerabilities in the aftermath of the cyclone, as discussed in the next section. Other vulnerable groups include children, who are at greater risk of abuse, violence, exploitation and neglect and may face difficulties continuing their education as families struggle to rebuild livelihood; the landless, who are economically vulnerable; and the elderly or chronically sick or disabled, who may be less able to rebuild livelihoods on their own and may be dependent on support from families or the community.

To address the needs of vulnerable groups, assistance programmes should involve community members in decision-making throughout the project cycle, with a focus on vulnerable groups. At the same time, a complementary system could be reinforced, with skilled social workers, community child protection and development workers, as well as functioning referral mechanisms.

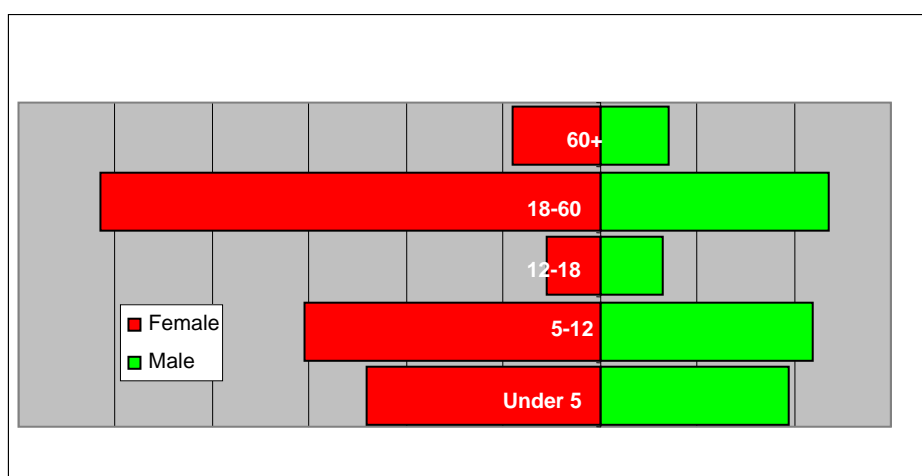


### 3.3.2. GENDER

According to the assessment data, the majority of the cyclone's victims are female: 61 percent of those dead are female, with the number much higher in some villages. The disproportionate number of female victims is especially evident in the key productive and reproductive age group of 18-60.

This demographic change will have significant impacts on the roles of, and relationships between, different genders, and may cause social reverberations, including a spate of remarriage, or early marriage. There may be a need for men to go to other villages or towns to find a wife, which could increase out-migration from severely affected areas or lead to more inter-village marriages.

**Figure 4: Indicative Age-Sex Pyramid of the Deaths in 10 Selected Severely Affected Villages**



Source: VTA survey.

The economic effects of the cyclone may cause younger unmarried women to leave the village to find work, especially as the labor of women in the Delta tended to be labor-based, compared to that of men, which tended to be land-based. Inexperienced in urban life, these young women are vulnerable to exploitation, forced labor, forced prostitution and trafficking.

An influx of migrant populations increases vulnerabilities for women in the Delta. Data shows that while there is a balance between migration into and out of the Delta, the incoming migrant population is four times more likely to be male than female. This will further exacerbate the gender imbalance resulting from uneven mortality in some areas and increase the potential for exploitation and abuse, including gender-based violence. Careful monitoring and provision of advocacy and protection services for women and children will be important.

These vulnerabilities highlight the need for relief and recovery strategies to incorporate an understanding of the social realities and impact of the cyclone, including the needs, experiences, and contributions of each gender to foster an environment promoting nondiscriminatory humanitarian assistance, through comprehensive and representative consultation with the affected population.

## Section IV: The Way Forward – Humanitarian and Recovery Strategy





## SECTION 4. THE WAY FORWARD – HUMANITARIAN AND RECOVERY STRATEGY

As the sections above have described, Cyclone Nargis caused immense human suffering and exacted a severe social and economic toll on the affected families and communities. Immediate assistance to complete urgent relief activities and the initiation of an early recovery programme that transitions into the medium and longer term, aimed at restoring livelihoods, assets of the poor and essential services is critical to relieve the suffering of communities and families of the Delta, many of whom have been struggling to rebuild on their own.

Humanitarian planning is more advanced than recovery planning, and the revised humanitarian appeal lays out a set of relief and early recovery priorities which aim to: (i) Address the basic humanitarian needs of the cyclone-affected population; and (ii) Early recovery to begin rebuilding the live and livelihoods of the cyclone-affected population. These will transition into medium and longer-term recovery activities, which will require further work at a sectoral level following the joint assessment (as recommended during the ASEAN roundtable on regional experiences in post-disaster assistance).

However, the PONJA has enabled a preliminary identification of some of the principal remaining recovery issues, aimed at: (i) Completing programs to restore basic needs and livelihoods; (ii) Ensuring continued protection of the most vulnerable households who lack sustainable livelihoods or who cannot or do not wish to return to their land; (iii) Restoring essential infrastructure, such as housing, schools, clinics, and religious buildings and increasing disaster preparedness.<sup>1</sup>

### 4.1. GUIDING PRINCIPLES

A set of guiding principles should govern the implementation of activities designed to address relief, early recovery and medium and longer-term recovery. The purpose of such an agreed set of principles is to enhance the effectiveness of humanitarian and recovery efforts, increase transparency and accountability of different actors, and promote understanding between stakeholders. The principles outlined below build on lessons learned from the immediate humanitarian response to Cyclone Nargis, as well as from medium and longer-term recovery processes in other disaster-hit countries.

#### ***EFFECTIVENESS, TRANSPARENCY AND ACCOUNTABILITY:***

- Sustained access to all affected populations, including access for assessment and monitoring.
- Aid is given regardless of the gender, race, creed or nationality of recipients and without adverse distinction of any kind. Aid priorities are calculated on the basis of need alone.
- Commitment to coordinated and coherent approaches, through transparent information sharing to avoid overlap and fill gaps.
- Establish common standards and approaches, with an independent complaint-handling mechanism to ensure accountability.
- Institute a comprehensive system for tracking the flow of aid and its utilization, with regular public reports.
- Assistance provided to the cyclone-affected population should not come at the expense of others in need in Myanmar – aid should be in addition to current assistance to Myanmar, rather than redirected from other parts of the country.

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<sup>1</sup> Disaster recovery aims at recovery rather than longer-term development outcomes. Hence the identification of recovery needs and estimation of costs in this section address only the infrastructure necessary to ensure recovery or provide increased resilience to disasters, and does not include an expansion or upgrading of infrastructure or economic development.

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***INDEPENDENCE, SELF-SUFFICIENCY AND CAPACITY-BUILDING:***

- Involve communities at all stages in the management of relief, including decision-making and feedback on quality of the relief and recovery efforts.
- Maximize use of local initiative, resources and capacities. Base planning and execution on local knowledge, skills, materials and methods, taking into account the need for affordable solutions.
- Build the capacity of local communities at every stage of the relief and recovery effort with a focus on reducing vulnerability to future disasters.
- Recognition of limited absorptive capacity in affected areas for large scale provision of aid. Ensure a progressive scaling up, as capacity of local communities increases.

***FOCUS ON THE MOST VULNERABLE GROUPS:***

- Although disasters increase the vulnerability of all, groups who are already disadvantaged may need special assistance and protection from exploitation.
- Give priority to the most vulnerable groups, including female-headed households, children and orphans, and the poor, and take account of those with special needs.

***STRENGTHEN COMMUNITIES:***

- Protect the humanitarian interests of the affected population while respecting local culture and customs.
- “Build back better,” to reduce future disaster risks but avoid radical redesign and restructuring of settlements or patterns of land use.
- Ensure that sensible and realistic measures are taken to protect the environment.

**4.2. OVERALL HUMANITARIAN AND RECOVERY APPROACH**

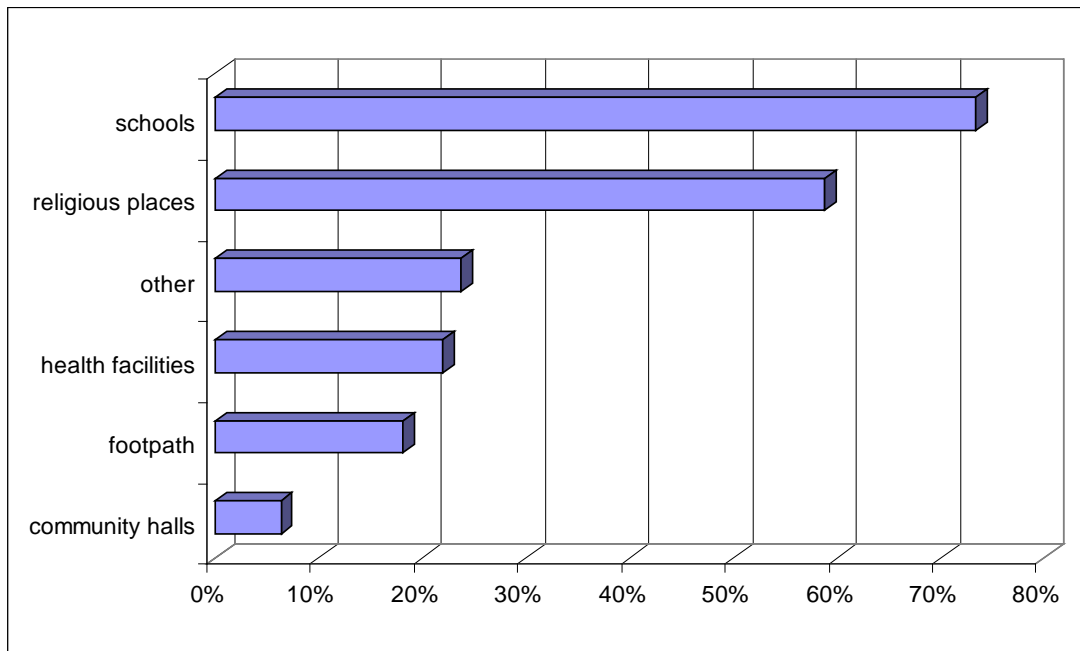
The comprehensive assessment of the cyclone impact, which has now been completed, has made possible both the revision to the initial humanitarian appeal for Cyclone Nargis and a preliminary identification of remaining recovery needs. The PONJA exercise, in addition to being the first post-disaster assessment to be led by a regional organization, is also the first assessment to attempt to provide an integrated and sequenced approach to humanitarian, including relief and early recovery, and medium and long term recovery needs, closely focused on providing direct assistance to families and communities.

The communities' perception of needs should be taken into consideration in this process through consultations. Results from the Village Tract Assessment provide some initial indications (see figures 5 and 6).

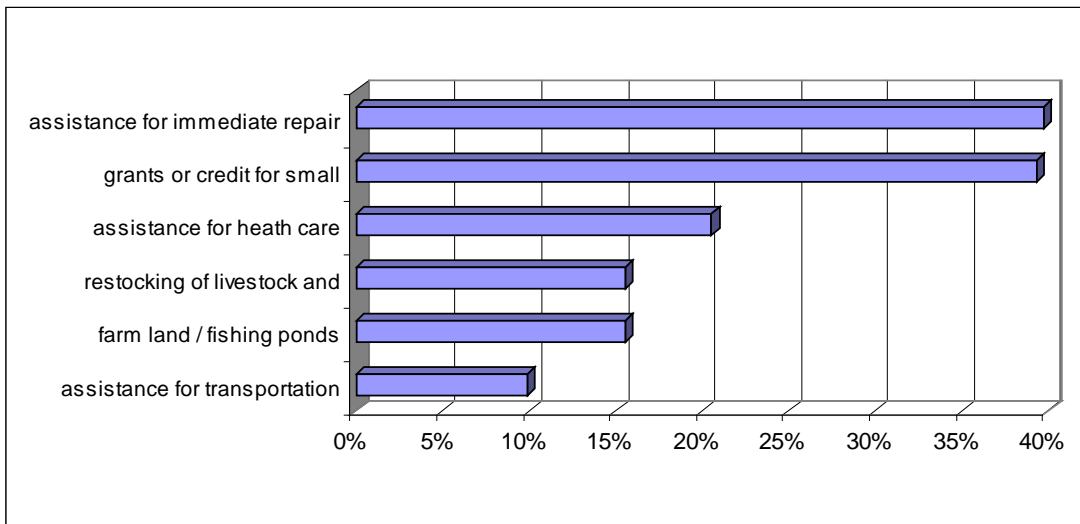
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**Figure 5: Facilities that need immediate support for repair or reconstruction, as reported by villagers in the Delta**



**Figure 6: Community support that is most needed, according to villagers in the Delta**



Source: VTA survey.

Relief, early, medium and longer-term recovery needs are summarised in a sequenced manner below, including discussion of areas where further work is needed to facilitate effective recovery.

**4.2.1. SOCIAL SERVICES**

In health, effective recovery will require a sequenced approach which provides emergency health services while facilities are being restored and re-equipped. Immediate humanitarian assistance is needed to ensure a sufficient supply of emergency drugs and support to essential health services, provided to the affected population through health facilities and temporary health service delivery points in shelters and relocation sites. Mobile clinics and outreach services will be used and mechanisms put in place to improve access to referral centres.

The aim of the health response plan is to reduce morbidity, disability and preventable mortality among the 2.4 million people most severely affected by the cyclone, and to improve sustainable access to preventive and curative health care. To address immediate needs, essential health services will be provided to the affected population through health facilities in shelters and mobile clinics, to ensure response to health needs and disease control. Priorities for early recovery will include restoring the functionality of the health systems and building the capacity for effective service delivery. The total early recovery cost for the first 12 months is estimated at USD13 million, of which USD11 million are included in the UN Revised Appeal.<sup>2</sup> The Appeal also includes USD35.5 million for emergency health provision.

Given the on-going risks caused by the impact of the cyclone, support to health services should pay particular attention to epidemiological surveillance of the population; infectious disease prevention and control (including adequate supplies and mobile response capacity); and health promotion through community outreach among vulnerable groups, especially for vector water borne disease prevention and treatment.

To ensure a coordinated approach to the provision of health services, the development of township-level coordination mechanisms will be important to agree between the different partners engaged in the health sector on the key outcomes expected and increase the efficiency of resource allocation from different institutions. Township-level plans would include detailed assessments of the necessary repairs to health facilities to disaster resistant standards. Coordination at this level would also allow for further assessment of demand-side constraints to address the barriers preventing the poorest households from accessing health services, as well as special needs for the injured and displaced. Finally, the health program should also establish a system to track the needs and use of pharmaceutical and medical supplies provided through international resources.

In education, immediate needs include the provision of temporary safe learning spaces for basic education schools, providing temporary safe learning spaces for early childhood development activities, and providing school and learning materials to affected girls and boys. The goal of the early recovery strategy is to provide and restore quality early learning and education in formal and non-formal settings in cyclone-affected townships, including by repairing, rehabilitating and beginning to rebuild damaged and destroyed schools (both public and monastic schools), and strengthening teacher capacity through training. The total cost for education programmes in the first 12 months is estimated at USD32 million, of which USD2.5 million is covered in the Revised Appeal. The Revised Appeal also includes USD23 million for relief assistance for temporary safe learning spaces and emergency supplies. Given the extensive destruction of school-buildings, reconstruction of some of the schools in the worst-affected areas will likely need to continue over two to three years. Assistance should be provided to both public and monastic schools, and accompanied with the training of new and volunteer teachers, psychosocial assistance to teachers and children, and community mobilization to support children's education.

To strengthen communities as part of the early recovery activities, there is a need for support to vulnerable groups, including women, children, the elderly, single-headed and landless households, the injured and disabled, with the goal of ensuring food security, protection from exploitation, abuse and other forms of violence, and protecting them from taking on risky employment. Community-based and community-driven protection strategies will be promoted, such as Child Friendly Spaces for the protection and psychosocial recovery of children, and designated places for women's protection and psychosocial recovery. A common case management approach is being developed to incorporate family tracing for separated children, ongoing monitoring (and where necessary referral to other sectors for their intervention or to community based protection mechanisms) for children in interim care, orphans, child victims of abuse, exploitation, violence and neglect or other vulnerable children. Costs for the protection of children and women over the first 12 months are estimated at USD16.8 million.

#### **4.2.2. SHELTER AND HOUSING**

Shelter is critical in providing basic security and personal safety from elements and resistance

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<sup>2</sup> Myanmar Revised Appeal: Cyclone Nargis Response Plan 2008. Launched at the United Nations in New York, 10 July 2008. Available online at: [www.humanitarianappeal.net](http://www.humanitarianappeal.net)

to diseases, as well as for sustaining the dignity and structure of families and communities. The relief strategy will ensure that 450,000 of the most severely affected households will have adequate shelter and non-food items, such as cooking utensils, blankets, mosquito nets, and water collection containers. Early recovery activities will support the ongoing rebuilding by households, including reducing vulnerabilities to future natural disasters by improving housing techniques. Early recovery costs for the first 12 months are estimated at USD47 million, of which USD21.5 million are included in the Revised Appeal. The Revised Appeal also includes another USD21 million for emergency shelter activities.

As noted in the impact assessment, most families have already started to rebuild on their original land. Lessons from post-disaster recovery in other countries indicate that support to housing is most likely to be successful if it supports families' own efforts through the provision of cash or materials, with careful monitoring systems to ensure that assistance is used for the purposes intended. Rebuilding to more disaster resistant standards can be started under the humanitarian assistance program during the first twelve months, by providing support to families to support their own efforts to rebuild, and supplemented by further assistance in subsequent years. A uniform approach is also desirable, where guidelines on the level of support provided to households are agreed between different institutions providing assistance to avoid causing tensions between families and communities.

Preliminary results from the field assessments indicate that the majority of households wish to return to their own land, and this would be consistent with other natural disaster events in the region. However, no systematic data is available on the number of households who wish to return versus those who wish to resettle elsewhere, on land which is hazardous or on land where the entire family or the registered user of the land died.<sup>3</sup> Good practice from ASEAN Member States and elsewhere in addressing resettlement and land use issues through participatory processes are discussed in section 3, under social impacts.

#### **4.2.3. FOOD AND AGRICULTURE**

Food assistance interventions will cover a period of 12 months (May 2008 – April 2009) and will help maintain adequate food consumption, stabilize the nutritional status of the most vulnerable groups and restore livelihoods, including through food-for-work schemes and cash interventions. For the families of the Delta, food insecurity is inextricably linked to the recovery of pre-cyclone levels of agricultural production, with the major rice harvests occurring in October-November and April-May. Needs for food distribution will therefore remain high for the next six months, starting to phase down after the October-November period to more targeted modes of assistance to the most vulnerable households and those who are unable to return to their land. The cost for food assistance for the first 12 months is estimated in the Revised Appeal at USD112.5 million. The cost for nutrition programmes for infants, children, and pregnant and lactating women over the same period is estimated at USD17.9 million.

In order to ensure early recovery of agricultural livelihoods, there is an urgent need for assistance for rice seeds, fertilizer, feed for draught animals, and fuel for power tillers. Assistance with inputs, including seeds, fertilizers, tractors and draught animals is likely to be needed in preparation for the next two harvests if rice production is to be restored to pre-crisis levels, with some continued assistance for families who are not immediately able to return to their land. In addition, support for small breeders to expand livestock breeding programs will be important both to restore the stock of draught animals and small livestock (e.g., ducks, chickens, pigs) and promote the restoration of sustainable livelihoods.

While rice is the principal crop in the Delta, vegetable crops and small livestock are also important sources of income for the poor, in particular for landless families. Starting under early recovery activities in the next twelve months and continuing until sustainable livelihoods are restored, community-based grant or micro-credit schemes would be an appropriate mechanism to support these households in regaining a sustainable source of income. The cost for early recovery activities to restore agricultural livelihoods is estimated at USD57 million for the first 12 months, of which

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<sup>3</sup> This is normal at this stage after the disaster – it is not generally possible to estimate resettlement and land use/land claim implications until a later stage.

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USD40 million are included in the Revised Appeal. The Appeal also includes USD18.5 million for relief activities in agriculture.

#### **4.2.4. COMMUNITY RECOVERY AND LIVELIHOODS**

Supplementing support to agriculture by other efforts to get cash incomes to the poorest families is important both to restore market activity and provide social protection to the landless or those who are unable to cultivate in time for the upcoming harvest season.

There have been some successful community-based development approaches in Myanmar prior to the cyclone. The PONJA teams visited several community-based projects and found that these are well managed in terms of participation of disadvantaged groups in decision-making, avoidance of capture by elites, and transparent budget and financial management procedures. While replication and expansion of such approaches should be undertaken carefully, they do provide potential to ensure that cash grants for the restoration of household assets and labour intensive works for local infrastructure can be carried out in a way that is in accordance with community priorities. Strong efforts at community capacity-building in areas such as simple financial management and accounting as well as effective monitoring should accompany these activities. Where labour-intensive works are provided through community-based mechanisms, care should be taken to ensure that wages do not exceed local market wages, to avoid undermining the resumption of regular market activities.<sup>4</sup>

Micro-credit, similarly building on lessons learned from pre-cyclone programs, would also be a useful component of a strategy to support non-farm incomes for the poorest families. Finally, the rehabilitation work which will be conducted provides an opportunity to provide vocational training to individuals in affected communities and support to small business organizations to ensure that they gain a longer term benefit from the cyclone relief and early, medium and longer-term recovery programs.

Assistance to replace small fishing boats and equipment that have been lost is also an important element of early and medium-term recovery activities: prior to launching a major program to import or distribute boats centrally, it would be desirable to make an assessment of the options for provision of cash grants to communities to buy boats in neighboring villages. Where boats are provided in kind rather than through cash grants, prior consultation with fishers' communities is crucial to ensure that replacement boats are suited to communities' needs.

Religious buildings are central to the life of communities in the country as a whole, including in the Delta, and with schools, are the top priority for assistance requested by communities in the VTA. The damage to religious buildings was very extensive and initial estimates of recovery costs have been included in the recovery program. In discussion with the PONJA teams, religious and community-based organisations have suggested that detailed township-level assessments of the damage to religious buildings could be refined by the religious institutions themselves, working together on a non-sectarian basis. These detailed assessments would then confirm the full recovery cost for religious structures. As described above, religious groups have been in the forefront of disaster-relief efforts, and have all stressed the non-sectarian nature of their assistance. It will continue to be important in the recovery process to pursue this inclusive approach.

Early recovery costs to support non-agricultural livelihoods and social recovery, rebuild religious and community infrastructure and begin environmental protection and disaster risk reduction activities are estimated at USD89 million over the first 12 months, of which USD54 million are included in the Revised Appeal.

#### **4.2.5. COASTAL MANAGEMENT**

While the joint assessment has provided initial indications of environmental damage, a more comprehensive environmental assessment and an updated flood and storm surge assessment would be desirable to confirm impact, guide recovery activities, identify hazardous land, and assess

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<sup>4</sup> Agencies and NGOs in some areas are currently paying daily wages of 2,000 K, which likely exceeds the normal wage for agricultural labour. It would be important to review this prior to the next harvest season.

long-term vulnerabilities and institutional constraints. Some early recovery activities to support the reforestation of mangrove reserves can be started in the interim, but a more comprehensive assessment would inform a program to repair environmental damage and reduce risks and vulnerabilities, such as the upgrading of coastal embankments and a more comprehensive program to rehabilitate the mangrove forests which play a crucial role in protecting human settlements, agricultural lands and fisheries.

#### **4.2.6. INFRASTRUCTURE**

To address immediate needs for clean water, sanitation, and hygiene, priorities include the provision of safe drinking water and safe excreta disposal facilities for 1.4 million cyclone-affected people through April 2009, and the rehabilitation of traditional ponds and rainwater harvesting systems by September 2008. The total cost for the first 12 months is estimated at USD27 million, of which USD12 million are included in the Revised Appeal. The Revised Appeal also includes USD38 million for the emergency provision of safe drinking water and safe excreta disposal facilities through April 2009. The remaining community infrastructure needs would be best addressed through community-based mechanisms which can also provide opportunities for temporary work for families who lack incomes. Exceptional road maintenance efforts in the delta to repair damage caused by heavy relief trucks will also be important.

The immediate relief effort required a significant logistical network to deliver assistance to the most severely affected population, with the cyclone having made an already limited transport system largely impassable. An air bridge from Bangkok to Yangon, as well as helicopter flights from Yangon to five operating hubs in the Delta, facilitated the effective delivery of relief. As the surface transport system (including by road and river) regains strength, these will be phased out. Related logistics costs are estimated at USD50.5 million, and emergency telecommunications costs at USD1.6 million, as reflected in the Revised Appeal.

Repairs to the major infrastructure needed to deliver the humanitarian and recovery program have already been completed in most sectors and infrastructure needs overall are low, due both to the fast action taken to restore services such as electricity, and the relatively low damage done to the road network and other large-scale infrastructure. Using the basic principle of restoring essential infrastructure to pre-cyclone levels (but not beyond), probable recovery costs in transport total USD24 million in the first year (10 percent of total recovery estimates), with 75 percent covering road and small bridge repair.

### **4.3. NEEDS AND COSTS**

#### **4.3.1. RELATIONSHIP TO THE REVISED APPEAL**

The relief costs for the first 12 months following the cyclone (May 2008 through April 2009) are estimated in the Revised Appeal which was presented by the United Nations on 10 July 2008. The Revised Appeal includes costs for both meeting immediate needs and early recovery activities, and calls for a total of USD482 million, of which about USD360 million will be for relief activities.

#### **4.3.2. EARLY AND LONGER-TERM RECOVERY COSTS**

The recovery needs costed as part of the PONJA and presented in Table 12 below are higher than the early recovery activities in the Revised Appeal because: (i) they cover an indicative estimate of total first year needs, not only those activities which can be delivered by the UN agencies and NGOs covered in the appeal, hence the difference in sectors such as housing, agriculture, health, education and livelihoods; and (ii) they include sectors such as transport and communications (ten percent of the total) which are not covered in the Revised Appeal.

The joint assessment does not constitute a recovery plan, which would require further work to refine sectoral needs and priorities, elaborate recovery approaches and implementation



arrangements and complete and refine estimates of costs. As part of the assessment, an initial identification of recovery costs has however been completed for some of the principal recovery activities. Around 90 percent of all recovery costs estimated – all those except transport and communications - are for activities delivered direct to the local community level.

It should also be noted that the costs below are not equivalent to an “appeal” for international assistance. The Government of Myanmar is financing and implementing its own recovery activities, and as in other disasters in neighboring ASEAN Member States, will look for external financing only to complement its own initiative in this regard.<sup>5</sup>

**Table 12: Indicative financial estimates of relief and recovery needs (Kyats billion)**

| REVISED APPEAL | Year 1        |             |
|----------------|---------------|-------------|
|                | Kyats billion | USD million |
| Relief         | 398           | 362         |
| Early recovery | 132           | 120         |
| <b>Total</b>   | <b>530</b>    | <b>482</b>  |

| PONJA COMPREHENSIVE ASSESSMENT - FULL INDICATIVE RECOVERY NEEDS | Year 1                | Year 2     | Year 3     | Total        |              |
|---|-----------------------|------------|------------|--------------|--------------|
|   |                       |            |            | K billion    | USD million  |
|   | <b>Social Sectors</b> | <b>45</b>  | <b>140</b> | <b>53</b>    | <b>238</b>   |
| Education*  | 32                    | 118        | 51         | 201          | 183          |
| Health*   | 13                    | 23         | 2          | 37           | 34           |
| <b>Community Recovery and Livelihoods</b>                       | <b>84</b>             | <b>114</b> | <b>109</b> | <b>307</b>   | <b>280</b>   |
| Livelihoods   | 44                    | 44         | 42         | 130          | 118          |
| Religious structures*   | 40                    | 70         | 68         | 178          | 162          |
| <b>Essential household and public infrastructure</b>            | <b>98</b>             | <b>191</b> | <b>206</b> | <b>495</b>   | <b>450</b>   |
| Housing*  | 47                    | 154        | 198        | 399          | 362          |
| Transport and Communications                                    | 24                    | 32         | 9          | 64           | 59           |
| Water Supply  | 27                    | 5          | -          | 32           | 29           |
| Electricity   | -                     | -          | -          | -            | -            |
| <b>Productive Sectors</b>                                       | <b>57</b>             | <b>-</b>   | <b>-</b>   | <b>57</b>    | <b>51</b>    |
| Agriculture**   | 57                    | TBD        | TBD        | 57           | 51           |
| Industry  | -                     | -          | -          | -            | -            |
| Commerce  | -                     | -          | -          | -            | -            |
| <b>Cross-Cutting Issues</b>                                     | <b>5</b>              | <b>-</b>   | <b>-</b>   | <b>5</b>     | <b>4</b>     |
| Environment***  | 5                     | TBD        | TBD        | 5            | 4            |
| <b>Total Recovery Needs</b>                                     |                       |            |            |              |              |
| In Kyats billion  | <b>288</b>            | <b>445</b> | <b>369</b> | <b>1,102</b> |              |
| In USD million  | <b>262</b>            | <b>405</b> | <b>335</b> |              | <b>1,002</b> |

\* Suggested further detailed township-level assessment to be completed for housing, religious buildings, schools, and health facilities.

\*\* Agriculture needs for years 2 and 3 still to be determined, depending on recovery progress.

\*\*\*Possible further activities discussed during PONJA which would require further assessment for first or second year costing are passenger ferries (initial estimate of K20 billion); upgrading of coastal embankments to protect against flood and storm surges (initial estimate at K40 billion); and mangrove rehabilitation (initial estimate of K30 billion).

#### 4.3.3. THE RELATIONSHIP BETWEEN DAMAGE AND LOSSES AND RECOVERY NEEDS

As is normally the case in disaster recovery programs, recovery needs are only a sub-set of total damage and losses. This is because many losses cannot later be compensated, a significant part of the damage stems from large scale private and commercial enterprises: the cost of compensating this damage does not form part of the needs which are generally incorporated into allocations from the Government budget or presented for external financing.

<sup>5</sup> The Myanmar Government has announced allocations amounting to K50 billion and has expressed the wish to discuss the budget allocations made to the cyclone recovery with the IMF as part of the upcoming Article IV mission.

#### **4.3.4. COORDINATION, MONITORING AND AID TRACKING**

Immediate relief, early recovery and medium-term recovery programs will all need to be accompanied by strong mechanisms to track aid, coordinate programs and monitor progress. Effective coordination, progress monitoring and aid tracking will be extremely important to ensure that the efforts of Government, UN agencies, international donors, national and international NGOs and the private sector combine to produce effective results for the people of the affected areas.

The tri-partite structure of the TCG has operated effectively in facilitating initial relief efforts. Progress in meeting humanitarian and recovery needs will be monitored through a community-based system over the next twelve months, complemented by a system to track aid pledges and disbursements from all sources, to ensure that a comprehensive picture is available of the expenditures on humanitarian and recovery activities. This would ensure regular reporting on the impact of assistance provided, as well as enabling communities to provide feedback on the support provided and adjust priorities according to their needs.

A forum of the humanitarian community to take stock of progress in the humanitarian and recovery programme could be held on a regular basis. Sectoral coordination mechanisms in areas central to the recovery effort such as health, education, agriculture and housing, on a more frequent basis, will also be important.



## Section V: The Response to Cyclone Nargis







## **SECTION 5. THE RESPONSE TO CYCLONE NARGIS**

### **5.1. THE IMMEDIATE RESPONSE**

The Government of Myanmar, Myanmar-based civil society organizations, private enterprises and individuals responded swiftly and generously to assist the cyclone victims. The New Light of Myanmar newspaper reported that individual cash and in-kind donations amounting to Kyat 12,418 million had been accepted by the Government's financial sub-committee as of 15 June.

On 9 May, the United Nations Emergency Relief Coordinator launched the Myanmar Cyclone Flash Appeal, requesting USD 187 million to carry out emergency relief activities over a six month period. The appeal included 49 projects in 12 sectors, involving ten UN agencies and nine international NGOs. On 10 July, a Revised Appeal was presented, taking into account data from the PONJA fieldwork that allowed for a more comprehensive assessment of needs and strategy to address them. Covering the 12 month period from the cyclone through April 2009, the appeal requests USD482 million to address ongoing humanitarian needs and take advantage of opportunities for early recovery.

Once Government permission had been granted on 2 June, a common transport network was established, including an air bridge for supplies from Bangkok to Yangon, warehouse services in Yangon and five hubs in the affected region (Labutta, Mawlamyinyun, Pathein, Pyapon, Bogale) and transport by helicopter, truck and river barge to outlying villages. The emergency response to the cyclone by the United Nations and international NGOs was organized in terms of 12 clusters, covering critical needs including health, nutrition, shelter, water, sanitation and hygiene, agriculture and logistics.

By 30 June, a total of 18,163 mt of food commodities had been delivered to 684,000 beneficiaries in the Ayeyarwady Division. Treated water (or the means to treat water) was distributed to 250,000 people on a daily basis, with 29 water treatment plants having been put into operation, delivering close to 800,000 litres of treated water every day. As of 30 June, emergency shelter assistance had been provided to over 195,000 cyclone-affected households in 11 townships in Ayeyarwady Division and 29 townships in Yangon Division. Medical care had been provided, including by a range of medical teams from ASEAN Member States and neighboring countries.

To reflect the response to date, each organization of the Tripartite Core Group – the Government of Myanmar, ASEAN, and the United Nations – has provided a contribution to this report reviewing their response components. To maintain the spirit with which these contributions were provided, they have not been edited or assessed by the PONJA team, but are presented in their entirety below.

#### **5.1.1. NATIONAL RESPONSE**

##### ***INTRODUCTION***

1. Cyclone Nargis, which struck Myanmar on 2 and 3 May 2008 with recorded wind speeds of up to 200 kph and a diameter of 240 kilometers, was one of the most destructive storms to hit Asia in decades. It made landfall at Hainggyikyun at 1430 hours on 2 May. Taking a north-easterly direction, it swept through the densely populated Ayeyarwady delta region passing through Pyinsalu, Labutta, Mawlamyinegyun, Bogale, Pyapon, and Kungyangon before it reached Yangon, the largest city and the country's commercial hub, in the early hours of 3 May 2008. The city sustained a direct hit with heavy damage to its buildings, infrastructure, power, water, and communication lines. A majority of its famed great trees were also uprooted. Nevertheless, it was in the Ayeyarwady delta where the effects of extreme winds, heavy rains, and a powerful storm surge, wreaked the most damage.

2. The Ayeyarwady Division covers 13,566 square miles with a population of over 6.5 million giving a population density of 466 persons per square mile. Agriculture is predominant, although fisheries have become an increasingly important industry along the coast and in the extensive network of rivers and creeks that are the distributaries of the Ayeyarwady river as it enters the sea through this huge and fertile delta. The principal crop and staple food is rice, with maize, sesame,

groundnut, sunflower, pulses, vegetables, jute and fruit trees being grown for both household consumption and income generation.

3. Over 7 million people lived directly in the path of the storm. Among them, initial assessments indicated that 1.5 million in Ayeyarwady Division were seriously affected. About 370,000 houses were damaged with a significant portion completely destroyed. A million acres of farmland were inundated with seawater, causing serious death and destruction to humans, livestock, farm animals, infrastructure, and means of production and livelihoods. Many survivors faced untold misery and hardships. The damage and destruction was understandably highest in the immediate area over which the 'eye' of the storm passed. Most affected were the 7 townships of Ngaputaw, Labutta, Mawlamyinegyun, Bogale, Pyapon, Kyaiklatt and Dedaye. Labutta followed by Bogale sustained the heaviest damage. It is estimated that 95% of structures were demolished in these two townships and in Hainggyikyun. There were similar heavy losses to physical structures in other townships as well, with a loss of 90% reported for Pyapon and Mawlamyinegyun, while damage was significant in the remaining townships.

4. Although the storm's fury abated somewhat when it reached the densely populated Yangon Division, it affected 4 million people, causing damage to 486,539 houses, over 7,900 factories and commercial establishments. Moreover 300,713 acres of farmland were flooded. Electricity, water, transportation, telecommunication facilities, networks of roads, bridges, rail-tracks, jetties and docks, transmission lines, public buses and rolling stock were affected. Many boats, both motorized and non-motorized, and steamers were also damaged, beached or sunk altogether. Some 75% of the trees were uprooted which resulted in blocking of roads, and destruction of houses. Electricity was also cut off due to the collapse of electric poles.

### ***THE HUMAN TOLL***

5. The human toll caused by Cyclone Nargis was overwhelmingly devastating and unprecedented in living memory. Small villages in the low-lying areas of the delta were hopelessly exposed to the ferocity of the winds and the waves and many of them were simply obliterated and wiped off the map. The official toll to date is 84,537 deaths with 53,836 missing, and 19,359 injured. Details of the dead and missing per township is provided at Annex (19).

### ***THE GOVERNMENT'S RESPONSE***

6. As a lesson learned from the 2004 Asian Tsunami experience, the Government of Myanmar has already established even before the onset of the cyclone, a National Natural Disaster Preparedness Central Committee (NDPCC) chaired by the Prime Minister General Thein Sein. A meeting of this Central Committee was held on the morning of 3 May, 2008, with an address by the Chairman to formulate and implement an immediate response to Nargis. Accordingly, 10 Emergency Disaster Response Sub-committees were formed to work in close cooperation. Further, implementation plans were urgently prepared to meet goals set out for each Sub-committee that required immediate attention for relief, recovery, rehabilitation, and reconstruction. The ten sub-committees formed dealt with:

- (1) News and Information,
- (2) Emergency Communication,
- (3) Search and Rescue,
- (4) Assessment and Emergency Relief,
- (5) Confirmation of Loss and Damage,
- (6) Transportation and Route Clearance,
- (7) Natural Disaster Reduction and Emergency Shelter Provision,
- (8) Healthcare,
- (9) Rehabilitation and Re-construction, and
- (10) Security.

7. For close and effective supervision in undertaking relief and rehabilitation tasks in the townships within the storm-hit region, individual ministers were assigned to each of them. The

Prime Minister also opened an office in Yangon to provide close supervision and support to the National Disaster Preparedness Central Committee. Immediately after the cyclone, the Government earmarked Kyats 50 billion (USD 45.45 million) for the overall relief and recovery effort. Armed with these funds, the Government was able to immediately commence, manage, spend and supervise relief and rehabilitation operations including the setting up of relief camps, field hospitals, verification and cremation of the dead, installation of a temporary communication system, clearance of the main roads, provision of fuel, opening of markets, restoring security in the affected areas and other relief activities. For example, reinstallation of electricity and water, and renovation of hospitals were completed within 4 days in Yangon Division which restored 33 townships back to normalcy. Also, military personnel in collaboration with the local authorities and the public carried out relief tasks such as storm debris removal in 7 townships outside the Yangon City Development area. Relief camps were set up in the affected areas, and statistical data of the dead and the missing was collected within 3 days. Moreover, the Yangon Division Peace and Development Council was able to restore food and drinking water supplies within seven days, thereby alleviating the emergency situation in the city.

8. After carrying out emergency relief and rehabilitation operations, the NDPCC plans to continue its work in four phases, namely:

Phase 1: Transition (The period between emergency relief/rescue and rehabilitation),

Phase 2: Short Term Rebuilding (Quick rebuilding of both urban and rural areas until farming and fishery activities can be resumed and livelihoods restored),

Phase 3: Longer Term Reconstruction (Further improvement and upgrading of reconstruction and resettlement tasks carried out under Phase 2),

Phase 4: Preparedness and Prevention (Create early warning systems, establish procedures and mechanisms to mobilize local and national effort for quick response to the danger and construction of facilities and structures in order to avoid similar casualties and deaths in the future. More specifically, special attention will be devoted to building stronger and storm resistant roads, embankments, and polders. Storm shelters of proven design to cater to needs of those in impending danger and in distress will also be constructed to protect humans as well as farm animals. These shelters could also be used as community centers to improve the social and cultural life of villagers. Moreover, an expanded program is already underway for the regeneration and development of mangrove forests throughout the coastal regions.)

9. In responding to the important task of rehabilitation and reconstruction of the damaged and destroyed towns, villages, business enterprises, schools, hospitals, monasteries and places of worship, as well as in providing assistance to the unification of divided families, and more generally to uplift the morale and to fulfill the psychological needs of the storm victims, the government's approach and priorities can be summarized as follows: -

- Rebuilding of houses by the townspeople,
  - Reconstruction of hospitals, schools and markets,
  - Repairing of roads and bridges,
  - Reconstruction of communication,
  - Restoration of electricity,
  - Resettling and construction of villages that were washed away by the storm surge,
  - Construction of damaged houses in village tracts,
  - Rehabilitation of drinking water sources,
  - Resuscitation of business enterprises, factories and workplaces for employment generation,
  - Revival of agriculture and rural industries to restore basic livelihoods of the villagers,
  - Revival of the fishery industry for restoring employment and earning opportunities for village folk,
-

- Rehabilitation of rice mills,
- Restoration of salt production facilities,
- Restoration of the means of production for fruits, vegetables, and livestock by rural population.

10. At the height of the relief period in mid-May, 419 relief camps in 29 townships in Yangon and Ayeyarwady Divisions were set up to cater to the urgent needs of the storm victims. A total of 380,529 storm victims were sheltered in these camps, where they were provided with food, clothing, medical care and other daily needs. The camp population presently stands at 10,567 persons living in a total of 7 camps in the Ayeyarwady Division.

11. To date, the Government has spent a total of over Kyats 70 billion for relief and early recovery. A further Kyats 17 billion has been spent for this purpose, out of funds received from contributions.

#### ***RESPONSE FROM THE MYANMAR PUBLIC AND CIVIL SOCIETY***

12. The grave adversity and the immense challenge posed by the cyclone also brought the best out of the Myanmar people. Known for their humanity, charity, generosity, kinship and neighborliness, they shared not only their wealth but in many cases, whatever little they possess. Many people of Myanmar throughout the country gave generously to their less fortunate storm affected compatriots in cash and in kind. In the days following the storm, the roads leading out of Yangon and other big towns to the affected townships were filled with motorcades of people carrying with them cash, food and household supplies. Many of them ventured further afield by boats to difficult to access villages, spurred on by a humanitarian urge to help. Similarly, many Buddhist monks from all over the country also went to the affected difficult to access areas and disbursed substantial quantities of cash and relief materials to the villagers using the local monastery as base. Likewise, religious leaders and members of all other faiths in the country contributed substantially to the relief efforts. The large Myanmar diaspora outside the country also responded generously. Many of them returned home to help in ways big and small. Others organized collections of mainly cash in favor of the affected population. Such spontaneous help from the public, religious leaders and civil society in general, reached the needy population, in a timely manner. The recorded contributions in cash and kind from Myanmar nationals reached a total of 13,040,881,369 Kyats or about USD11.86 million by 24 June. This figure does not tell the whole story as many donations and contributions have been made anonymously and without registration anywhere. The unrecorded portion is quite possibly as large as, if not larger than the recorded figure. It is therefore quite impossible to put a precise value to the entire massive outpouring of generosity by the people of Myanmar. Nevertheless, the fact that starvation and disease that was originally feared and voiced in some quarters was avoided, is due in no small measure, to the unstinting, if not completely recorded generosity of the people.

#### ***RESPONSE FROM THE TATMADAW (MYANMAR ARMED FORCES)***

13. In the immediate aftermath of the cyclone the Tatmadaw provided substantial assistance in the overall relief and early recovery effort. Senior military officials accompanied the Prime Minister in his first tour of the affected regions in the Ayeyarwady Division on 3 May. Two divisions of infantry servicemen were also deployed in the region to ensure the continued maintenance of peace, security and tranquility during the turbulent days in the wake of the cyclone. In addition, they undertook a myriad of tasks ranging from search and rescue, evacuation of the injured, setting up of camps for the displaced, collection, identification and burial of the dead, clearing of roads, removal of debris, loading and unloading of relief goods, and generally to help in the distribution of relief assistance to the distressed. Doctors and nurses from the Defense Services Medical Corps also provided emergency medical care in the affected areas. Fleets of military trucks were used to transport relief goods, oil and fuel, seeds, agricultural machinery and implements. Water buffaloes were transported from up country to the lower delta region in time for the planting season. The Air

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Force has placed its helicopters at the disposal of the relief operation for ferrying and evacuating to and from the affected areas. On its part the Myanmar Navy deployed a number of its boats and crew at a number of locations in the lower delta region to generally help in the relief effort.

14. To summarize, in an atmosphere of shock, dismay, grief and uncertainty that prevailed in the immediate aftermath of the cyclone, the Tatmadaw made a valuable contribution by calming fears, providing security, and maintaining peace and harmony in the affected areas. Further, the armed forces provided services that assisted the government, the private sector, civil society organizations, local community and international aid workers for more effective, and timely delivery of aid supplies and services to the victims of the cyclone.

#### ***RESPONSE FROM MYANMAR BUSINESS COMMUNITY***

15. The Myanmar business community, consisting both of large enterprises and small and medium firms, responded in a timely and effective manner to the crisis. They contributed substantially in cash, kind, and essential services to the relief and reconstruction tasks. Many of them made a special effort to provide assistance in areas of their competence. In this regard, the large construction and engineering firms, with their considerable capacity in equipment, technical know-how, manpower, and financial muscle were well suited to repair and rebuild the physical infrastructure damaged by the storm. These large firms, in close cooperation with the government authorities and village and township elders, gave priority to the renovation and rebuilding of hospitals and schools and the construction of relief camps. The Government provided construction materials including timber, zinc sheets and nails either free of charge, or at heavily subsidized prices. Some construction materials were also permitted to be imported from abroad free of tax or duty. These companies were also tasked to reconstruct entire villages to replace those that were completely swept away by the cyclone. Many villages have either been completed or are already in various stages of completion in the Ayeyarwady Division. The total value of their initial inputs and contributions of these companies to date is USD 68.13 million.

16. For the next phase, the government intends to build more than 50,000 houses in various villages to replace those lost in the cyclone. These would be durable houses superior in quality to those that were lost, with cement post shoes, zinc roofing, and wood. They would measure 16' x 20', self standing in individual plots of land measuring 40' x 60'. To ensure that cost are kept down, the State will provide corrugated zinc sheets, roofing nails, nails, cement and other construction materials. Many of these houses, which are of a uniform design and specification are already completed and are available for donation at a low cost of Kyats 600,000 or USD 545.45 each. Provided there is good support and cooperation from donors, the government expects the construction of these houses to be completed within a short time.

#### ***AGRICULTURE, IRRIGATION, LIVESTOCK AND FISHERIES***

17. In the rehabilitation of the cyclone devastated areas, the Ministry of Agriculture and Irrigation set three main strategies namely,

- Timely provision of agricultural inputs;
- Repair and upgrading of damaged embankments; and
- Improving paddy yields in areas, where feasible, through application of intensive agricultural methods and inputs.

With regards to agricultural inputs, timely provision of seeds and availability of draught power and equipment for land preparation are urgently needed in the affected areas for July/August planting season. Both the Government and the private sector have responded to meeting this requirement. Accordingly, the government has to date distributed 23,205 metric tons of paddy seeds to 7 townships in the Ayeyarwady Division, which is 71% of the requirement. Similarly, 4,024 metric tons which met 88% of requirement have been distributed in 6 townships in Yangon Division. At the same time, a private donor has contributed a further 5,013 metric tons of paddy seeds worth USD1.25 million, for distribution to farmers in the above divisions. As for draught power 6,708 power tillers were



provided by the Government while 15 private donors have contributed 1,489 power tillers worth USD2.08 million. Assisted by these efforts a total of 322,694 hectares of land have been prepared for paddy cultivation. With regards to embankments, 34 which were near the coast line and located in 6 townships of Ayeyarwady Division were damaged. Heavy machineries were deployed and to date 42% of the damage have been repaired. In the Yangon Division, all damaged embankments have been repaired. Tables showing distribution of paddy seeds, crop inputs, land preparation and progress of repairs to embankments in the affected areas are annexed at 19a and 19b.

18. Farmers faced difficulties in land preparation due to loss of draught animals particularly water buffaloes. Many of those that survived are incapacitated due to ingestion of salt water during the floods and are unfit for work. To assist farmers in the Ayeyarwady Division, 2,173 water buffaloes were transferred from other regions of the country at a cost of USD0.59 million. Starting from the third day after Nargis, vaccination against foot and mouth and hemorrhagic septicemia diseases have been undertaken in Ayeyarwady and Yangon Divisions. The restocking of pig, chicken and duck for backyard farming is also underway.

19. Fishing is both an important income generating activity as well as a source of food for the rural people in the Ayeyarwady delta. Unfortunately, a very large proportion of boats and trawlers owned by the fishermen were lost in the storm and with it their livelihoods. The larger and more well-to-do commercial fishing enterprises are expected to fund the replacement of their fleets with credit provided by the Government. As for the poorer fishermen with limited resources, the Government intends to provide subsidies to purchase boats, nets, and fishing gear. Accordingly, 9500 fishing boats are presently under construction for sale at heavily subsidized prices. They will be equipped with a 3.5 Hp engines. The total cost of the 9,500 fishing boats plus the engines is USD3.45 million. Similarly, arrangements are being made for 16,793 fishing nets of various types and sizes to be distributed to the fishermen at a total cost of USD 3.23 million.

20. The national contribution towards the agriculture, livestock, and fishery sectors is USD16.16 million, made up of

- Crop sub-sector USD8.89 millions
- Livestock sub-sector USD0.59 millions
- Fishery sub-sector USD6.68 millions

### **HEALTH AND NUTRITION**

21. Medical Care. Immediately after the cyclone, health teams accompanying the Prime Minister visited Mawlamyinegyun, Pyapon and Bogale and provided emergency medical care. Severely injured patients were transferred to specialist and tertiary care hospitals in Yangon by military helicopters. At the same time, the Minister of Health initiated a series of emergency response actions. Specialist teams comprising of physicians, surgeons, trauma specialists, paediatricians, anesthetists, psychiatrists, eye specialists, dental surgeons, general medical doctors and nurses from general hospitals in groups of 20 were formed and sent to the disaster hit areas of Ayeyarwady Division starting from 5 May 2008. Since then medical teams, fully equipped with medicines and supplies, were sent to the relief camps in rotation.

22. In the Ayeyarwady Division (12) front line relief camps were formed in Pyinkayaing, Thingangyi, Saluseik, Theikpankonegyi, Pyinsalu, Hlaingphone, Polaung, Kwinpauk, Kyeinchaung, Kyonedar, Setsan, and Kadonkani, (6) intermediate camps in Hainggyi, Labutta, Mawlamyaingkyun, Bogale, Pyapon and Dedaye and (3) rear camps were formed in Myaungmya, Wakema and Maubin. Up till 30 June six batches of specialist teams totaling (762) health personnel were sent to the storm hit areas of Ayeyarwady Division which increased access to medical care for cyclone hit victims. Three batches of (297) house surgeons were also mobilized to enhance the coverage of medical care services at cyclone hit areas.

23. In Yangon Division, since 6th May, specialist teams had been stationed at Kungyangon, Kawhmu, Twante and Kyauktan townships for provision of medical care. Daily trips for medical care and health education were accomplished by doctors and nurses from medical universities, University

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of Public Health, University of Nursing, Department of Medical Research (Lower Myanmar), personnel from Myanmar Medical Association, Myanmar Nurses and Midwife Association and Myanmar Health Assistant Association. Public health measures were undertaken by the Yangon Health Division.

24. **Mental Health.** For management of mental health disorders, mental health care activities were provided to patients in the camps by 6 teams of psychiatrists based at Myaungmya. They provided individual and group counselling as well as curative services. Psychiatrists were also sent along with the mobile health teams stationed on floating hospitals.

25. **Mobile Floating Health Teams.** The Ministry of Transport made available four double decker river boats to be used as mobile floating hospitals in the storm affected areas. Health teams comprising doctors from various specialties were stationed on these boats to provide medical care for patients living along the sea coast, streams and creeks in the Ayeyarwady Delta. The ships were based at Pyapon, Bogale, Labutta and Mawlamyaingkyun. Seven batches had already been deployed to storm-hit areas where they have been giving curative services as well as disease control and other public health measures. Mental health care was also taken care of by psychiatrists on board and patients that needed referral were referred to the base camp for further mental health care.

26. **Public Health Measures.** Public health professionals together with health education personnel and environmental sanitation engineers were sent to the relief camps and provided necessary services. Health education with emphasis on good personal hygiene, sanitary habits, consumption of safe drinking water, fly-proof latrines, use of insecticide treated bed-nets were given to the people in the disaster hit areas. Up till 30 June, 5 batches of public health professionals in group of (30s) had been sent to cyclone hit areas to provide public health measures. In addition (72) Health Assistants were also mobilized to frontier and middle camps for two weeks to provide public health services.

27. **Emphasis has been given on measures to control vector-borne diseases as well as water-borne diseases by daily surveillance, preparedness and response.** Immunization particularly with polio vaccines for children up to 5 years and measles vaccination for children up to 15 years have been carried out in all the camps. Vitamin A distribution, moral support, mental health care and surveillance of disease outbreak are also taken care of at the camps. As regards restoration of routine health care delivery services, National TB program officers renewed efforts toward tracing old cases to be able to continue treatment. In addition new case findings have also been done at the camps as well as at the hospitals. Similarly, midwives at the health centers are resuming their daily ante-natal care services, delivery and post-natal care services as well as immunization activities. Disease control and surveillance activities were augmented by the WHO which had provided 12 cars with Regional Surveillance Officers.

28. **Nutrition.** Rapid assessment of the nutritional status among under-five children was accomplished by National Nutrition Centre jointly with the UNICEF. Moderate malnutrition rate was found to be 3.9% and 6.5% in Yangon and Ayeyarwady Divisions respectively. High potency vitamin A was also provided to under- five children in camps. Severe and moderate nutrition cases were treated by Plumpy nuts and BP 5 biscuits. In the affected six townships basic health personnel were trained on management of malnutrition.

29. **Traditional Medical Care.** Traditional medicine services were provided since 6 May in both Ayeyarwady and Yangon Divisions. Traditional medicine clinics were opened at storm-hit areas. Since 11 June, a ship had been provided to offer traditional medicine services in far flung areas.

30. **Provision of Medical Care by Medical Associations and Private Health Clinics.** Health care activities were also provided by local NGOs, such as Myanmar Medical Association, Myanmar Nurses and Midwife Association and Myanmar Health Assistant Association. Health personnel from the private sector also participated in provision of medical care as doctors and nurses from the Asia Royal Private Clinic, Pun Hlaing Private Hospital and Pinlon (SSC) Private Clinic also provided medical services in the areas they were stationed in the Ayeyarwady and Yangon Divisions. Health personnel from the Defense Medical Services also provided health care alongside with the health personnel from the Ministry of Health. Similarly, International NGOs also provided health care services in the cyclone-hit regions.

31. **Provision of Medical Care by International Medical Teams.** ASEAN and international medical teams had responded to Cyclone Nargis in Myanmar with solidarity. Many states rapidly deployed

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medical teams both bilaterally and as a regional outfit, working hand-in-hand with teams from other countries. Up till 30 June medical teams from Malaysia, Thailand, Singapore, Indonesia, Vietnam, Philippines and Laos from the ASEAN Member States and teams from Japan, China, France, Korea, India, Bangladesh, Hungary and Sri Lanka had collaborated with the Ministry of Health in treating patients in both Ayeyarwady and Yangon Divisions.

32. Logistics. As regards logistics, an adequate amount of essential medicines and equipment were provided to the cyclone-hit regions by the Ministry of Health central logistics and supply team managing the logistics from the Central Medical Store Depot as well as those donated by various organizations both national and international. The medical teams that visited the cyclone-hit areas were well-equipped with medicines including anti-snake venom. For prevention and control of vector borne diseases, fogging machines with insecticides were distributed to the cyclone-hit areas and also insecticide impregnated bed-nets. For prevention and control of diarrhea and dysentery water guard tablets and bleaching powder for chlorination of water were distributed to these areas. Good sanitary practice was observed partly by building sanitary latrines and provision of health education. Safe delivery kits were distributed to cyclone-hit regions to provide adequate maternal care.

33. Laboratory Services. The National Health Laboratory has been taking care of investigations of diseases and laboratory confirmation for prevention of communicable diseases at the cyclone-hit areas. In addition it has been taking care of water quality testing and support of laboratory equipment to the hospitals at cyclone-hit regions. Capacity building of laboratory health workers has also been provided.

34. Outcome. As a result of provision of efficient and continuous medical care by different sources of medical teams from the Ministry of Health as well as from other sources, health situation of the people in the cyclone-hit regions is improving day by day without any serious complications. As public health measures had been taken to prevent the outbreak of diseases such as diarrhea, dysentery and dengue hemorrhagic fever together with sanitary measures that had been taken at emergency relief camps and continuous disease surveillance, there were no outbreaks of diseases up till now.

35. Daily outpatients from hospitals and camps, in-patients, diarrhea and referred cases at the Ayeyarwady and Yangon Divisions from (6-5-2008) to (30-6-2008). Medical treatment given by traditional medicine professionals and floating hospitals' activities are shown in Annex 3a.

36. Financial Component. The financial cost to the Ministry of Health in taking the extraordinary health care measures described above in response to cyclone Nargis amount to USD1.19 million. A detailed breakdown is at Annex 19b.

### **TELECOMMUNICATION INFRASTRUCTURE**

37. Most communication links of Myanma Posts and Telecommunications (MPT) were damaged and some telephone exchanges in the low-lying areas were inundated with flood waters and damaged. Most telephone cable lines were cut off by fallen trees and lamp posts. Altogether, in Yangon Division alone, some 3,600 telephone posts broke and fell, downing and damaging some 466 kilometers of telephone cables and 14 kilometers of fiber optic cables which were broken and damaged. Inside Yangon City, three telephone exchanges in Mingaladon, North Oakalar, and Shwe Paukkan were damaged and 92 sub-exchanges lost connection leaving only 25% of the 157,300 of the auto telephone lines left in a serviceable condition. International links via satellite were cut off when the antenna of the microwave link between ground stations lost its balance and tilted. The same was true of the overhead and underground fiber links, underwater cable systems, voice and internet links among the MPT satellite terminals and data communication networks. Similarly telecommunications by mobile phones stopped when 37 of the 56 GSM radio stations were cut off and antenna pole mounts failed and fell. Long distance communication with and within the affected area stopped as the various cable, microwave and fiber-optic links failed following the storm. The main telecommunication towers at Dedaye, Pyabon, and Mawgyun all collapsed.

38. Repair work was carried out with two purposes - for emergency telecommunication, and for enhancing quality for long term improvement in telecommunication sector. Intensive work on repairing the downed infrastructure commenced almost immediately after the storm has passed.

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This involved clearing fallen trees, renovating and constructing buildings, repairing and replacing fiber-cable transmission lines. International direct dialing from the microwave link was restored by May 4, 2008, and between Yangon and Ayeyarwady Division in stages between May 6 and May 13. By May 6, underwater cable systems were repaired and all IDD and internet connections came back into service. The broken fiber optic link between gateways was also repaired to enable voice and internet services to be resumed through the MPT satellite system. Repair work on all GSM radio stations was accomplished. Twenty-three main exchanges and 92 sub-exchanges of auto telephone lines were repaired and are now being used. New CDMA 450 stations were opened enabling 3,662 CDMA phones to be put into service which proved to be vital in the ongoing emergency relief and rehabilitation work. By June 26, 100% of all repair work in the Ayeyarwady Division involving erecting new posts, mending the tilted posts, and replacing cables, was accomplished.

### ***INLAND WATER TRANSPORTATION***

40. Inland waterways form the main form of transportation of goods in the Ayeyarwady Division and this is particularly so for the movement of relief supplies during the emergency. All in all, the Inland Water Transport Corporation was called upon to provide these services. For the period from May 4 to June 30, 2008 a total of 6,973.88 tons of relief supplies were transported to and through various destinations in the Ayeyarwady Division costing a total of USD 143,368.

### ***FORESTRY***

41. In the relief stage but even more importantly, at the stage of early recovery, availability of timber are crucial for the repairs and reconstruction of houses in townships and villages and for construction of fishing boats. The Government has called upon the various departments within the Ministry of Forestry not only to provide the required timber but to do so at highly subsidized prices so as to alleviate the hardships already caused to the affected population. In the 7 townships of Ayeyarwady Division and 1 in Yangon Division, about 50,000 economy houses are under construction. To support that effort, the Government has provided about 90,000 cubic tons of both round wood and scantlings at a cost of about USD16.36 million. In addition, the Government has also provided about 5,000 cubic tons of sawn timber for the purpose of reconstruction of infrastructure and dwellings. The actual cost of production of the timber is Kyats 222,000 per ton but the price actually charged was only Kyats 40,000 per ton, giving a total subsidy valued at USD0.82 million. Furthermore 4,000 tons of timber was provided for the reconstruction of schools, hospitals, and religious buildings. Lastly, 9,000 cubic tons of round logs were provided to the Ministry of Livestock Breeding and Fisheries specifically for the purpose of constructing fishing boats. All in all, a total of some 101,903 cubic tons of sawn timber was provided at a special subsidized price of Kyats 40,000 per ton even though, the actual production cost is Kyats 222,000 per ton. The total value of the Government's subsidy in this sector is USD16.82 million. The Ministry of Forestry's itemized contribution for the reconstruction activities of cyclone damaged areas is at Annex 19-4a and the itemized contribution for the reconstruction activities of cyclone damaged areas is at Annex 19-4b.

### ***EDUCATION***

42. Institutions of learning ranging from primary schools through to higher education institutes in the storm affected areas suffered considerable loss of life and property. A total of 1,778 primary schools, 166 middle schools, 129 high schools and 163 university buildings and office complexes under the Higher Education Department, were either totally or partially damaged. Roofs were blown off over 2,000 other schools. The Government has accorded priority to timely reopening of schools and much effort was made to achieve this objective. Those schools that could be repaired have been repaired either by the Ministry of Education or with the help of the private construction companies. Temporary school buildings were constructed in many cases of bamboo and thatch, with the aim mainly to get children back into the classrooms without further delay. Clearly, this is a temporary measure and neither adequate nor satisfactory in the longer run. As such there is an urgent need to reconstruct permanent school buildings. The Government has to date spent the equivalent of USD 2.15 million for school reconstruction and will continue to devote efforts in this regard.

**ELECTRICITY**

43. Comparatively, damage to electricity generating facilities in both Ayeyarwady and Yangon Divisions was slight. Damage to generating sets in places like Hainggyikyun, and Labutta were repaired and put back into operation within a few days. The small gen-set at Pyinsalu however was completely washed away by the storm surge and was lost just like the rest of the entire village. Similarly, many generating units in a number of villages that were affected by the flooding have suffered extensive loss or damage although there are no precise figures. Most of the loss and damage is in the transmission and distribution area where in places like Mawlamyinegyun, Bogale, Kyaiklat, Pyapon, and Dedaye townships, there was extensive damage of up to 82%. In Yangon Division, there was considerable loss and damage to both transmission and distribution lines, largely caused by fallen trees and structures.

44. The overall cost of the repairs, recovery and rehabilitation within the electricity sector came to USD9.68 million of which USD 5.67 was in respect of Yangon Division and USD 4 million in the Ayeyarwady Division.

**5.1.2. REGIONAL AND INTERNATIONAL RESPONSE**

In addition to the tremendous national response from Government, local communities, monasteries, churches, local civil society groups, non-government organisations and the private sector, there was also a swift, sizeable and sustained response from regional countries and the international community, delivered both bilaterally and multilaterally through international NGOs, regional mechanisms and the United Nations.

**5.1.2.1. THE REGIONAL RESPONSE**

From the outset, the Association of Southeast Asian Nations (ASEAN) took an active lead in providing assistance and coordinating the international response in collaboration with the United Nations and its various agencies. ASEAN's regional response was in line with the spirit and purposes of the ASEAN Agreement on Disaster Management and Emergency Response, even though the 2005 agreement had not yet entered into force.

Table 1 captures a fraction of the regional response as recorded by the ASEAN Secretariat. As it is true in any emergency situations, a lot more emergency assets and commodities have been deployed through various other mechanisms.

An ASEAN Emergency Rapid Assessment Team (ERAT), coordinated by the ASEAN Committee on Disaster Management, was dispatched on 9 – 18 May 2008 to assess critical needs in the aftermath of the cyclone. The ASEAN team comprised experts with specific knowledge in coordination, water and sanitation, health, logistics and food. The Emergency Rapid Assessment Team was deployed to complement the rapid assessment efforts by the United Nations Disaster Assessment and coordination team and the Government of the Union of Myanmar.

**THE ASEAN FOREIGN MINISTERS MEETING**

The role of ASEAN in providing assistance in the aftermath of the cyclone was agreed upon by the foreign ministers of ASEAN, at their special meeting in Singapore on 19 May 2008. Based on recommendations from the ASEAN Emergency Rapid Assessment Team, the foreign ministers agreed to establish an ASEAN-led coordinating mechanism to facilitate effective distribution and utilization of assistance from the international community, including expeditious and effective deployment of relief workers, especially health and medical personnel.

To operationalise this ASEAN-led approach, the Foreign Ministers set up the ASEAN Humanitarian Task Force for the Victims of the Cyclone Nargis (AHTF), headed by ASEAN Secretary-General Dr. Surin Pitsuwan. The Task Force works closely with the United Nations as well as the central coordinating body set up by the Myanmar Government.

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**THE PLEDGING CONFERENCE**

The ASEAN-United Nations International Pledging Conference was held in Yangon on 25 May 2008, bringing together delegations from 51 countries, including ASEAN Member States, as well as 24 United Nations agencies, the World Bank, Asian Development Bank and non-governmental organisations. Myanmar Prime Minister General Thien Sein, ASEAN Chair Mr. George Yeo from Singapore and United Nations Secretary-General Ban Ki-moon opened the conference, which concluded with unanimous agreement on the need to urgently scale up relief efforts to ensure that all those in need were reached quickly and with adequate relief supplies. The Pledging Conference also stressed the need and importance of a credible assessment, which led to the commissioning of this Post-Nargis Joint Assessment. This report is the outcome of this joint assessment

**ASEAN-LED MECHANISMS**

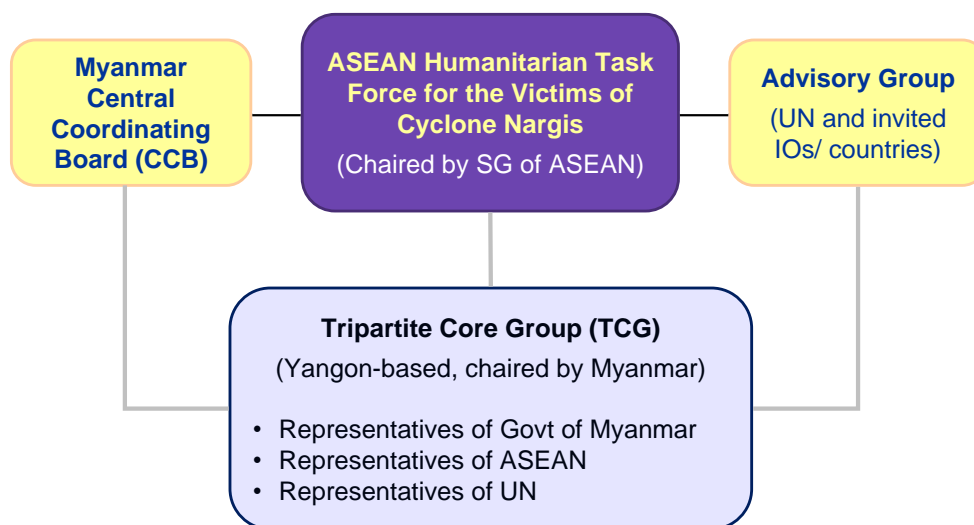
For the purpose of a day-to-day efficient operation, ASEAN also set up a Yangon-based “Tripartite Core Group” comprising nine representatives from the Government of the Union of Myanmar, ASEAN and United Nations as a working mechanism for coordinating, facilitating, and monitoring the flow of international assistance into the country. This report was commissioned by the Tripartite Core Group. The first two press releases of the TCG are included in Annex 20.

In order to assist the Task Force in providing relevant technical expertise and inputs, an Advisory Group to the ASEAN Humanitarian Task Force was established. The Advisory Group currently consists of representatives from the neighbouring countries of Myanmar (i.e. China, India and Bangladesh), United Nations, the Red Cross and Red Crescent Movement, the World Bank, the Asian Development Bank and international non-government organisations.

To support the ASEAN-led coordinating mechanism, ASEAN Secretariat set up a Coordinating Office in Yangon to work closely with representatives of the Government of Myanmar and the United Nations under the Tripartite Core Group and provide secretariat support for the ASEAN Humanitarian Task Force.

The ASEAN-led coordination mechanism is shown in Figure 7.

**Figure 7: ASEAN- led coordination mechanism**





**THE ASEAN ROUNDTABLE**

On 24 June, an ASEAN roundtable was held in Yangon, bringing together the ASEAN Humanitarian Task Force and Tripartite Core Group members, Government of Myanmar, potential donors and humanitarian and development partners, to review progress made since the May pledging conference, and present initial findings of the Post-Nargis Joint Assessment.

**Table 13: ASEAN Member States' Assistance to Cyclone Nargis (as of 11 July 2008)**

| Country           | Financial Aids   | Relief and Other Aids   | Relief Teams   | Rapid Assessment          | B /R  |
|-------------------|--|---|--|---------------------------|-------|
| Brunei Darussalam | USD 1,100,000  | Water, foods, emg shelter, medicines  | 12 pax medical team, SAR, logistics teams on standby | 1 pax for ERAT            | B & R |
| Cambodia          | USD 300,000  |   |  |                           | B     |
| Indonesia         | USD1,000,000   | 25 MT relief aids in 2 planes   | 29-pax medical team                                  | 3 pax for ERAT            | B & R |
| Lao PDR           | USD 120,000  | 2.5 MT food aid 1.3 MT clothing, drinking water   | 23-pax medical team                                  |                           | B     |
| Malaysia          | USD1,000,000   | 13 MT relief goods in two planes worth MYR 500,000  | 25-pax medical team                                  | 2 pax for ERAT            | B & R |
| Philippines       | USD 359,000  | 13 MT drinking water, and relief aids   | 30-pax medical team                                  | 1 UNDAC<br>4 pax for ERAT | B & R |
| Singapore         | USD 3,293,470 relief package as of 23 May 08<br>USD 5 million pledge | SAR equipment, infocomms technology, base camp supplies, medicals and vehicles<br>Airport ground handling equipment   | 23-pax Medical "Team Singapore"                      | 2 UNDAC<br>2 pax for ERAT | B & R |
| Thailand          | USD800,000   | USD 15.26M worth of food and non-food relief items and equipments in 26 flights. Pledge includes staging area at Don Muang Cargo, and post-immediate relief | 2 medical teams<br>30 pax<br>and 32 pax              | 4 pax                     | B & R |
| Viet Nam          | USD 200,000 (through the UN)<br>Viet Nam Red Cross:<br>USD170,000    |   | Medical team 15 pax                                  |                           | B     |

Note B: through bilateral mechanism; B & R: through bilateral supported by regional mechanism

**REGIONAL IMPLICATIONS OF CYCLONE NARGIS**

Cyclone Nargis happened in the eve of the ASEAN Charter, a critical juncture of this region coming of age with regard to integration. In the background is the ASEAN Agreement on Disaster Management and Emergency Response (AADMER), a cornerstone of the region's integration in the field of disaster management. The agreement was signed soon after the Indian Ocean Tsunami and has strong flavor of the Hyogo Framework for Action, although it was conceptualized and negotiated by and in the ASEAN Committee on Disaster Management far before those events. This instrument, which Myanmar has ratified, is a progressive regional instrument comprising complete elements of regional cooperation in disaster risk reduction, preparedness, response and recovery with rich reference to ASEAN's own long traditions in relief – oriented cooperation, United Nations' instruments, as well as the International Disaster Response Laws and Regulations (IDRL).

The AADMER has several associated apparatuses that are constantly evolving and are at varying levels of maturity. These include the ASEAN Committee on Disaster Management (ACDM), Standby Arrangements and Standard Operating Procedures (SASOP), ASEAN Regional Programme on Disaster Management (ARPDM), ASEAN Regional Disaster Emergency Response Simulation

Exercise (ARDEX), ASEAN Disaster Management and Emergency Relief Fund, and at the core the ASEAN Coordinating Centre for Humanitarian Assistance on disaster management (AHA Centre). In addition, there are hosts of other relevant regional frameworks including the disaster relief cooperation component of the ASEAN Regional Forum, the ASEAN cooperation on land and forest fire and transboundary haze pollution.

Some of the regional implications of the response mechanism to Cyclone Nargis are:

*Operationalising the regional cooperation mechanism for disaster response:* This operation utilised the steps and phases stipulated in the SASOP, starting with a deployment of an emergency rapid assessment team that triggered a policy decision at ministerial level, forming of a specific task force, mounting of international conference, forming of the Tripartite Core Group as a field level convergence policy making body, conducting joint assessment, planning for implementation and monitoring. Throughout the course of the operation, ASEAN relies on its regional instruments while it adopts innovative measures and adjusts to the fast-changing environment. Through conscious and thorough documentation, ASEAN is feeding back the experience into the regional cooperation mechanisms for disaster response. Future performance of ASEAN and the region will most likely be guided by this precedent.

*Refining of ASEAN Roles in humanitarian practices:* As ASEAN is becoming more conversant in applying the provisions of its regional instrument in disaster management and emergency response, it will also develop confidence in actively engaging in humanitarian discourse and practices in the sub-region. The ASEAN values and framework, its maturing integration, and international roles will provide strategic infusion of a unique role in humanitarian theatre. As such, the unique experience from Nargis will shape the humanitarian set up in the sub-region. ASEAN will maintain its political non-implementation nature.

This bodes well for future joint initiatives that aim to bring together different interests and strengths, and serves as a model for regional community-building in the area of disaster management and emergency response. Regional mechanisms that have not yet been brought to bear – such as the ARF search, rescue and disaster-related work, and the scope of the ACDM itself – can find a new rationale for more collaborative work.

#### **5.1.2.2. THE INTERNATIONAL RESPONSE**

The humanitarian response in the wake of Cyclone Nargis initiated through the United Nations, including in the flash appeal launched on 9 May, was organized into 11 thematic clusters. The relief delivered through these clusters is summarized below.

Table 14: Relief priorities and activities by the 11 clusters

|                                       |   |
|---------------------------------------|---|
| <b>Agriculture and Early Recovery</b> | <ul style="list-style-type: none"> <li>• A joint FAO-Government needs assessment highlighted the complex logistics involved in distributing agricultural inputs, as well as the urgent need for procurement of local and high yielding paddy rice seeds, fertiliser, power tillers, diesel, draught animals and animal vaccines.</li> <li>• Distribution of these inputs to 40,900 farming households is underway in 11 of the most affected townships of the two Divisions of Yangon and Ayeyarwady.</li> <li>• While it is unlikely that produce will be sufficient for all affected populations, efforts are being directed towards not losing the full planting season. Alternative crop strategies have been identified to mitigate the negative impact of the cyclone on the planting season.</li> <li>• Quick impact projects focusing on immediate clean-up and debris removal and the restoration of community infrastructure, are facilitating access for delivery of urgently needed assistance while supporting families and communities in rebuilding their lives.</li> <li>• By the end of June, a basic services package had provided early recovery support to 250 villages, reaching an estimated population of 113,000; such support can be quickly expanded under the Revised Appeal.</li> <li>• An early recovery network has been set up for inter-cluster coordination, and thematic working groups are addressing areas not covered by other clusters.</li> </ul> <p>Other observations/findings</p> <ul style="list-style-type: none"> <li>• The first response in many of the cyclone-affected areas was carried out by the communities themselves, with an important role played by monasteries, churches, local civil society groups and NGOs. Valuable support has also been provided by the Government of Myanmar and the private sector.</li> <li>• Preparation of the land for the up-coming rice planting season, which needs to take place before the end of July, has been hampered by lack of draught animals (e.g. buffalo).</li> </ul> |
| <b>Education</b>                      | <p>In Yangon (11 townships)</p> <ul style="list-style-type: none"> <li>• 46 temporary schools set up benefiting 7,248 children and 280 teachers.</li> <li>• Essential learning packages (exercise books, pencils, erasers, etc) provided to 52,610 children.</li> <li>• 435 Schools-in-a-Box and 459 Recreation Kits distributed benefiting 34,800 children.</li> <li>• Repairs of 440 primary school roofs (government, monastic and affiliated) initiated using 16,271 roofing sheets.</li> </ul> <p>In Ayeyarwady (ten townships)</p> <ul style="list-style-type: none"> <li>• Essential learning packages provided for 59,600 children in six townships (including Labutta, Bogale, Mawlamyinegyun, Pyapon).</li> <li>• 367 Schools-in-a-Box and 317 Recreation Kits distributed benefiting 29,360 children.</li> <li>• 824 primary school roofs repaired with 29,354 roofing sheets and tarpaulins.</li> <li>• 123 tents provided to Labutta and Bogale Townships; of which 48 set up to provide temporary learning spaces.</li> <li>• Tarpaulins provided to 18 affiliated and monastic schools in Wakema Township.</li> <li>• One informal school in a camp in Labutta set up by recruiting high school students in the camp to teach younger students at primary and middle school level.</li> </ul>  |
| <b>Food</b>                           | <ul style="list-style-type: none"> <li>• As of 3 July, a total of 18,703 metric tonnes (MTs) of food assistance has been delivered to the affected areas, of which 14,564 MTs has been distributed.</li> <li>• The Food Cluster has now reached a total of approximately 733,490 beneficiaries with food and cash assistance: 684,000 in the Ayeyarwady Division (food) and a further 49,490 in the Yangon Division (cash transfer).</li> <li>• 12 cooperating partners working around the clock with WFP to ensure outreach to previously unreachable areas for food distribution</li> </ul>   |
| <b>Health</b>                         | <ul style="list-style-type: none"> <li>• Disease surveillance: no outbreaks reported.</li> </ul>  |
| <b>Nutrition</b>                      | <ul style="list-style-type: none"> <li>• More than 200 tonnes of ready-to-use therapeutic food (RTF) has been distributed by UNICEF to partners who have already started supplementary and therapeutic feeding programmes in the field.</li> <li>• Existing State and Divisional Nutritional Teams and local NGOs are fully involved in micronutrient supplementation and identification/management of acute malnutrition through the vast existing network of midwives and rural health sub-centres.</li> <li>• The Ministry of Health (MoH) in collaboration with UNICEF has been able to establish four hospital therapeutic feeding units in affected areas and dozens of workers are trained in targeted feeding.</li> <li>• Staffing, training and initial assessments have enabled delivery systems to be in line with national guidelines on micronutrient supplementation, to avoid duplication, and to ensure that all of the most vulnerable are reached.</li> </ul>   |

|  |   |
|--|---|
| <p><b>Protection of Woman and Children</b></p> | <ul style="list-style-type: none"> <li>• Protection assessment carried out jointly by cluster members and information systematically shared with key partners regarding child registration, interim care, family tracing and reunification. Some key data includes: <ul style="list-style-type: none"> <li>⇒ The mortality rate of women between the ages of 18 to 60 years was twice that of men in the same age range;</li> <li>⇒ At least 22% of the affected population suffer from post-cyclone psychosocial distress;</li> <li>⇒ Only 12% of the affected population reported availability of child care services (including day care, schools and orphanages).</li> </ul> </li> <li>• Sub-clusters activated in affected areas to coordinate and support community-based protection networks.</li> <li>• Technical support provided to the development of a National Plan of Action for Child Protection in Emergencies by the Department for Social Welfare</li> <li>• 132 child friendly spaces (CFS) functioning, and includes the provision of psychosocial support to children.</li> <li>• 30,000 Dignity Kits, 398 early childhood development kits and 1,519 child protection kits have been distributed to vulnerable women and children.</li> <li>• UNFPA also distributed emergency reproductive health kits and supplies to provide care to approximately 450,000 people in affected areas</li> </ul> |
| <p><b>Shelter</b></p>                          | <ul style="list-style-type: none"> <li>• As of 30 June, the humanitarian community has provided some form of emergency shelter assistance to over 195,000 cyclone-affected households living in 11 townships in Ayeyarwady Division and 29 townships in Yangon Division. To date, the following has been provided;</li> <li>• 390,000 plastic sheets/tarpaulins (4mx6m sheets, two per household);</li> <li>• 19,000 community tool kits (one kit per five families);</li> <li>• 7,000 household relief kits (two blankets, two mosquito nets, water container, cooking sets and sanitary materials per household).</li> </ul>  |
| <p><b>WASH</b></p>                             | <ul style="list-style-type: none"> <li>• 800,000 litres of water supplied to 250,000 persons per day through 29 water treatment plants.</li> <li>• Nearly 250 ponds rehabilitated.</li> <li>• In spite of poor living conditions in camps, and contamination of water sources in the villages, there has been no alarming increase in incidence of diarrhoea as per WHO disease surveillance reports.</li> </ul>  |
| <p><b>Common Support Services</b></p>          |   |
| <p><b>Coordination</b></p>                     | <ul style="list-style-type: none"> <li>• Overall coordination structures strengthened at Yangon level after the cyclone to support planning, fundraising, and delivery.</li> <li>• Common humanitarian action plans developed through the cluster approach, and are monitored through the IASC country team.</li> <li>• Initially a United Nations disaster assessment and coordination team was deployed for this support. This was replaced by an OCHA team to provide support to the HC's Office.</li> <li>• Situation reports detailing the current situation and response efforts at the national and international levels have been compiled and disseminated regularly.</li> <li>• The Myanmar Information Management Unit provides an updated range of products including maps, databases and contact directories.</li> <li>• An early recovery network has been set up for inter-cluster coordination, while complementary thematic working groups are addressing early recovery areas that are not covered by other clusters (non-agricultural livelihoods; social recovery; community infrastructure; environment; and disaster risk reduction).</li> <li>• As early recovery efforts gain momentum over relief needs, OCHA support to the Office of the UN Humanitarian Coordinator will be handed over to the Office of the UN Resident Coordinator/Humanitarian Coordinator.</li> </ul>                   |
| <p><b>Emergency Telecommunications</b></p>     | <ul style="list-style-type: none"> <li>• Emergency Data communication support was provided in Yangon, Laputta and Bogale, Pyapon, Mawlamyinyun and Pathein, allowing UN agencies, NGOS and Government to better coordinate assessment, rescue and relief operations in the Ayeyarwady Division and the Yangon valley.</li> </ul>  |

|                  |   |
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| <b>Logistics</b> | <ul style="list-style-type: none"><li>• Five logistics hubs (Labutta, Mawlamyinyun, Pathein, Pyapon, Bogale) established in the affected areas;</li><li>• 7,645 MTs cargo dispatched into Myanmar by the Logistics Cluster;</li><li>• Total estimated number of relief aircrafts which delivered supplies to date: 528, including:<ul style="list-style-type: none"><li>⇒ Donor (Government) flights: 260, including 185 USAID flights, 22 DFID flights, 19 Thai flights;</li><li>⇒ UN Flights: 89 including 39 WFP flights;</li><li>⇒ NGO Flights: 89;</li><li>⇒ IFRC Flights: 79.</li></ul></li><li>• Web-based logistics information service established.</li><li>• Warehouse facilities were also set up in Yangon, from where relief goods were distributed using ten helicopters, 33 trucks and seven boats/barges. 89 remote locations have been reached through 466 rotations of ten helicopters.</li><li>• The field hubs allocated warehouse space to all interested UN agencies and NGOs and organised supply delivery to targeted locations</li><li>• As the immediate relief operations scale down, the logistics cluster will phase out by helping agencies to prepare their own transport arrangements as of August.</li></ul> |
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## Section VI: Disaster Risk Management







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## **SECTION 6. DISASTER RISK MANAGEMENT**

### **6.1. INSTITUTIONAL ARRANGEMENTS**

The Government of Myanmar has established institutional arrangements for dealing with disasters. The national level Natural Disaster Preparedness Central Committee (NDPCC), chaired by the Prime Minister, formulates policy and provides guidance on disaster preparedness. Similarly, the Chairmen of the State/Division/Township Peace and Development Councils also head Disaster Preparedness Committees at various levels. Emergency response functions are primarily assigned to the Fire Services department under the Ministry of Social Welfare, Relief and Resettlement. In addition, the Department for Meteorology and Hydrology (DMH) is responsible for disaster forecasting and early warning dissemination, and is currently leading several new initiatives in the area of disaster risk identification, assessment and monitoring. Other major partners for disaster risk management include the Myanmar Red Cross Society, the Departments of Health, Irrigation and General Administration, as well as the police and armed forces.

### **6.2. REGIONAL PARTNERSHIPS FOR DISASTER RISK MANAGEMENT**

The ASEAN Agreement on Disaster Management and Emergency Response (AADMER) was signed by member countries in 2005 and provides mechanisms to achieve a substantial reduction of disaster losses in the lives and social, economic and environmental assets of member countries. AADMER also provides for cooperation and collaboration among ASEAN Member States in areas of common concern along the priorities of action. The ASEAN Regional Programme on Disaster Management (ARPDM) being implemented by the ASEAN Committee on Disaster Management (ACDM) also provides a framework for promoting regional cooperation and outlines ASEAN's regional strategy, priority areas and activities for DRR for the 2004-10 period.

### **6.3. IMMEDIATE AND SHORT TERM NEEDS**

*Community-based disaster preparedness and enhancing risk awareness:* There is an opportunity to use community-based organizations to enhance disaster preparedness at the village level, including through the formation of village disaster preparedness committees and of specialized disaster management teams on various aspects of disaster preparedness (search and rescue, first aid, evacuation, etc.); community-based risk assessment, including mapping of past disasters and their impacts; and identification of priority interventions at the community level. These actions will not necessarily reduce future disaster risks but can enhance community preparedness to respond to disasters and minimize the loss of lives and livelihoods.

*Strengthening local level elements of early warning systems:* Cyclone Nargis has exposed weaknesses in early warning systems. Under the leadership of the government, and in cooperation with regional and international agencies, an end-to-end review of the early warning systems is currently underway. Strengthening of early warning systems will require a comprehensive effort. The efforts to generate improved forecasts and warning need to be matched with effective communication systems, public awareness and social infrastructure at the community level so that the warnings can be acted on.

*Introducing disaster risk reduction in reconstruction and recovery efforts* The rebuilding of permanent shelters is an opportunity to "build back better," including through the use of locally appropriate construction technologies, training of building artisans, and manuals on construction technologies. There is a need to initiate the process of setting design and safety guidelines for the housing sector, as well as for settlement planning, infrastructure, health and education facilities, water and sanitation, and livelihoods.

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#### **6.4. MEDIUM TERM NEEDS**

In the short and medium term, a comprehensive multi-hazard risk assessment should be carried out, to guide the reconstruction process as well as future development. This could be accompanied by an assessment of the existing early warning system to clarify roles and responsibilities, and a strengthening of institutional and legislative arrangements for disaster risk management systems, including strengthening local level disaster preparedness and response systems to increase capacity to manage risks.

Fostering national public-private partnerships would contribute to a holistic approach towards DRR, and the creation and strengthening of national integrated disaster risk reduction mechanisms. Finally, exploring the development of micro-insurance mechanisms could serve to guard against natural hazards for small farmers as well as small and micro enterprises, while the construction of multi-purpose evacuation shelters would provide physical safety.

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## ANNEXES





## ANNEX 1: THE VILLAGE TRACT ASSESSMENT METHODOLOGY

### OBJECTIVES OF THE ASSESSMENT

In the immediate aftermath of Cyclone Nargis, local authorities, UN Agencies, international non-governmental organisations (INGOs) and community based organisations (CBOs) made various rapid assessments of the situation. These assessments<sup>1</sup> guided the very early humanitarian response. However, these assessments were neither consistent in their content nor comprehensive in their geographical coverage, and this resulted in significant knowledge gaps.

The Village Tract Assessment was thus designed as a single assessment that would identify the vulnerabilities and capacities in the areas worst affected by the cyclone. Specifically, the assessment identifies relief and early recovery priorities for intervention in the immediate future, by collecting information on a range of sectors/clusters and in a number of communities across the affected areas. The assessment will also support future needs for monitoring and evaluation by providing a baseline on a range of issues.

### ASSESSMENT PRINCIPLES AND PROCEDURES

The assessment focuses on “affected” areas. The definition of ‘affected’ used to select the townships is the loss of life and/or property that has an impact on an individual’s, family’s or community’s livelihood, without any consideration for their ability to cope with the damage and destruction. The 30 townships assessed by the VTA are distinct from the 57 Townships included in the DaLA, in that the Townships selected for the VTA had populations requiring humanitarian assistance according previous assessments<sup>2</sup>.

The grid-based sampling frame endeavours to select communities of an even spatial distribution, whilst the assessment instruments ensure the gaps from previous assessments<sup>3</sup>. Communities were assessed using a household survey and various participatory approach tools, including transect walks, key informant interviews and focus group discussions.

The assessment uses the centric systematic area sample (CSAS) method to identify Probability Sampling Units (PSU). The method involves dividing the assessment area into non-overlapping squares (quadrants) of equal area (15km by 15km) and assessing the community or communities located closest to the centre of each quadrant. GIS is used in combination with sketch maps.

Map 1 illustrates the sampling method. The map displays a selection of the sampled area as an example of how to select communities. Two lines were drawn from corner to corner of each grid, as shown in the zoomed squares with a dotted lines to locate the community closest to the centre. Map 2 presents the location of the communities which were visited by the assessment teams.

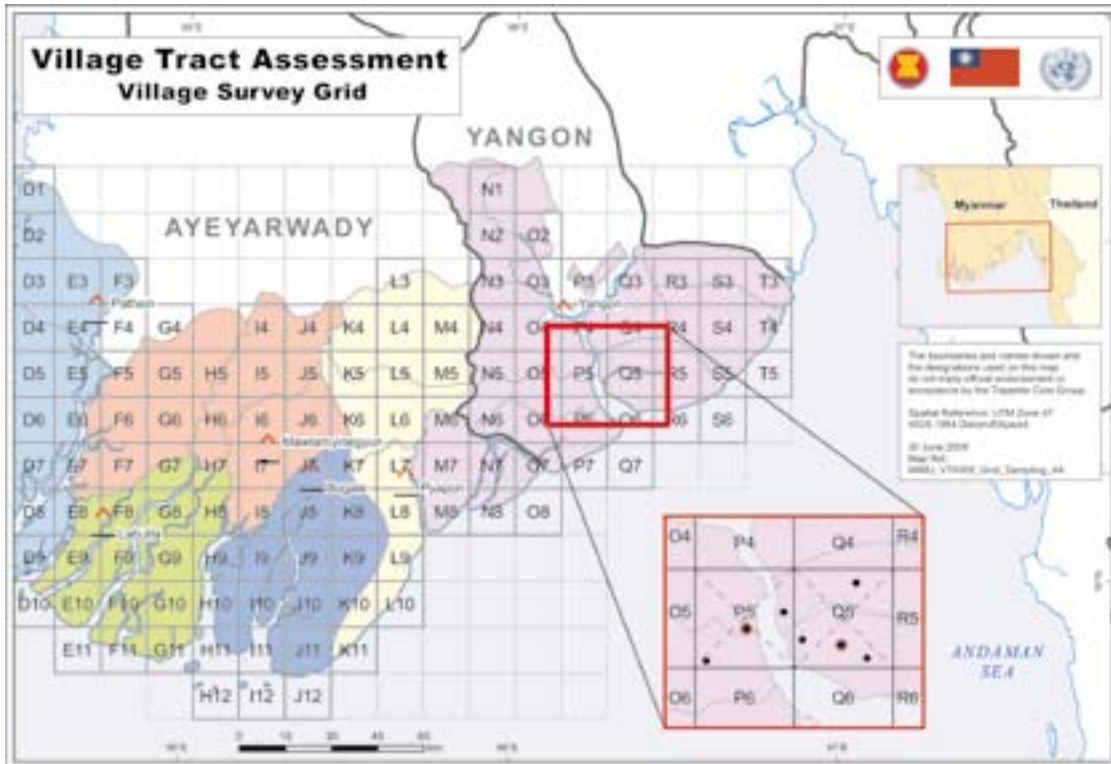
The number of communities sampled from each quadrant was primarily determined statistically: it represented 5% of all villages in the quadrant as well as being feasible to assess in a single day. The number varied between quadrants.

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1 Myanmar Information Management Unit (MIMU) (2008). Summary of Preliminary Assessments of Areas Affected by Cyclone Nargis, submitted to MIMU between 3 and 30 May 2008. 11 June 2008.  
2 MIMU (2008), op. cit.  
3 MIMU (2008), op. cit.

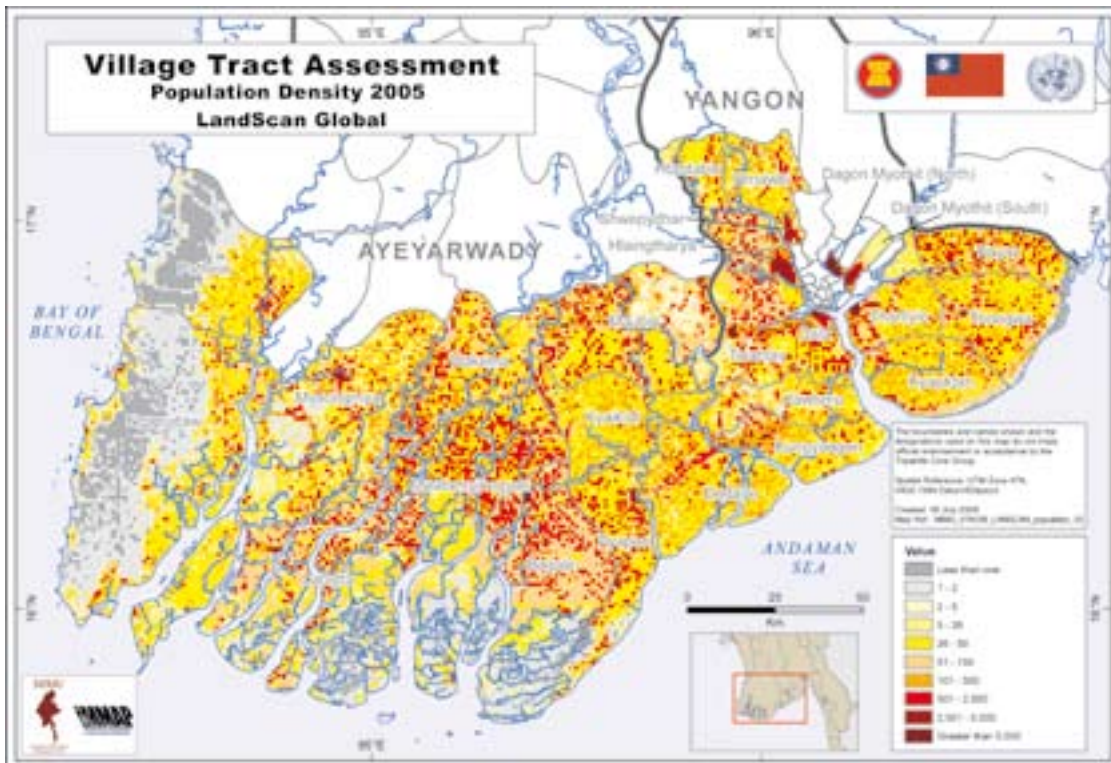


Map 1: Grid applied to sample villages



Source: VTA survey

Map 2: Population density as reported by the VTA



Source: VTA survey

The VTA collects primary information specifically from various sources at village level. Key informants, people representing an opinion or view on behalf of a community, were identified as

religious leaders, a teacher or head teacher, health worker for the community, village leader, a farmer and agriculturalist.

The assessment tool combined key questions from nine clusters: Health, Food and Nutrition, Protection of Women and Children, Water and Sanitation, Agriculture, Early Recovery, Temporary Settlements, Education, and Emergency Shelter. The questionnaires underwent translation and back-translation by independent translators twice and evaluated in the Pilot survey.

The questionnaires used for each village visit comprised of 10 Household survey interviews, 6 Key Informant interviews, 3 Focus Group Discussions, and 1 Observation checklist. Teams of enumerators visited 291 villages across 30 townships over a ten-day period in early June 2008.

The Myanmar authorities provided full cooperation, and no restrictions were placed on access to any location. Sub-national centres, referred to as Hubs in this document, were created in the Affected Area by the United Nations to assist in operational activities responding to the devastation left by Cyclone Nargis. The Hubs, located in Bogale, Labutta, Pathein, Pyapon, Wakema, and Yangon were used by the Village Tract Assessment (VTA) teams to implement the assessment. These Hubs are represented by the red star symbol on Map 1 in the main report. Ten villages were unable to be assessed due to logistical reasons

### **STRENGTHS OF THE ASSESSMENT METHOD**

The quadrat sampling method allowed sampling of villages without having their population figures. The sampling method guarantees even spatial coverage of the sample with small and large communities equally likely to be included in the sample, whereas methods such as PPS would have concentrated sampling on the most populous communities and areas. The even spatial sample allows reasonably detailed maps of prevalence to be made. Other methods would have produced a single wide-area estimate or allow only for coarse mapping.

The multi-disciplinary nature of the survey (i.e., quantitative, qualitative, and direct observations) provided a rich dataset and allowed data from different source and methods to be (partially) validated against each other. The effort was also inclusive. It provides a springboard for further in-depth investigations that may follow as well as a baseline of information against which to monitor recovery. Finally, it provides a far more substantial basis for monitoring than has been available in many disaster recovery efforts in the past.

### **LIMITATIONS OF THE ASSESSMENT**

The sample selection for households within each village was difficult to standardize. Some villages are so spread out that randomization was impractical. Parts of some villages could not be reached because bridges had been washed out. In large villages, a proximity sample centered on a single random location were assessed. In smaller villages, systematic sampling were used.

Sometimes questions had to be re-phrased or expanded with examples for villagers to understand them. Some women were reluctant to respond directly to male enumerators, in which case relatives were recruited to assist. Some were reluctant to answer certain questions. At times, observers had difficulties identifying destroyed houses when foundations had been entirely washed away. These variations may have introduced some biases which are difficult or impossible to correct in the analysis. Such biases are not unique to this type of assessment.

The lack of data on some key areas, namely a shortage of data on household population, has restricted the ability to confidently make statistical inferences. Finally, the administrative boundaries on maps of Myanmar are inaccurate, making it impossible to provide Township estimates of affected population and other findings other than proportions.

### **DATA PROCESS AND RESULTS**

Procedures were followed to ensure the data was not interfered with in transit from village

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to Hub and onwards to data headquarters. The original documents were photocopied twice. Data entry started as soon as a sufficient number of data had been collected. Data was entered twice and merged to limit the data-entry errors. Differences between two entries were checked by referring to the original data sheet.

Results on questions to Key Informants, Focus Groups, and Observation Checklists are reported as non-weighted proportions of affected villages. In the case of Household Surveys, findings are weighted based on the population estimates provided by the interview with the Village Leader. There was a rigorous procedure to check the accuracy of each village location by comparing GPS coordinates, quadrant record and numerous other location sources.

Interpretation of the findings was done by statisticians in close collaboration with Myanmar experts who are familiar with the Delta Region and specialists from the clusters.

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## **ANNEX 2: THE DAMAGE AND LOSS ASSESSMENT METHODOLOGY**

The damage and loss assessment (DaLA) methodology was developed originally by the United Nations Economic Commission for Latin America and the Caribbean (ECLAC) in the early 1970s.<sup>1</sup> This methodology has been continuously expanded and updated over the past three decades, and in recent years has been simplified and customized for application in different regions of the world. It has been applied by the World Bank and other international organizations in numerous cases of recent disasters, and provides a satisfactory framework to identify and quantify the socio-economic and environmental impact of disasters.

### **CONCEPTUAL FRAMEWORK**

The DaLA methodology is based on the utilization of the system of national accounts of the affected country as a means for valuation of the damage and the losses caused by the disaster. In the simplest terms, the DaLA methodology provides for the estimation of the destruction of assets caused by the natural event that caused the disaster, the changes in the flows of the economy caused by the temporary absence of the destroyed assets, and the modifications in the performance of the affected economy. In addition, it also provides the basis for assessing the negative impact on personal or household income and overall well being.

Damage is defined as the monetary value of fully or partially destroyed assets. It is initially assumed that assets will be replaced to the same condition – in quantity and quality – that they had prior to the disaster.

Losses are defined as the changes in the flows of goods and services that will not be forthcoming until the destroyed assets are rebuilt, over the span of time that elapses from the occurrence of the disaster and the end of the recovery period. Losses include production of goods and services that will not be obtained; higher costs of operation and production, and the cost of the humanitarian assistance activities.

### **TOTAL DISASTER EFFECTS ARE THE SUM OF DAMAGE AND LOSSES**

Macro-economic effects are defined as the manner in which the disaster modifies the performance of the main macro-economic aggregates in the affected country or region. These effects arise from the damage and losses caused by the disaster. Macro-economic effects represent a different view of disaster impact – as they describe the effects of the disaster on the functioning of the economy and the resulting macro-economic imbalances – and are therefore not added to the sum of damage and losses to avoid double accounting.

Main macro-economic effects include the impact on the level and growth of the gross domestic product of the country or region affected by the disaster; the modification of the normal pattern and structure of the balance of trade due to increased imports and lower exports of goods and services arising from the disaster; and the corresponding impact on the fiscal sector that may occur due to lower revenues and higher expenditures of the government.

The post-disaster macro-economic analysis also includes an examination of the impact on gross investment to take into consideration the investments to be made during the recovery, the examination of possible inflation stemming from the effects of the disaster, and negative impacts on employment and income at the personal and household or family level.

### **OBJECTIVES OF THE ASSESSMENT**

The assessment of damage and losses after disasters is essential for the estimation of financial needs for recovery. Priorities are defined in terms of the most affected sectors of the economy, geographical areas of the country and population groups to be attended during recovery.

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<sup>1</sup> Economic Commission for Latin America and the Caribbean (2003). Handbook for Estimating the Socio-Economic and Environmental Impact of Disasters, ECLAC, United Nations, second version.

Furthermore, the assessment of damage and losses provides a quantitative basis to monitor progress in the execution of post-disaster programmes.

### **ASSESSMENT PRINCIPLES AND PROCEDURES**

The DaLA relies on the estimation of disaster effects in each and all sectors of the affected economy. Once all sectors have been assessed in terms of damage and losses, the results are aggregated to obtain the total amount of disaster effects ensuring that no double accounting and/or gaps exist.

The above enables the analysis of the impact of damage and losses on the functioning of the affected economy, using the forecasted performance for the current year—and in some cases for several subsequent years—if the disaster had not occurred. In addition, estimates are made of the decline in personal or household income arising from the estimated losses in all sectors.

From there, estimates are derived of the financial needs for ensuring recovery, based on public policies designed to mitigate the negative impact of the losses on production as well as on a preliminary strategy for recovery that takes into consideration the possibility of “building back better” the destroyed or damaged assets for increased disaster resilience, within financial constraints.

Recovery estimates include support to rebuild private assets of the poorest households (such as housing, farming tools, and fishing equipment) but do not include compensation for private assets of the wealthier households or for the assets of industrial and commercial enterprises.

The procedure used in the Myanmar assessment involves many steps and activities, beginning with the collection of baseline information and of data on damages provided by the government through its different technical and service delivery ministries and offices. Immediately after, the DaLA assessment team carried out plausibility reviews of the data, including triangulation and independent verification of the data.

Baseline data was time-normalized across various sectors of the economy to provide the best possible reference for the analysis. This included desk reviews of information and the identification of information gaps and the possible sources for filling them, as well as detailed field surveys of the affected areas where extensive consultations were held with inter alia township officials, community leaders and representatives, non-governmental organizations, villagers, business owners and other stakeholders.

The assessment analysed information on disaster effects in a total of 79 townships located in Ayeyarwady, Yangon and other affected Divisions, and the macro-economic analysis covered the entire country with special reference to the Ayeyarwady and Yangon Divisions for which the system of national accounts provides adequate coverage.

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## ANNEX 3: NUTRITION AND FOOD SECURITY

### SUMMARY

In Myanmar, food security is more an issue of 'access to food' and 'food utilization' rather than availability. Generally, Myanmar is a food surplus country, producing sufficient quantities of rice, pulses and a variety of other food commodities. Although the country has been able to produce a food surplus, large segments of the population, including in the cyclone-affected areas, were food insecure and levels of nutrition were a serious concern before Nargis.

The Village Tract Assessment (VTA) survey results indicate that 42 percent of households lost all their food stocks during the cyclone, with another 33 percent losing most or some of their stocks. Thirty four percent of households reported no remaining food stocks on the day of the survey, and a further 45 percent reported stocks sufficient to last only 1 to 7 days. VTA results also show that while 54 percent of households were able to source food from local markets, over 50 percent of households obtained food from humanitarian agencies, with many households depending on multiple sources. After Nargis, households surveyed by the VTA consumed a much more limited variety of food items. Consequently, many households face increasing risks of acute malnutrition and micronutrient deficiencies among infants, young children and pregnant and lactating women.

The assessment team proposes a two-pronged approach to stabilise and improve the nutrition and food consumption status of the population in the affected areas over a 12-month period after Nargis. Firstly, significant relief food (in cash or in kind) for a period of 6-12 months after Nargis, depending on needs. Secondly, nutrition interventions over a 12-month period aimed at preventing a deterioration of the nutritional status of the most vulnerable groups, especially those who are potentially 'at risk'.

### PRE-DISASTER SITUATION

While Myanmar is a food surplus country, and has recently exported up to half a million tons of rice and more than one million tons of pulses annually, malnutrition remains a concern. Micronutrient deficiencies, especially Vitamin A Deficiency (VAD), Iodine Deficiency Disorders (IDDs) and Iron Deficiency Anemia (IDA), are significant public health problems.

While the Ayeyarwady Division is a major producer of rice, the southernmost areas, where the cyclone hit the hardest, were characterized as being the poorest areas of the Delta. Primary reasons for this include poor soils, lower yields, an elevated population density in a fragile ecological environment, and a high percentage of landlessness. Thus, while the country has been able to produce a food surplus, large segments of the population, including in the cyclone-affected areas, remain food insecure and levels of nutrition are a serious concern.

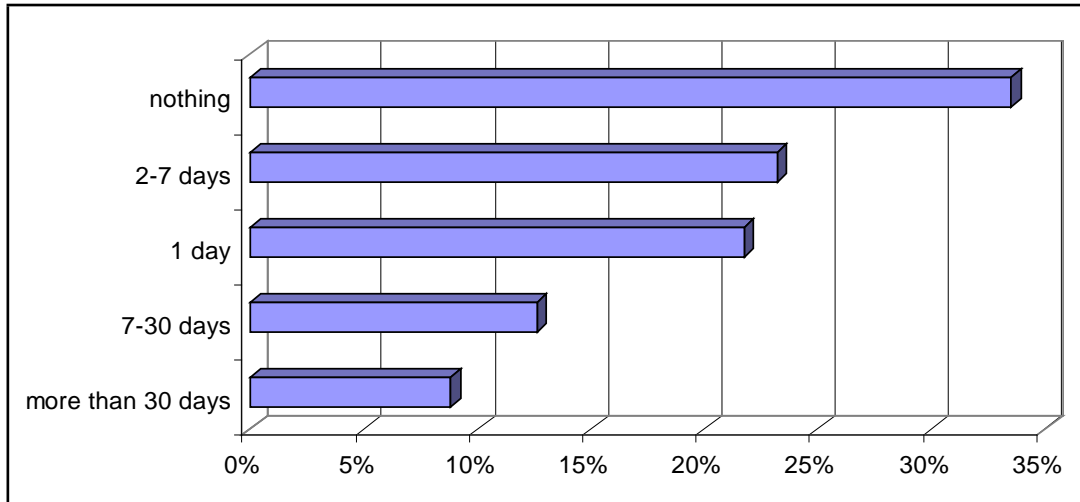
### IMPACT

In the immediate aftermath of the cyclone, a majority of households in the affected areas, many of whom were displaced at least temporarily<sup>1</sup>, faced difficulties in meeting their basic daily food needs. The Village Tract Assessment (VTA) survey results indicate that 42 percent of households lost all their food stocks, with another 33 percent losing most or some of their stocks (see map 2 in main report). Thirty-four percent of households reported no remaining food stocks on the day of the survey, and a further 45 percent reported stocks sufficient to last only 1 to 7 days (Figure 1).

1 See Annex 16 (Vulnerable Groups).



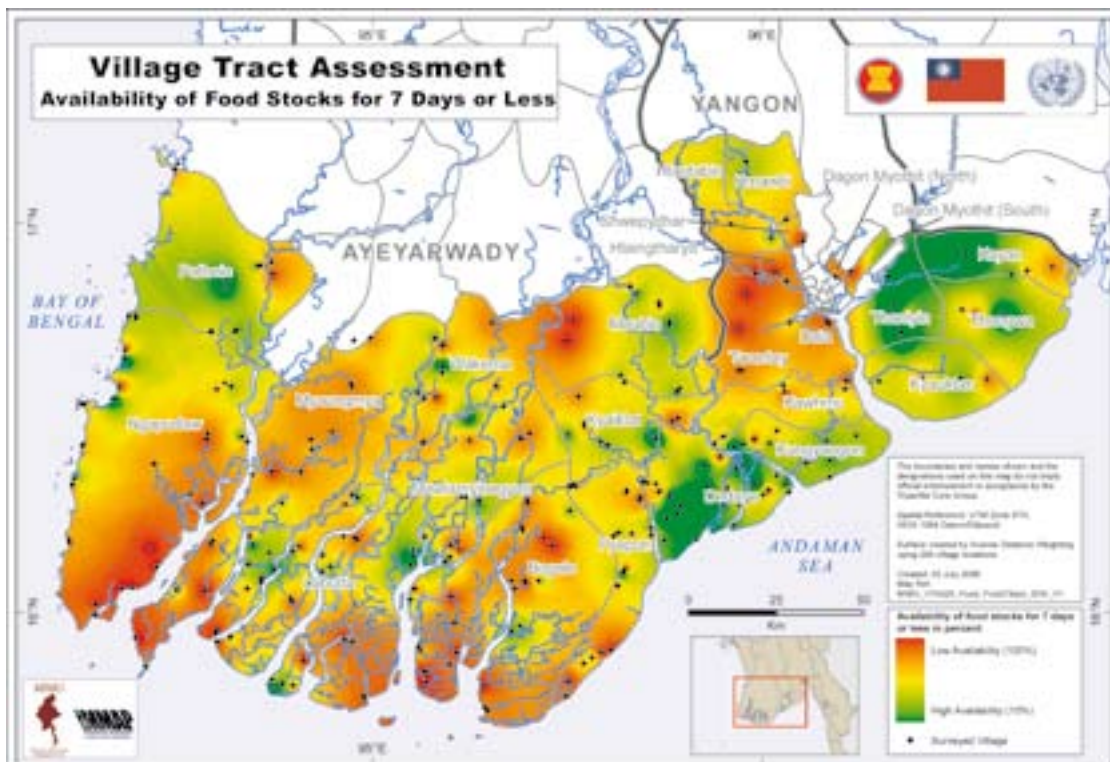
Figure 1: Availability of food stock as reported by households in the Delta



Source: Village Tract Assessment (2008).

The map below shows the availability of food lasting for one week or less. While green areas have enough food to last over a week, villages in the red areas represent those with the lowest food availability, meaning that 100 per cent stands for the fact that all their food stocks will be finished by the end of a week. The map shows that many villages in Labutta and Bogale still have low food stocks, not lasting for longer than a week. Despite strong efforts to bring aid and food supplies to these townships, the fact that most of their arable lands are flooded and that the cyclone took most of their livestock prevents households from holding a constant supply of food. There are, however, other areas in Myaungmya, Ngapudaw and Twantay which do not have enough food stocks to last for over a week.

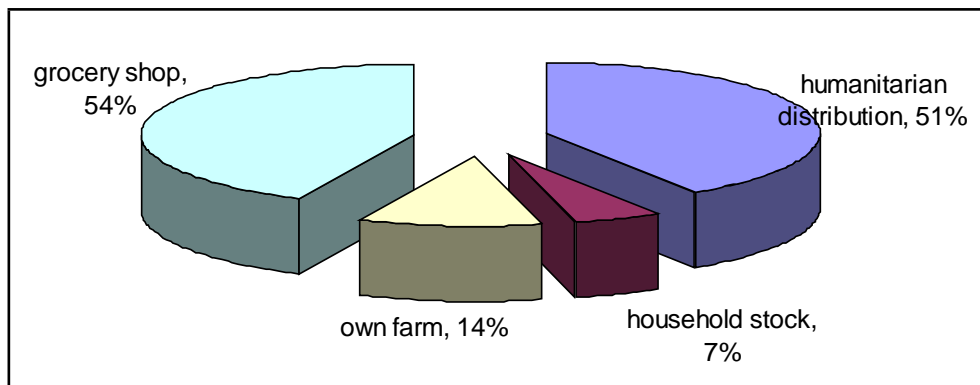
Map 1: Availability of food stock as reported by households in the Delta



Source: VTA Survey.

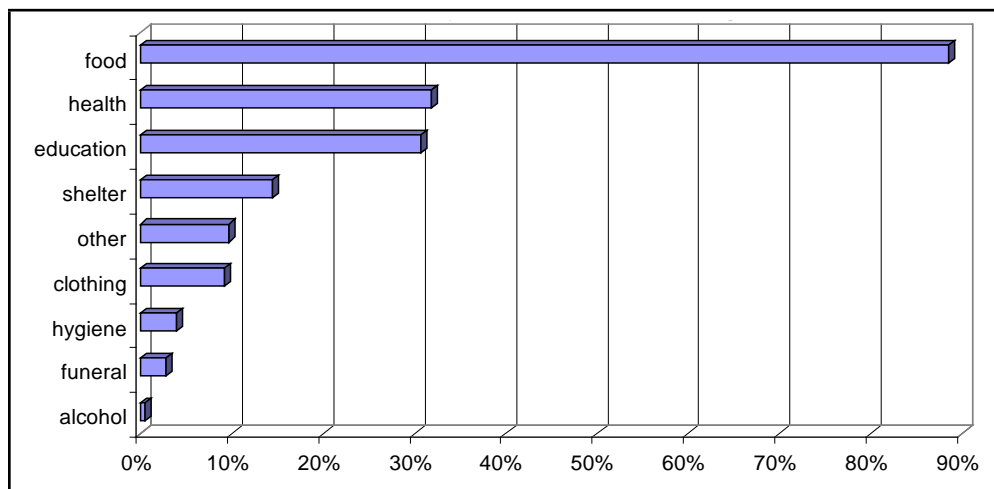
VTA results also show that while 54 percent of households were able to source food from local markets, over 50 percent of households obtained food from humanitarian agencies, with many households depending on multiple sources (Figure 2). Dependence on food aid surpassed 90 percent in some villages in the frontline townships of Labutta and over 70 percent in Dedaye. Overall, food was the highest priority expenditure for surveyed households, with 89 percent placing it as the top priority, followed by health (32 percent), education (31 percent), and shelter (14 percent) (Figure 3).<sup>2</sup>

**Figure 2: Sources of food as reported by households in the Delta**



1/ Multiple answers.  
Source: VTA survey.

**Figure 3: Priority expenditures as ranked by households in the Delta**



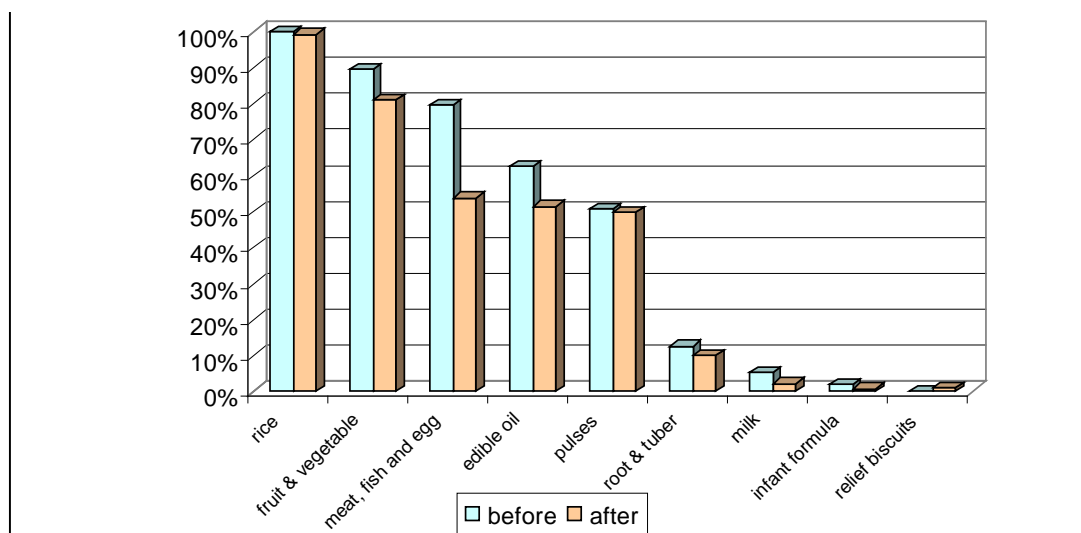
1/ Multiple answers.  
Source: VTA survey.

In addition to the low availability of food stocks at the household level, households surveyed by the VTA consumed a much more limited variety of food items (Figure 4). While rice remains the staple food for all households, the proportion of households consuming fish and eggs, the main sources of protein and fat, dropped from 80 percent before Nargis to 54 percent after the cyclone. The consumption of vegetables and fruits, one of the main sources of vitamins and minerals, decreased by 9 percentage points and of edible oil by 11 percentage points. Consequently, many households face increasing risks of acute malnutrition and micronutrient deficiencies among infants, young children and pregnant and lactating women.<sup>3</sup> Malnutrition poses potentially tremendous consequences on children's cognitive, social and motor skills and their physical and emotional development.

<sup>2</sup> Respondents provided multiple answers.

<sup>3</sup> Micronutrient deficiencies can be exacerbated due to disrupted or insufficient access to micronutrient-rich foods such as fruits and vegetables. Those suffering from micronutrient deficiencies are at a higher risk of acute morbidity and death due to common illnesses that can arise during emergencies, such as diarrhoea and respiratory infections. The VTA survey indicates that 34 percent and 39 percent of household members experienced such health conditions, respectively.

Figure 4: Food consumption in the Delta before and after cyclone



Source: VTA survey.

### EXISTING RELIEF AND RECOVERY EFFORTS

In addition to the Ministry of Health and the National Nutrition Centre, a broad range of agencies is working together in order to reach affected communities. These agencies include UN organizations, international NGOs, the Myanmar Red Cross, faith-based organizations, local NGOs and community-based organizations.

The World Food Programme reported as of 30 June 2008 that as much as 17,000 MT of food commodities had been delivered to close to 730,000 beneficiaries in the Delta. An additional 50,000 beneficiaries received cash transfer to purchase food commodities from functional markets in five townships in Yangon Division. In total, USD 175,000 has been disbursed that way. WFP and partners have been working around the clock to ensure that previously unreachable areas for food distribution are being served.

Feeding for children under age five has been initiated. The Ministry of Health in cooperation with UNICEF has been able to establish four therapeutic feeding centers in affected areas and dozens of workers are trained in targeted feeding. More than 200 tons of therapeutic food has been distributed by UNICEF to partners and WFP has imported special complementary food for children 6-23 months old in worst-affected areas.

VTA results indicate that distribution of various forms of infant feeding—powdered milk, feeding bottles and teats—was reported by 3 percent, 3 percent and 1 percent of households, respectively. These items were mainly distributed by private companies, individuals, local authorities and NGOs.

### RECOVERY NEEDS AND STRATEGY

*Needs.* VTA data demonstrate that 55 percent of households had food for 1 day or less on the day of the interview, and over half depended in part or wholly on food aid. The continued provision of food assistance and nutritional assistance is therefore essential until at least the next harvest, especially to marginal farmers (those who farm less than one acre of land) and the landless. Though markets are functioning, it is proposed to pursue a mixed provision of food—to reduce pressure on markets on the supply side—and cash—to increase peoples' purchasing power and stimulate demand—in the short-term, until market supplies recover fully.

*Strategy.* The assessment team proposes a two-pronged approach to stabilise and improve the nutrition and food consumption status of the population in the affected areas over a 12-month period after Nargis. Firstly, significant relief food (in cash or in kind) for a period of 6 months

after Nargis until the next harvest in October/November 2008 (see below). This would allow needy families to restart their livelihoods without worrying about basic food items. The provision of relief food would be reduced progressively thereafter, and phased out entirely with the subsequent harvest in April/May 2009. Secondly, nutrition interventions over the 12-month period aimed at preventing a deterioration of the nutritional status of the most vulnerable groups, especially those who are potentially 'at risk'.

A central tenet of food assistance during the 12-month period would be the supply of basic food commodities to households for free, and a shift to conditional transfers (cash/food for work) as and when the conditions in the villages improve. In the first 6-month period, 724,000 beneficiaries in the affected areas of the Delta would receive a basic food basket, consisting of rice, pulses, fortified oil and iodized salt. Furthermore, 200,000 affected families in urban areas would receive cash transfers to increase their purchasing power.

Central elements of immediate nutrition support are: effective management of acute malnutrition through supplementary and therapeutic feeding to 60,000 children aged 6-59 months and 28,000 pregnant and lactating women; support for the local production of blended fortified food; support to and the promotion of appropriate feeding practices; and control and prevention of micronutrient deficiencies through the provision of vitamin A and multi-micronutrient supplementation to 218,000 children aged 6-59 months and 100,000 pregnant and lactating women.

*Cost estimate.* The total estimated cost for food security and nutrition interventions during the 12-month post-Nargis period amounts to USD134 million, of which USD116 million is for food assistance and USD18 million for nutrition. Implementing agencies will aim to avoid duplication of efforts through coordination in the existing Food and Nutrition Clusters. Critical for the successful provision of food and nutrition assistance will be effective targeting of the neediest, the timely and safe delivery of supplies and services to the affected villages, and harmonized distribution mechanisms<sup>4</sup>.

*Next steps.* Household food security and nutritional assessments, and regular monitoring through routine data collection and reporting, rapid nutritional assessments, household surveys and surveillance, are essential to review the efficiency and effectiveness of the interventions in accordance with the objectives of the recovery programme. In this regard, a Food and Nutrition Survey is planned for July/August 2008 to provide a better understanding of the nutritional status of the households in the affected areas. This survey will help direct future programming and refine the target groups, as needed.

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4 See Annex 15 on Social Impacts.

## ANNEX 4: HEALTH

### SUMMARY

Despite recent improvements in some indicators, the health status of the people of Myanmar remains of concern, with considerable disparities in health and nutrition outcomes across geographic areas. Government expenditure on health is low, representing only 0.2 percent of GDP in 2005. UN agencies and bilateral agencies, as well as International Non Government Organizations (INGOs), continue to provide multi- and bilateral assistance.

Overall, the level of damage to health facilities and services is estimated to be around K12,800 million whilst the losses are estimated at around K6,100 million. Most of the damage affected facilities that serve more remote and rural populations. Information from the Village Tract Assessment survey indicates there are significant health impacts following the cyclone at the village level including: (i) a range of health risks that will require the health system to be vigilant with respects to potential disease outbreaks; and (ii) urgent and on-going health needs for survivors.

The assessment team proposes a recovery strategy aimed at preventing disease outbreaks; meeting basic needs of the population and assisting them to recover from the physical and mental effects of the cyclone; and restoring the local health care system of the Delta in a way that manages pre-cyclone resources to provide better health care and improves the health outcomes of the population in the affected areas. The indicative costs of the recovery strategy are estimated at K31,000 million.

### PRE-DISASTER SITUATION

*Health and nutrition outcomes.* Despite recent improvements in some indicators, the health status of people in Myanmar remains a concern. Recent estimates of infant and child mortality rates vary<sup>1</sup>. Nutrition is also a concern, with iron deficiency anemia, iodine deficiency disorders and Vitamin A deficiency common causes of micronutrient deficiencies.

Communicable diseases remain a major challenge and contribute the largest share of the disease burden, accounting for an estimated 60 percent of years of life lost in 2002. For example, 70 percent of the population lives in endemic malaria areas, and Myanmar is one of the 23 countries globally designated as a "high tuberculosis burden" country.<sup>2</sup> Estimates for people living with HIV/AIDS range from 240,000 upwards (which translates to a prevalence rate of at least 0.67 percent among the age group of 15-49 years)<sup>3</sup> indicating that HIV/AIDS poses a sustained challenge to improved health outcomes in Myanmar. Data on causes of child morbidity are limited, but acute respiratory infections, diarrhoea, meningitis, and malaria are believed to be the main causes, with high rates of malnutrition being both a cause and consequence of this morbidity profile.

*The health system.* Health care is provided through both the public and private sectors. The public sector is centralized with most basic health services provided at the township level and below. Townships, covering 100,000-200,000 people, have the primary responsibility for providing health services. A typical township public medical care system includes a township hospital with 50, 25 or 16 beds depending on population, one or two station hospitals and 4 to 7 rural health centres (RHCs) serving about 20,000-25,000 people each. An RHC would have, on average, about four sub-centres (sub-RHCs) operated by a midwife and a community health worker. By 2008, the Ministry of Health (MOH) reported having 839 hospitals, 86 primary and secondary health centres and 1,473 RHCs and 6,599 sub-RHCs.

Health outcomes have improved somewhat in recent years.<sup>4</sup> For example, the 2003 Multiple

1 See UNICEF report "State of the Worlds Children 2008" as well as Overall and Cause Specific Under Five Mortality Survey 2002/03, Department of Health/UNICEF, 2003, and Overall and Cause Specific Maternal Mortality Survey 2004/05, Department of Health/UNICEF, 2005.

2 The incidence of tuberculosis is 171/100,000 population compared to 141 in the region.

3 Estimated by UNAIDS, WHO National AIDS Programme, 2007.

4 The national programs include national malaria, tuberculosis, HIV/AIDS, immunization, nutrition, integrated management of childhood illnesses (IMCI) reproductive health and birth spacing, leprosy elimination, health promotion and education, and school health services

Integrated Cluster Survey (MICS) found that 79 percent of children aged 12-23 months were fully covered by the immunization program. The percentage of births attended by a health worker rose from 46 percent in the 1990s to 57 percent during 2000-2006. Notwithstanding these achievements, utilization of government health services has declined over the last decade. This, in part, reflects the expansion of the private sector following the market-oriented reforms of the late 1980s and early 1990s. Sixty percent of all visits are now estimated to occur in private facilities.<sup>5</sup> Traditional medicine also plays an important role in service delivery.

*Health financing and health system resources.* Myanmar's health sector is financed by a mix of general government revenue, external assistance, social security contributions, community contributions, and out-of-pocket payments by households. Government expenditure on health is low. Expanding health infrastructure with declining government spending led to a growing reliance on out-of-pocket spending by households for staff incentives and recurrent costs. The social security system covers approximately 1 percent of the population.

*Health human resources.* There has been a rapid increase in the supply of health human resources in the late 1990s and early 2000s. Between 2004 and 2008 the total trained professional health workforce is reported to have increased by 27 percent from over 56,500 to 71,800. The number of doctors, nurses and midwives increased 27 percent, 35 percent and 20 percent, respectively, over the same period. Notably the number of doctors in cooperative and private practice also increased to at least maintain their share of the total over this period.<sup>6</sup> Public sector doctors also provide a significant range of private services.

*International support for health.* UN agencies (WHO, UNICEF, UNFPA, UNAIDS) and bilateral agencies (JICA, DFID) continue to provide multi- and bilateral assistance. Moreover, in 2002, there were at least 27 INGOs active in the sector, mostly in maternal and child health, primary health care, environmental sanitation, rehabilitation of disabled and handicapped, and prevention and control of communicable diseases. Bilateral agencies and the European Commission (EC) provide funding to address HIV, tuberculosis and malaria. The EC and USAID, in collaboration with WHO and technical support from the World Bank, also provide assistance for preparedness and surveillance of Avian and Human Influenza.

## DAMAGE AND LOSSES

The assessment team estimates that the cyclone resulted in the destruction or severe damage of about 57 percent of public facilities in all affected areas. 10-15 percent of these facilities were fully destroyed while the remainder were partially damaged.<sup>7</sup> Village leaders indicate that about 50 percent of the damaged facilities have been partially repaired. Cyclone damage was largely in two Divisions, Ayeyarwady and Yangon, with the number and proportion of facilities damaged being greater in Ayeyarwady (Table 1).

**Table 1: Damage to Public Health Facilities by Division/State**

| Division/State      | Damage     |            |            |            | Total*       |
|---------------------|------------|------------|------------|------------|--------------|
|                     | Full       | Partial    | Roof       | None       |              |
| Ayeyarwady Division | 15%        | 21%        | 24%        | 40%        | 621          |
| Yangon Division     | 6%         | 14%        | 32%        | 48%        | 548          |
| Bago East Division  | 4%         | 17%        | 67%        | 12%        | 24           |
| Mon State           | 0%         | 35%        | 45%        | 20%        | 18           |
| Kayin State         | 0%         | 0%         | 0%         | 100%       | 6            |
| Percentage Total    | 11%        | 18%        | 29%        | 42%        | 1,217        |
| <b>Total</b>        | <b>129</b> | <b>222</b> | <b>346</b> | <b>520</b> | <b>1,217</b> |

\* Number of facilities

Source: PONJA Team Estimates

<sup>5</sup> UNICEF

<sup>6</sup> Health in Myanmar 2008, Ministry of Health, 2008.

<sup>7</sup> Based on administrative estimates, field visits, validation with humanitarian agencies and the Village Tract Assessment (VTA): while 70 percent of communities in the VTA report damage to facilities, this covers only the 30 most severely affected townships.



Most of the cyclone affected facilities serve more remote and rural populations, namely station hospitals, RHCs or sub-RHCs (Table 2). Larger facilities and training centres were also affected but the damage was either partial or restricted to roofing damage. Housing of staff was also affected: about 18 houses were reported to be totally destroyed and 76 partially destroyed. Housing damage is likely an underestimate as many midwives in villages sometimes reside in the sub-centres and lost their residence when these sub-RHCs were destroyed. Damage to health facilities was also accompanied by losses in equipment, supplies, vehicles and ambulances. More importantly, such damage has resulted in the disruption of health services to the majority of the rural population and the poor who rely on these facilities.

**Table 2: Damage to Public Health Facilities by Type**

| Facility Type               | Full       | Partial    | Roof       | None       | Total        |
|-----------------------------|------------|------------|------------|------------|--------------|
| 100+ Bed Hospitals          | 0%         | 46%        | 18%        | 36%        | 28           |
| 50-100 Bed Hospitals        | 0%         | 24%        | 47%        | 29%        | 17           |
| 16-25 Bed/Station Hospitals | 13%        | 25%        | 26%        | 36%        | 85           |
| RHCs/Clinics                | 7%         | 25%        | 42%        | 26%        | 257          |
| Sub-RHCs                    | 12%        | 14%        | 24%        | 50%        | 821          |
| Training Schools            | 0%         | 11%        | 89%        | 0%         | 9            |
| <b>Total</b>                | <b>129</b> | <b>222</b> | <b>346</b> | <b>520</b> | <b>1,217</b> |

Source: PONJA Team estimates.

Getting an accurate estimate on the private sector was difficult. First, many providers are both private and public. Second, some of the facilities that are listed as public are at times owned or even built by the community or the providers (for instance, some of the sub-RHCs). The assessment team was able to obtain some estimate of the private sector as well as estimates of the proportion of facilities that are private at the divisional level. This allowed a rough estimation of the private sector damages at the divisional level.

Overall, the level of damage is estimated to be around K12,800 million—about 10 percent is private and 90 percent is public and community owned (Table 3). Some of the facilities have been repaired. However, some of the repairs have been done without adequate technical assessment to examine the level of damage and the type of restoration needed. These may require additional work in the future.

**Table 3: Damage and Loss Estimates by Type of Health Facility**  
(Kyat million)

|   | Public        | Private      | Total         | BOP          | Fiscal Sector |
|---|---------------|--------------|---------------|--------------|---------------|
| <b>Damage</b>   |               |              |               |              |               |
| 100+ Bed Hospital                                       | 3,380         | -            | 3,380         | 826          | -             |
| 50-100 Bed Hospital                                     | 659           | -            | 659           | 108          | -             |
| 16-25 Bed/Station Hospital                              | 4,093         | -            | 4,093         | 1,207        | -             |
| RHC/other clinics                                       | 1,472         | -            | 1,472         | 493          | -             |
| Sub-RHC   | 1,894         | -            | 1,894         | 540          | -             |
| Training school   | 47            | -            | 47            | 7            | -             |
| Private clinics   | -             | 1,236        | 1,236         | 374          | -             |
| <b>Total</b>  | <b>11,545</b> | <b>1,236</b> | <b>12,781</b> | <b>3,555</b> | <b>-</b>      |
| <b>Losses</b>   |               |              |               |              |               |
| Additional medical care<br>(injury, mental, disability) | -             | 4,971        | 4,971         | 1,491        | -             |
| Preventive programs                                     | 1,086         | -            | 1,086         | 326          | 1,086         |
| Temporary facilities, etc.                              | 55            | -            | 55            | -            | 55            |
| <b>Total</b>  | <b>1,141</b>  | <b>4,971</b> | <b>6,113</b>  | <b>1,817</b> | <b>1,141</b>  |
| <b>Damage and Losses</b>                                | <b>12,686</b> | <b>6,208</b> | <b>18,894</b> | <b>5,372</b> | <b>1,141</b>  |

Source: PONJA Team estimates.

The losses are estimated at around K6,100 million with just over 80 percent of losses being private. Losses include estimates of the costs of additional medical care, preventive programs and supply side response as well as temporary response measures. There are reports of increased injuries as a result of Nargis and these are likely to be accompanied by an increase in disabilities. Population based estimates of such injuries were used to estimate the likely losses. The psychological and social impacts are also an important source of disability. Table 4 presents the estimates of damage and losses by Division, again demonstrating that total damage and loss falls largely in Ayeyarwady and Yangon.

**Table 4: Summary of Damage and Losses by Division/State**

(Kyat million)

| Division/State      | Damage        | Loss         | Public        | Private      | Total         | BOP          | Fiscal       |
|---------------------|---------------|--------------|---------------|--------------|---------------|--------------|--------------|
| Ayeyarwady Division | 5,425         | 2,594        | 5,431         | 2,587        | 8,018         | 2,220        | 484          |
| Yangon Division     | 6,393         | 3,058        | 6,223         | 3,228        | 9,451         | 2,764        | 571          |
| Bago East Division  | 479           | 229          | 506           | 202          | 708           | 173          | 43           |
| Mon State           | 474           | 227          | 516           | 188          | 704           | 213          | 42           |
| Kayin State         | 9             | 4            | 10            | 3            | 13            | 2            | 1            |
| <b>Total</b>        | <b>12,781</b> | <b>6,113</b> | <b>12,686</b> | <b>6,208</b> | <b>18,894</b> | <b>5,372</b> | <b>1,141</b> |

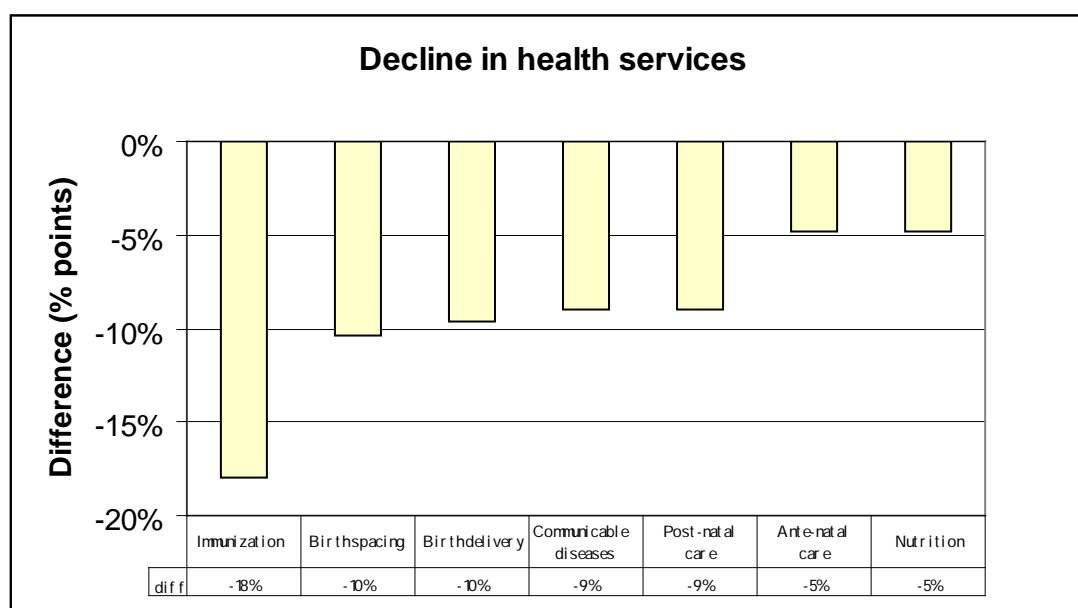
Source: PONJA Team estimates.

### HEALTH IMPACTS AT VILLAGE LEVEL

VTA findings indicate that there are significant health impacts following the cyclone at the village level including: (i) a range of health risks that will require the health system to be vigilant with respects to potential disease outbreaks; and (ii) urgent and on-going health needs for survivors.

The most common services available at the nearest health facility before the cyclone were immunizations, treatment of prevalent diseases, delivery, and antenatal care. Access by villages to these services has declined by 18 percent, 9 percent, 10 percent, and 9 percent, respectively.

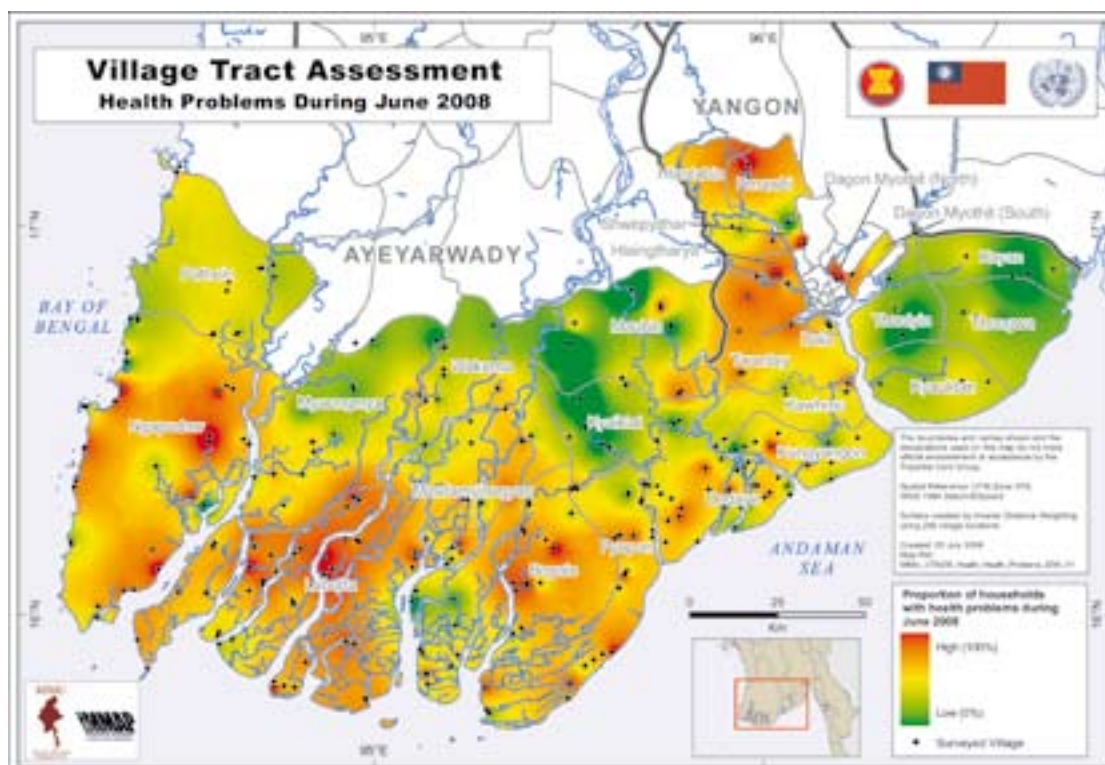
**Figure 1: Decline in health services as reported by health workers in the most affected townships**



Source: VTA survey – Key informant Health staff

*Reported health problems/conditions.* Almost two-thirds of households in the household survey reported health problems among household members during the 15 days prior to the survey. Map 1 below shows the variation of reported health problems at the village level; the areas in orange and red have higher proportions of households reporting health problems among household members. The most common health problems, according to VTA data, were cold (39 per cent), followed by fever, diarrhoea and respiratory problems (37 per cent, 34 per cent, and 22 per cent, respectively). Trauma and injury accounted for 8 per cent of problems. About a quarter of all respondents listed more than one complaint.

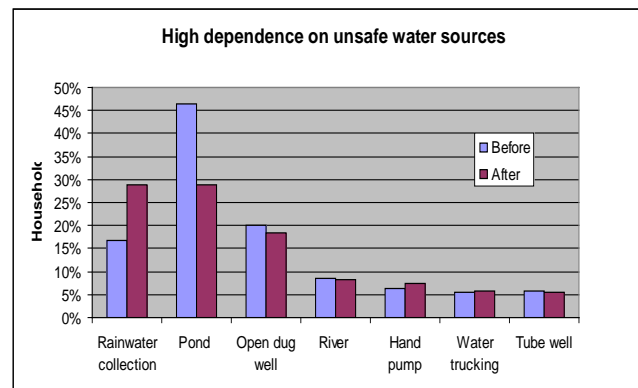
**Map 1: Health problems as reported by households in the Delta (early June 2008)**



Source: VTA household survey

The danger of a rise in enteric (gastro-intestinal) diseases is clear. Prior to the cyclone, 77 percent of those interviewed had a pit latrine; now this has declined to 60 percent. Most of those who lost their latrines now defecate openly, rising from 8 percent to 16 percent while defecation in trenches increased from 12 percent to 17 percent. Together the practice of unsanitary defecation – comprising open defecation, floating latrines and trenches – has almost doubled after the cyclone from 23 to 40 per cent. A particular concern is also the increasing use of floating latrines from 3 to 7 per cent in combination with the still common use of river water as a drinking water source as well as the low usage of soaps in only one-third of households. This is reflected in almost 60 percent of households who report not having access to clean water, further underscoring the potential for future health problems.

Almost 40 percent of the villages surveyed reported that their rivers and ponds have been salinated. Most have shifted from these sources to rainwater tank collection. 74 percent are using risky water sources at the household level, which include ponds, rivers and open dug wells. Households are aware of this risk; more than 60 percent of households reported the use unsafe water sources.

**Figure 2: Water Sources of Affected Households**

Source: Village Tract Assessment survey.

On the psychological impact of the cyclone, 23 percent of all respondents reported that family members had experienced or observed psychological problems due to Nargis. Reporting of psychological problems varied across townships (ranging from 6 percent to 51 percent). Among those with problems, only 11 percent had received any support or services to deal with it. This varied across townships, from 33 percent to only 3 percent. Health workers and village leaders reported slightly lower rates of the need for psychological care at 11 percent and 16 percent, respectively, and also reported, respectively, that 7 percent and 25 percent in need had received care.

*Health service challenges.* Less than half (47 percent) of respondents stated that they had adequate access to health facilities. About 80 percent of respondents indicated that they lived within an hour's walk or boat ride to a health facility. An additional 17 percent were 1-2 hours away, while 4 percent were more than 2 hours from a health facility.

As for availability of medicines, 53 percent of respondents reported that some essential medicines were partly available at the health facility. A further 18 percent reported that medicines were widely available, 14 percent said that they were unavailable, and 15 percent said that they did not know. Village leaders reported that facilities with some medicines declined after the cyclone by 3 percentage points, those with widely available medicines declined by 10 percentage points, and those without medicines increased 21 percentage points. Health workers reported nearly identical rates of change in access to medicines. At the townships level, almost everyone reported that medicines were widely available, but in remote townships almost everyone had only partial or no access.

## EXISTING RELIEF AND RECOVERY EFFORTS

The relief effort worked to ensure that preventive measures were taken to prevent disease outbreaks and ensure access to basic health care. WHO and other agencies assisted the Ministry of Health (MOH) through the establishment of an Early Warning and Response System in the affected areas to complement the MOH's existing disease surveillance system. No major disease outbreaks have been identified to date. Mobile teams have been organized to provide public health services as well as medical care. These efforts have succeeded in reaching the affected population: VTA results estimate that while prior to the cyclone only 9 percent of communities had service from a physician, that figure has now increased to 16 percent.

## RECOVERY STRATEGY AND NEEDS

The overall objective of the health strategy is to ensure the provision of basic services and restore the health care system in a way that provides better health care and improves the health outcomes of the population in the affected areas. The main pillars of the approach include: (i) ensuring basic health services including adequate disease surveillance and disaster preparedness; (ii) reconstruction of health facilities to agreed standards for cyclone resistance; (iii) responsiveness to demand-side constraints; and (iv) community support and reporting on results.

The activities will be facilitated by: (i) agreeing on one implementation plan and establishing coordination and information sharing arrangements between delivery agencies (including international partners) and MOH; (ii) ensuring provision of services per the agreed plan, including options for mobile services and deployment of staff and temporary facilities in areas of greatest need and establishing services in temporary accommodation; (iii) tracking needs and use of facilities and pharmaceutical and medical supplies (including vaccines). As many activities take place at the township level, one integrated township plan that includes all supported activities is important to ensure adequate coordination of various inputs. The plans should outline key needs as well as key outcomes expected and provide a mechanism to ensure adequate coordination and efficiency of resource allocation at the township level and below (including options to re-map/reconfigure facilities to better serve the population where they are fully destroyed).

*Ensuring basic health services.* For the next 12 months, the focus of the relief program will be on: immunization, supply of emergency drugs, outbreak preparedness and response, TB and HIV care and treatment, primary health care, sexual and reproductive health, mental health, hospital referrals for secondary and tertiary medical care and waste management. Damaged health and medical equipment will be replaced, including cold chain and waste-disposal infrastructure. The national and local primary health care networks and systems will be reactivated by mobilizing and supporting community health workers and voluntary workers.

*Health facility reconstruction:* This would involve: (i) undertaking, by specialized teams, detailed facility assessments and design as well as human resource needs; and (ii) rehabilitation of partially and completely damaged facilities, and equipment, supplies and vehicles needed for the restoration of services. A close examination of the standards for construction is warranted and consistent with the “build back better” agenda for restoration, taking into account lessons from this experience and from other countries that faced similar recovery challenges after natural disasters. The guidelines should look at options to make facilities more cyclone resistant, including, in addition to better building standards, the provision of solar systems or other measures to ensure sustained cold chain and power supply. It is estimated that one third of damaged health facilities can be rehabilitated in the first twelve months.

*Responsiveness to demand side constraints.* This would involve identification of constraints and other issues to the use of health services as well as other special needs for the poor and those seriously disadvantaged by the cyclone, including changes in population needs, location and affordability. Technical assistance would be required for a demand side assessment and options for implementation design of demand side financing arrangements. Options should draw on both international experience and experience within Myanmar from ongoing initiatives. Other types of assistance would include financing of health services for those disabled (hence, with reduced incomes) due to events surrounding the cyclone, and financing of health services for the most vulnerable arising from the impact of the cyclone, including the displaced.

*Community support and reporting on results.* Part of the success of the recovery phase will involve linkages with the community and mobilization of their support. This is not a new phenomenon as many of the previous RHCs and sub-RHCs were supported by the communities they served.

*Financing needs.* Overall health sector recovery costs are estimated c. K31,000 million, including K20,900 million (70 percent) for facility restoration and K10,100 million (30 percent) for service delivery restoration (Table 5).

**Table 5: Estimate of Health Recovery Needs**

(Kyat million)

| Items   | Total         |
|---|---------------|
| <b>A. Facility Repair and Restoration</b>                       |               |
| Township health system planning                                 | 400           |
| Facility assessment (supply side needs)                         | 100           |
| Facility design   | 772           |
| Repair and restoration  | 19,606        |
| <i>Sub-total 1/</i>   | <i>20,878</i> |
| <b>B. Service Delivery Restoration</b>                          |               |
| Public health (including mobile teams)                          | 1,380         |
| Human resource development and redeployment                     | 440           |
| Management and coordination of health services (township level) | 150           |
| Demand side financing design                                    | 200           |
| Health services for the disabled                                | 132           |
| Health services for the most vulnerable(including displaced)    | 6,520         |
| Emergency/ disaster management (incl. surveillance)             | 800           |
| Community support and result monitoring                         | 500           |
| <i>Sub-total</i>  | <i>10,122</i> |
| <b>Total</b>  | <b>31,000</b> |

1/ Indicative estimates suggest it might cost an additional K3,000 million to reconfigure the health system to meet long-term health service needs at the township level and below.

Note: Costings in this report cover all identified restoration health needs at 2008/09 prices. It is assumed that the restoration program will be undertaken over three years. By contrast, the costs of the overall program reflected in the overview section include inflation estimates for that proportion of the program estimated to be undertaken in 2009/10 and 2010/11; costs, thus, will be greater than reported in this Annex.

Source: PONJA Team estimates.

## ANNEX 5: EDUCATION

### SUMMARY

According to the Human Development Report 2005, Myanmar scores 0.76, just below the world average (0.77), on its Education Index.<sup>1</sup> The Education for All (EFA) Mid Decade Assessment 2007 reports net enrolment levels at 82 percent for primary education and 34 percent for secondary education in 2005/06. These aggregate figures mask significant variations across income levels. Data derived from the Multiple Integrated Cluster Survey (MICS) of 2000 indicate that almost 20 percent of children from the poorest quintile of the population never enrol in school, compared to less than 5 percent who do not enrol from their wealthier counterparts in the top quintile.<sup>2</sup>

Cyclone Nargis had a severe impact on the education sector, destroying about 4,000 schools. The VTA also shows that (i) a large share of schools were left with unusable latrines (57 percent), raising issues of public health safety; and (ii) there was widespread loss of school furniture, teaching and learning materials, all of which need to be replaced. The total damage and losses in the education sector due to Cyclone Nargis are estimated at K116 billion including K115 billion for replacement facilities, furniture and education materials and loss estimates of K1 billion (inclusive of expenditures related to temporary school facilities, recruitment and training of new teachers, clean-up costs and psycho-social counseling). Public general education accounted for the overwhelming proportion of the damages K106 billion (92 percent) of which primary education accounted for K92 billion (87 percent).

*Education sector needs* are estimated at K179 billion with: (i) K2 billion being required for service delivery restoration and overhead support; and (ii) K177 billion being for facility restoration including for resupplying furniture, teaching and learning materials and textbooks. It is estimated that K167 billion is required for the public general education cycle (93 percent of needs) while early childhood, monastic, higher education facilities and repair of administrative buildings require K11 billion (6 percent of overall needs). Most significantly the cost of restoring the primary education system is estimated at K142 billion (almost 80 percent of total needs).

### PRE-DISASTER SITUATION

The government has a clearly articulated EFA strategy. The education system is structured around five years of primary school, four years of middle school and two years of high school. Students are expected to enter primary school at the age of five and complete it by the age of ten.

*Education participation.* According to the Human Development Report 2005, Myanmar scores 0.76, just below the world average (0.77), on its Education Index. The EFA Mid Decade Assessment (MDA) 2007 reports net enrolment levels at 82 percent for primary education and 34 percent for secondary education in 2005/06. Comparable middle school and high school rates were 43 percent and 28 percent, respectively. These figures are fairly congruent with the Integrated Household Living Conditions (IHLC) survey of 2004 which suggests an 85 percent primary net enrolment rate. According to IHLC, Ayeyarwady and Yangon Divisions have generally ranked slightly above the national average in terms of primary net enrolment rates at about 88 percent each.

These aggregate figures mask significant variations across income levels. Data derived from the MICS indicate that almost 20 percent of children from the poorest quintile of the population never enrol in school, compared to less than 5 percent who do not enrol from their wealthier counterparts in the top quintile.<sup>3</sup> By the age of 11, approximately 60 percent of students in the richest quintile transferred to middle school, while only 10 percent of students in the poorest quintile continued to middle school.

Gender does not appear to be a critical factor in determining education attainment. The gender gap among younger age cohorts has been reduced notably compared to older cohorts. At

1 United Nations Development Program, Human Development Report, 2005.

2 United Nations Children Fund (UNICEF), Multiple Integrated Cluster Survey, 2000. This information on wealth quintiles derived from the 2000 MICS data base (unpublished). It was derived from an analysis of the household characteristics documented in the report applying a standard methodology used for establishing wealth indexes.

3 *ibid.*



present, the ratio of girls to boys in primary education is around 96 girls for 100 boys. Drawing from IHLC survey data, while Ayeyarwady Division had achieved gender parity, Yangon Division lagged behind with a ratio of girls to boys in primary level enrolment of 0.92 to 1. Table 1 below provides estimates of the number of school children in the cyclone affected areas.

**Table 1: Number of School Children (2007)**

| Division   | High    | Middle  | Primary   | Total 1/  |
|------------|---------|---------|-----------|-----------|
| Ayeyarwady | 49,532  | 135,683 | 499,108   | 684,321   |
| Yangon     | 124,222 | 288,769 | 520,363   | 933,354   |
| Total      | 173,752 | 424,452 | 1,019,471 | 1,617,675 |

1/ It is estimated that a further 7,800 students are enrolled in early childhood programs, the majority of whom are private.  
Source: Ministry of Education, 2008.

The number of public general education schools has increased steadily in the last 10 years. According to the Government of Myanmar, private general education schooling does not exist in the country, as all schools are public, managed by various Ministries such as Education, Agriculture, Science and Technology. Monastic schools receive a public subsidy for education costs through the Ministry of Religious Affairs. In 2005/06 the student-teacher ratio for primary education was 30:1 (34:1 in Yangon and Ayeyarwady) and for middle education was 33:1 (30:1 in Yangon and 39:1 in Ayeyarwady). Rural ratios tend to be higher, while urban ratios are often smaller.

**Table 2: Number of Public Schools (2007)**

| Division   | High | Middle | Primary | Total |
|------------|------|--------|---------|-------|
| Ayeyarwady | 207  | 317    | 4,068   | 4,592 |
| Yangon     | 229  | 232    | 2,204   | 2,665 |
| Total      | 436  | 549    | 6,272   | 7,257 |

Source: UNICEF, 2008.

Completion of primary schooling is constrained by both supply and demand factors. On the supply side, limitations exist in materials and infrastructure, as well as opportunities for teacher training, although access to schools does not appear to be a critical issue: according to the IHLC 2004 survey, 91 percent of the population lives within 30 minutes of walking distance to a primary school (90 percent for rural areas and 96 percent in urban areas); thus. The situation is different for access to higher education levels, where 46 percent of the population (36 percent in rural areas) lives within 30 minutes of a middle school, and 32 percent has access to a secondary school (17 percent in rural areas). In Ayeyarwady and Yangon Divisions, the proportion of the population with access to primary schooling was 96 percent and 97 percent respectively. The proportion of the population with access to middle and high school drops significantly to 51 percent and 31 percent, respectively, in Ayeyarwady, and 76 percent and 69 percent in Yangon.

Monastic schools follow the official school curriculum but fall under the administration of the Ministry of Religious Affairs. They primarily serve townships where access to schooling is limited. Formally registered monastic schools represent approximately 3 percent of primary education enrolments and under 1 percent of secondary education enrolments. In 2008, it is estimated that there were 308 registered monastic schools serving approximately 51,600 students in Yangon and Ayeyarwady Divisions. However, most village monasteries provide schooling (using the standard curriculum) for village school-age children. Enrolments in these schools are believed to be quite significant in aggregate terms and could account for as much as 10 percent of total primary school enrolments<sup>4</sup>.

<sup>4</sup> The estimates provided here are subject to some uncertainty but can be confirmed by detailed assessments which religious institutions consulted offered to facilitate at township level. The rebuilding of these monastic premises used for village schooling is included in the restoration of religious buildings. If these schools enrolled 10 percent of the students, then the cost of furniture and learning materials could account for an additional K2,000 million.

Early Childhood Care and Education service provision is limited and largely provided by a constellation of private sector providers including NGOs, INGOs, for-profit operators and faith-based organizations. The Department of Social Welfare is also an important player in the delivery of early childhood care. The Ministry of Education manages approximately 1,800 preschool centres for 37,000 students nationwide, from a total of 7,500 centres catering to 256,000 children. Yangon and Ayeyarwady Divisions have amongst the highest concentration of pre-primary education facilities.

The government also manages 896 community learning centres to provide basic literacy services to adults. A two-year program provides equivalency degrees to formal primary education for out-of-school children who never enrolled in or dropped out of school. However, these programs are relatively small. Non-formal education has been generally hampered by weak infrastructure and insufficient funding.

*Education financing.* On the demand side, household expenditure for education varies from 0.78 percent of total household expenditure in the Eastern Shan State to 2.4 percent of expenditure in Yangon City. Primary education is officially free in Myanmar. However, parents usually contribute payments for textbooks, paper, supplies, Parent Teacher Association Fund contributions, and miscellaneous school improvement fees. Contributions to enrol in school are estimated at K5,000-K8,000 for middle school rural students and K10,000-K14,000 for urban students. At the primary level, direct costs (contributions, school uniforms, private tuition and transport costs etc.) have been assessed at around K25,000 per child per year. A study in Yangon high schools estimated that education represented 16 percent of household income and private tutoring fees raised this figure to 27 percent (Bray, 1999)<sup>5</sup>.

Government education expenditure has been on the rise—from K68,700 million in 2005/06 to K204,000 million in 2007/08 (Table 3), yet total education investments remain low. In 2005/06, education represented about 8 percent of the total government budget or 0.6 percent of GDP; this is in contrast to 2001/02 when education expenditures amounted to K32,000 million representing about 18 percent of the government budget or 1.3 percent of GDP. Budgetary increases in basic education have been driven largely by increases in recurrent spending for teacher salaries.

**Table 3: Government Education Expenditures (Kyat Million)**

|              | <b>2005/06<br/>Actual</b> | <b>2006/07<br/>Estimated</b> | <b>2007/08<br/>Estimated</b> |
|--------------|---------------------------|------------------------------|------------------------------|
| Recurrent    | 46,500                    | 151,700                      | 160,700                      |
| Capital      | 22,200                    | 30,900                       | 43,300                       |
| <b>Total</b> | <b>68,700</b>             | <b>182,600</b>               | <b>204,000</b>               |

Source: Budget Department, Central Bank of Myanmar.

Parent-Teacher Associations (PTA) and School Boards of Trustees play major roles in financing education. Schools possess a PTA that raises funds regularly and levies fees on students.

*Teachers.* Traditionally seen as role models and community leaders, teachers are highly regarded in Myanmar society. In 2005, the government supported 210,705 teachers in basic education with over 85 percent being female (EFA MDA 2007). Teachers are trained using a two-pronged approach, with pre-service and in-service training provided. Qualifications of teachers vary according to the level of school being taught. Primary school teachers receive a Certificate of Education through a one-year course offered at Education Colleges after completing high school. Middle school teachers are expected to complete a two-year program after high school and receive a Diploma of Education. Meanwhile, high school teachers are trained at the Institute of Education and are conferred a Bachelor of Education after two years of distance learning or one year in residence (UNESCO, 2005).

Monthly base salary of primary school teachers starts at approximately K27,000 (see Table 4). Teachers in urban areas conduct private tutoring to supplement their income, while rural teachers often work part time pursuing activities such as the sale of local produce. Approximately 75 percent of all teachers are stationed in rural areas, around half of whom receive some kind of support (food

<sup>5</sup> The Shadow Education System: Private Tutoring and its Implications for Planners. Paris. IIEP.

or accommodation) from the community. In June 2004, the government ceased to provide rice to government employees but is paying an extra living allowance.

**Table 4: Monthly Teacher Base Salaries (Kyat)**

| Level          | Monthly Salary |
|----------------|----------------|
| Primary school | 27,000         |
| Middle school  | 33,000         |
| High school    | 39,000         |

Source: Ministry of Education.

## DAMAGE AND LOSSES

Cyclone Nargis had a significant impact on the education sector. Between 50-63 percent of schools were damaged or destroyed (3,600 to 4,500 schools).<sup>6</sup> School buildings are a centre piece in the livelihoods of many of the villages in the affected areas. According to the VTA, 73 percent of village leaders identified schools as the priority facilities needing immediate support for rebuilding. Damage brought about by the cyclone affected many schools throughout the region as observed in the map of Damaged School Buildings (map xxx in the main report). Most villages in the southern part of Ngapudaw Township were affected as well as many areas of Labutta, Bogale, Pyapone and Dedaye. Some school buildings are also reported as damaged near Yangon, in Kyauktan, Thanlyin and Twantay. The survey also found that latrines were rendered unusable in 57 percent of village schools, and a widespread loss of school furniture, teaching and learning materials, all of which need to be replaced. Table 5 present key findings of the VTA.

**Table 5: VTA Key Informant Responses \***

(Percent)

| Percent of Villages   | Village leaders<br>(n=281) | Teachers<br>(n=206) | Direct observation<br>(n=283) |
|---|----------------------------|---------------------|-------------------------------|
| with schools damaged *  | 32                         | --                  | 63**                          |
| with unusable school latrines                                       | 57                         | 57                  | 54                            |
| School furniture needed   | 89                         | 90                  | --                            |
| Textbooks needed  | 57                         | 63                  | --                            |
| Learning materials needed   | 64                         | 56                  | --                            |
| %with teachers trained on ways to help children deal with a cyclone | 7                          | 19                  | --                            |

Source: VTA Survey

Note: \* Covers only a proportion of the most severely affected townships, hence will overestimate total percentages.

\*\*39 per cent of schools were reported totally damaged and a further 24 per cent partly damaged

Damage in similar proportions to government primary and middle school buildings were also reported to monastic schools, public Early Childhood, Youth Development, and Community Learning Centers. Approximately 242 Early Childhood Care establishments managed by the private sector also incurred total or partial damages.

Additionally, education administrative offices experienced roof and partial damages, while about 500 university buildings and higher education administrative offices are reported to have had roofs toppled. Government reports that 113 teachers and school personnel lost their lives and that about 250 teachers are currently absent from their posts.

The education working group identified the immediate need for repair, rehabilitation, and support for materials, as the school year started on 2 June. The group agreed that attention to safety

<sup>6</sup> The information is drawn from administrative data, UN Agencies and the Village Tract Assessment (VTA). Administration figures show a range of 43- 49 percent destroyed. Only the VTA indicates 63 percent of schools damaged, but this focused on the thirty most severely damaged townships.

was paramount, and on the need to “Build Back Better”, with increased resilience to future cyclones or natural disasters. Opportunities, particularly where schools have been totally destroyed, exist to make school designs more child friendly.

*Damage assessment of schools.* The high level of destruction of civil works was a product of long-standing infrastructure that has been maintained inadequately or recently-erected buildings where construction standards have not been enforced. While education participation has grown steadily over time, capital investments have remained limited. Recurrent financing is dedicated mostly to financing teacher salaries, limiting regular operations and maintenance expenditures.

Damages in the education sector by School Type and location are presented in Table 6 below. Table 7 present damages to the public general education sector in more detail.

**Table 6: Damages in Education Sector by School Type and Location**

(Kyat million)

|  | Damages        | Percentage |
|--|----------------|------------|
| <b>Public general education</b>                          |                |            |
| Totally or partially damaged schools                     | 68,040         | 58.8       |
| Roof damaged schools                                     | 12,518         | 10.8       |
| Furniture, equipment and learning materials              | 25,832         | 22.3       |
| <b>Monastic education</b>                                |                |            |
| Partially damaged schools                                | 1,584          | 1.4        |
| Furniture and learning materials                         | 259            | 0.2        |
| <b>Early childhood, youth and adult literacy centers</b> |                |            |
| Partially or totally damaged <i>public</i> institutions  | 392            | 0.3        |
| Furniture and learning materials                         | 84             | 0.1        |
| Partially or totally damaged <i>private</i> institutions | 2,939          | 2.4        |
| Furniture and learning materials                         | 508            | 0.4        |
| <b>Higher education</b>                                  |                |            |
| Roof damaged higher education institutions and offices   | 2,742          | 2.4        |
| Furniture, equipment and learning materials              | 208            | 0.2        |
| <b>Administrative offices</b>                            | 559            | 0.5        |
| <b>Total</b>   | <b>115,665</b> | <b>100</b> |

Source: PONJA Team estimates.

**Table 7: Damages in Public Primary, Middle and Secondary Schools**

(Kyat million)

|   | Damages        | Percentage |
|---|----------------|------------|
| <b>Primary school</b>                       |                |            |
| Totally or partially damaged schools        | 59,297         | 55.9       |
| Roof damaged schools                        | 10,407         | 9.8        |
| Furniture, equipment and learning materials | 22,352         | 21.1       |
| <b>Middle school</b>                        |                |            |
| Totally or partially damaged schools        | 5,118          | 4.8        |
| Roof damaged schools                        | 1,005          | 0.9        |
| Furniture, equipment and learning materials | 1,964          | 1.9        |
| <b>High school</b>                          |                |            |
| Totally or partially damaged schools        | 3,367          | 3.2        |
| Roof damaged schools                        | 1,105          | 1.0        |
| Furniture, equipment and learning materials | 1,434          | 1.4        |
| <b>Total</b>                                | <b>106,050</b> | <b>100</b> |

Source: PONJA Team estimates.

Losses relate primarily to costs from providing interim public school facilities during reconstruction, compensation to families for teacher deaths, professional training for staff

replacements and provision of psycho-social counselling in affected areas (Table 8). Revenue stream losses in the private sector are considered minimal.

**Table 8: Losses in Education Sector**

(Kyat million)

|   | <b>Losses</b> |
|---|---------------|
| Provision of interim public school facilities | 672           |
| Family compensation benefits                  | 11            |
| Professional training for staff replacements  | 100           |
| Psycho-social counselling                     | 240           |
| <b>Total</b>                                  | <b>1,023</b>  |

Source: PONJA Team estimates.

Private sector damages in the education sector only account for a relatively small share of overall damages, around K3 billion or just over 2.5 percent of the total damages, given its limited presence (only in the early childhood care and development sub-sector).

### **EXISTING RELIEF AND RECOVERY EFFORTS**

The initial response to damages caused to the school system have been significant. Government, private sector organizations, NGOs and international donors have already provided funding estimated at K4.9 billion for the repair of primary and secondary schools with damaged roofs. The Ministry of Education has also delivered textbooks and some educational materials to schools in affected areas. NGOs and international partners have been supporting government efforts to reopen educational establishments or set up temporary learning spaces with a minimum set of educational inputs.

Since the launch of the Flash Appeal 430 school roofs (government, monastic and affiliated) have been repaired by humanitarian organizations (as of 4 July). Some 518 temporary safe learning spaces have been provided for schools and early childhood care and development (ECD), and student packages (exercise books, pencils, erasers, ruler and school bag, etc.) have been provided for 133,500 children. Over 800 Schools-in-a-Box and 837 recreation kits have also been distributed, potentially benefiting 65,560 children.

### **RECOVERY STRATEGY AND NEEDS**

The Recovery strategy in the education sector is to:

- Re-establish access to formal and non-formal education for all children affected by Cyclone Nargis through: (a) restoration of schools and other institutions of learning (e.g. ECD centres, monastic schools, affiliated schools); and (b) provision of immediate transitional schooling (e.g. tent classrooms) in affected townships, providing basic education materials and logistical support to facilitate back-to-school and other learning opportunities for children.
- Promote the resumption of quality education activities, including child friendly teaching/learning practices during recovery. An additional focus will cover provision of psychosocial support for teachers and children.
- Ensure a supportive learning environment through community mobilization to facilitate children's access to schooling and other learning opportunities.

Selected early recovery activities are covered under the revised Humanitarian Appeal, which aims in a 12-month period to increase the provision of temporary safe learning spaces (to 1,315 school and 520 ECD spaces); to provide repair and reconstruction of schools (1,640 schools, the majority temporary repairs which will need subsequent replacement); to provide basic materials to 362,400 girls and boys; and train education professionals (9,300) in Disaster Risk Reduction, and

child-friendly methodologies including psychosocial support.

Total recovery needs for the education sector are summarized in Table 9. It is estimated that total facility rehabilitation costs (including to furniture and school supplies and textbooks) are K146.5 billion with K125.1 billion required for primary schools, K11.5 billion for middle schools, and K8.7 billion for high schools. Additionally, close to K4 billion has been estimated for service delivery restoration including: (i) community mobilization and monitoring K900 million; (ii) interim public school provision not covered in the relief appeal (K2,500 million); and (iii) costs for family compensation benefits, training and psycho-social counselling, with emphasis for townships/areas not covered in the relief program (K510 million).

Construction/rehabilitation of schools is being undertaken through various modalities, and at different standards. It will be important early in the relief operation to agree on appropriate standards at different levels (temporary rebuilding, permanent rehabilitation) and to agree on successor arrangements for schools which will last through only one rainy season. Urgent action is also needed to ensure student safety in schools that have sustained serious partial or non-visible damage. A review by technical personnel of standing establishments is required in order to guarantee structural soundness. Where structures are found to be unsound, repair and rehabilitation should cede to complete reconstruction of school facilities. To address the emerging health, hygiene, psycho-social and other life-threatening issues affecting children in schools, coordination and partnership should also be promoted in the areas of water, sanitation and hygiene, protection, health, nutrition and shelter.

There appears to be some anecdotal evidence that the cyclone may have affected education demand, but this should be corroborated later in the school year with student attendance figures. While some form of children's work to support household livelihoods is a common occurrence, older children may now face increased pressure to help increase family earnings and compensate for inflicted economic losses. Through mobilizing government, well-wishers and NGOs, some support is being provided to families to help reduce the direct and opportunity costs of schooling through provision of cash and supplies, such as uniforms, textbooks or school materials. Efforts to improve livelihoods (Annex 14) will abate this problem but if enrolments do fall significantly a more formal approach including direct subsidies to those who are very vulnerable as a consequence of the impact of the cyclone might be needed.

**Table 9: Education Sector Needs**

(Kyat million)

|   |                |
|---|----------------|
| <b>A. Facility Restoration 1/</b>               |                |
| Early childhood                                 | 1,200          |
| Primary schools 2/                              | 125,100        |
| Middle schools                                  | 11,500         |
| High schools                                    | 8,700          |
| <i>Sub-total A. Facility Restoration</i>        | <i>146,500</i> |
| <b>B. Service Delivery Restoration</b>          |                |
| Management, supplies and community mobilization | 900            |
| Interim public school provision                 | 2,500          |
| Family compensation benefits                    | 510            |
| Training (including staff replacements)         | 300            |
| Psycho-social counselling                       | 200            |
| <i>Sub-Total B Service Delivery Restoration</i> | <i>3,910</i>   |
| <b>Total (A+B)</b>                              | <b>150,910</b> |

1/ Including estimates for furniture and education materials.

2/ Including monastic schools.

Source: PONJA Team estimates.

The process of reconstructing schools which have been completely destroyed provides an opportunity to introduce changes to the current school building design to allow for cyclone resistance,

improved quality and an environment more conducive to “child-friendly” teaching and learning. Recovery plans should also take into consideration possible changes in education demand due to demographic shifts and villages having been washed out during Cyclone Nargis. More generally, the “build back better” allowance enables all damaged schools to be rebuilt to a standard more resilient to future cyclones.

*Next steps.* Detailed planning for next steps is essential and should include: (i) a detailed assessment of damages as input to design and documentation for the restoration effort; (ii) a review of options to reconfigure/redesign schools which were destroyed to produce schools more conducive to “child-friendly” teaching and learning; (iii) set priorities for the recovery effort including how to respond in those areas not covered adequately by the revised humanitarian appeal; (iv) agreement on how the overall program is to be managed, coordinated and monitored and (iv) agreement on the specifics of the “build back better” standards to be implemented for the school rebuilding program, including guidelines on appropriate standards at different levels (temporary rebuilding, permanent rehabilitation) and successor arrangements for rebuilt schools which will last through only one rainy season.

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## ANNEX 6: AGRICULTURE, LIVESTOCK AND FISHERIES

### SUMMARY

The agriculture sector, encompassing crops, plantations, livestock and fisheries, comprised about a third of the regional GDP of Ayeyarwady and Yangon Divisions. Average farm size is reported as 3.4 ha and 4.1 ha in Ayeyarwady and Yangon Divisions, respectively. According to official figures, the 13 hardest-hit townships normally produce an annual total of 4.3 million MT paddy. Livestock plays an important role in the livelihoods of the rural population, both as a source of food and as draught animals for agriculture. Fisheries and aquaculture are equally important, as both income for rural communities and for commercial production.

Estimating the impacts on the agricultural sector must take into account several significant challenges, given that rice production in the Delta plays an important role in home consumption as well as exports. Field interviews with farmers indicated a wide range of actual production figures based on several factors including land quality and fertilizer use. There are also uncertainties over the losses associated with land which will not be replanted, and yields for the 2008 monsoon paddy season where efforts are currently underway to provide inputs to farmers. This assessment, therefore, provides ranges. It should be noted that these ranges vary particularly in terms of the losses associated with reductions in paddy production for the current monsoon season and therefore the implications are most significant for ensuring that food security support is maintained for at least six months and possibly through the 2009 summer cropping season.<sup>1</sup>

Due to the uncertainty<sup>2</sup> regarding impacts to the upcoming monsoon paddy rice crop, damages and losses to the agriculture sector are estimated over a range of K575,000 million to K700,000 million. There was a significant mortality of livestock, including the deaths of approximately 50 percent of buffaloes in the worst-affected townships. Small in terms of direct economic losses, but significant in terms of household well-being is the loss of small family vegetable gardens and small-scale cash crops that complement rice production. The damages to capture fisheries, both marine and inland, and aquaculture are estimated at K29,700 million, and the losses from foregone production in this sub-sector at K129,500 million.

A significant effort has been launched in recent weeks by the government, UN agencies, bilateral donors and international and national NGOs to ensure the timely planting of the monsoon paddy crop by end-July. These activities are facing some difficulties, due to shortages of fuel and with the supplied implements not always suitable for production in the lower Delta. The affected communities remain heavily reliant on external sources of assistance and will need considerable time and support to fully overcome the effects of the disaster. The main goal of recovery in the agriculture sector is two-fold: first, the re-establishment of food security; second, the re-establishment of household livelihoods, economic security and standard of living.

### PRE-DISASTER SITUATION

The agriculture sector, encompassing crops, plantations, livestock and fisheries, comprised 44 percent of the national economy in 2007, and about a third (31 percent) of the regional GDP of Ayeyarwady and Yangon Divisions.<sup>3</sup> The sector is the mainstay of the rural economy in the Ayeyarwady Delta area; of the total population of about 14 million in the two Divisions, the rural population comprises about 39 percent (68 percent excluding the approximately six million inhabitants of the City of Yangon).

Ayeyarwady and Yangon Divisions, in which the 13 hardest-hit townships considered in this assessment are situated,<sup>4</sup> comprise mainly Delta lowlands at the mouth of the Ayeyarwady River,

1 The impact in terms of overall rice availability in Myanmar should also be assessed so that appropriate policy measures can be taken to avoid further price impacts on consumers.

2 Given that the cyclone damage occurred just prior to the monsoon paddy land preparation period, estimates of the impacts on planting vary considerably.

3 The analysis draws on government statistics and the recently conducted FAO assessment [FAO, 2008. Myanmar: Emergency & Rehabilitation Program Needs Assessment for Cyclone Nargis Affected Areas. 13 June 2008].

4 Seven townships in Ayeyarwady Division: Bogale, Dedaye, Kyaiklat, Labutta, Mawlamyinegyun, Ngaputaw and Pyapon; and six townships in Yangon Division: Thanlyin, Kyauktan (including Tada), Thonegwa, Twantay, Kawhmu, Kwanchankone. Three

interspersed with many tidal waterways. Soils within the area are predominantly riverine sediments, with textures ranging from clays to silt and sand, which are ideal for monsoon rice cultivation with limited inputs. The rural population lives in both small villages along the banks of the tidal waterways and in scattered settlements throughout the Delta. Many areas of the southern Delta area are accessible only by river, making boats an important means of transport. Forest products, principally mangrove, which grow in the reserve forests and amongst the settlements, provide the main source of materials for housing and fuel wood, and are a nursery area for fisheries. The divisional township administrative centres are also the main commercial centres within the Delta.

Farms range in size from less than 0.4 hectares (ha) to over 20.2 ha, with the average farm size reported in the Myanmar Census of Agriculture (2003) as 3.4 ha and 4.1 ha in Ayeyarwady and Yangon Divisions, respectively. The same report notes that average farms owned by poor households range in size from less than 0.4 ha to 1.2 ha, and that 30 percent and 20 percent of those involved in agriculture in these respective Divisions are landless; they rely on fishing, home gardens and agricultural labour for their livelihoods.<sup>5</sup>

Paddy is the major crop, which relies entirely on rainfall during the monsoon season, and low-level pumping and tidal irrigation during the summer season.<sup>6</sup> The principal crop is the monsoon crop, which is grown on 2.0 million ha in the two divisions and produces approximately 7.5 million metric tons (MT) of paddy (29 percent of the national total). A second, summer season rice crop is grown on 0.6 million ha, and produces approximately 2.7 million MT paddy annually (48 percent of national total)<sup>7</sup>.

According to reported figures, the 13 hardest-hit townships normally produce 3.3 million MT monsoon paddy on 0.9 million ha, and 1.0 million MT summer paddy on 0.2 million ha, for an annual total production of 4.3 million MT paddy<sup>8</sup>. Both traditional<sup>9</sup> and high-yielding varieties of rice are grown, with relatively low levels of inputs of fertilizer and insecticides. These crops are reported to achieve yields of 3.7 MT/ha in the monsoon season and 4.9 MT/ha during the summer season when only high-yielding varieties are grown. These yields are relatively high by regional standards, given the low levels of fertilizer and other inputs applied.

Other important crops include pulses (628,000 ha) and sesame (12,200 ha) in the late monsoon, jute (18,800 ha) and kenaf grown during the pre-monsoon season, and groundnut grown in the winter and rainy seasons (52,200 ha).<sup>10</sup> Home gardens include a variety of vegetables, and plantation crops include mango, coconut (27,400 ha), banana, betel nut (8,500 ha), betel leaf (3,700 ha), cashew nut, rubber (13,800 ha) and nipa palm (for roofing/building materials).

Within the Ayeyarwady and Yangon Divisions, 37 flood embankments (polders), totalling over 1010 km in length and encompassing 162,500 ha of cropland, provide protection against flooding and saline intrusion during the monsoon season. These embankments protect about 7.7 percent of the agriculture land in the two divisions (2.4 million ha).<sup>11</sup>

Livestock plays an important role in the livelihoods of the rural population, both as a source of food and as draught animals for agriculture. The adoption of agricultural mechanization is relatively low, with buffalo and oxen being widely used as draught animals. Cattle, pigs, goats, chicken and ducks provide an important source of farm income and subsistence production. Most are raised by small farmers, although several dairy farms and a number of poultry farms exist in Yangon Division. Of the large ruminants (buffalo and cattle), about 55 percent (about 360,000) are used as draught animals, for agricultural land preparation and transport.

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townships each in Bago Division and Mon State were also affected but the losses were relatively minor and are not included in the data reporting or analysis.

5 The percentage of landless in individual townships can be significantly higher; see Annex 15 (Social Impacts).

6 The monsoon season rice crop is planted from end-June to August and harvested from October to February (depending on variety, high yielding or local) The summer season rice crop is planted from December to February, and harvested from March to May (high yielding variety).

7 As indicated above, these are broad estimates based on official statistics with field work indicating significant variations in productivity amongst farms.

8 See footnote 8.

9 Traditional varieties include both preferred varieties for eating quality and salt tolerant varieties. Some of these varieties can only be grown in the delta area. High yielding varieties require high fertilizer application, whereas traditional varieties are typically grown with less.

10 Myanmar Statistical Yearbook (2006). Crop production are quoted for 2005.

11 The embankments were largely constructed under two World Bank financed Paddy Land Development Projects between 1976 and 1990, though some date back over a century.

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Fisheries and aquaculture are also important, as both a subsistence food source for rural communities<sup>12</sup> and for commercial production. While no statistics are available for the subsistence catch, MoLF reports that commercial production of marine and inland fisheries and aquaculture was 1,517,000 MT, 717,000 MT and 604,000 MT, respectively, in 2006/07. Over 1,100 marine fishing vessels, over 1,160 small inland motorized boats and over 1,130 small non-motorized boats were licensed in the two Divisions. In addition, a large number of rural families in the Delta own small canoes used for local transport and subsistence fishing. Most fishing requires the use of a boat to set or tow the fishing gear.

## DAMAGES AND LOSSES

Damages to the agriculture sector are estimated at a floor of K186,000 million. Given the uncertainties regarding pre-Nargis production and the actual extent of likely reductions in monsoon paddy production in 2008, a range of field crop loss estimates is provided from K160,000 million to K283,000 million which translates into a damage and loss range of K570,000 million to almost K700,000 million.

**Table 1: Estimates of Agricultural Damage and Loss (Kyat million)**

|                   | Disaster Effects |                           |                           | Ownership by Sector |                           |
|-------------------|------------------|---------------------------|---------------------------|---------------------|---------------------------|
|                   | Damage           | Losses                    | Total                     | Public              | Private                   |
| Field Crops       | 65,336           | 159,929 to 283,000        | 225,265 to 348,336        |                     | 225,265 to 348,336        |
| Farm Equipment    | 24,046           |                           | 24,046                    |                     | 24,046                    |
| Plantations       | 22,043           | 65,209                    | 87,252                    |                     | 87,252                    |
| Livestock         | 45,190           | 30,775                    | 75,965                    |                     | 75,965                    |
| Capture Fisheries | 25,609           | 99,932                    | 125,541                   |                     | 125,541                   |
| Fish Farms        | 4,120            | 29,394                    | 33,514                    |                     | 33,514                    |
| <b>Total</b>      | <b>186,344</b>   | <b>385,239 to 508,310</b> | <b>571,583 to 694,654</b> | <b>0</b>            | <b>571,583 to 694,654</b> |

Source: PoNJA team estimates.

## CROPS

Damage was reported to about 16,200 ha of the standing summer paddy crop, equivalent to 80,000 MT of production. In addition, paddy and milled rice in farmers' storage (including seed and paddy for home consumption and sale) was damaged or destroyed, estimated at 251,000 MT.<sup>13</sup> Overall damage to farm equipment is estimated at K24,000 million.

The cyclone's timing, just prior to the start of monsoon paddy planting season, will likely result in significant future production losses. The Village Tract Assessment reports that 28 percent of farmers' land was damaged, only 25 percent of farmers have enough seeds. As observed in map 5 (see main report), villages in the townships of Labutta, Bogale, Pyapon, Dedaye, Kyaiklat (all in red) are among the worst affected, reporting not having enough seeds for the upcoming season. The VTA also indicates that less than 23 percent of farmers have fertilizer, only 10 percent have enough cash to purchase needed inputs, and 51 percent have enough labour. The VTA data also confirm a reduction in agricultural incomes and in paddy land for the monsoon season. Trauma and/or physical injury may also impact the ability of households to undertake productive work. Furthermore, some equipment and replacement animals provided have only limited usability (for instance, some tillers are fitted with the wrong wheels, there are shortages of fuel; and animals suffer from changes in environment).

Seed stock was lost as a result of the flooding and cyclone damage to grain storage facilities. Shortages of seed for the monsoon crop have been widely reported by remote communities in the Delta area. Lack of seeds is a major issue for the upcoming monsoon paddy season, and will undoubtedly persist for some time (including the 2008/09 summer paddy crop).

The cyclone-flooded areas cover approximately 615,000 ha based on township-level and satellite data for the 13 worst-affected townships.<sup>14</sup> Within this area, the government estimates

<sup>12</sup> Fishermen acquire fishing rights annually from licensed operators; see Annex 15 (Social Impacts).

<sup>13</sup> Additional losses to stocks of paddy stored by rice millers and traders (estimated at about 376,500 MT) are accounted for under the industries sector; see Annex 7 (Industry and Commerce).

<sup>14</sup> The government estimates saline intrusion on 53,000 ha in the coastal areas due to the tidal inundation and storm surge

a reduction in paddy area through damage to agriculture land at 38,500 ha while FAO has estimated 130,000 hectares and the VTA survey suggests that as much as 28 percent of land (equivalent to 172,200 ha) are damaged). The wide variance is likely due to different definitions of land damage, the consequences in terms on this year's monsoon crop are reflected in the range of potential impacts to rice production calculated. Planted area will also be low due to a lack of draught animals and lost or damaged farm equipment and farm labour.

The assessment team assumes that the above constraints will persist for the monsoon rice season in the areas affected by tidal and storm-surge flooding.

Planted area and yields will be lower than usual due to lack of seed and other inputs and problems with seed viability. Urgent efforts are being made to distribute seeds, equipment, and fertilizer to affected farmers, but concerns remain whether farmers will be able to fully cultivate the monsoon paddy crop. Following these considerations, a model was developed based on area available for paddy planting, damaged area and areas not planted, and anticipated yield (table 2).

**Table 2: Losses in Production due to  
(i) Area Planted and (ii) Yield Reduction**

| Loss expressed<br>as a percentage of maximum yield |      |     |     | Loss expressed<br>as production loss (million baskets) |      |     |     |
|--|------|-----|-----|--|------|-----|-----|
| (i) Area planted (percent of<br>available)         |      |     |     | (i) Area planted (percent of<br>available)             |      |     |     |
| (ii) Yield %                                       | 100% | 80% | 60% | (i) Yield %  | 100% | 80% | 60% |
| 100%   | 7%   | 27% | 47% | 100%   | 7    | 29  | 50  |
| 80%  | 25%  | 41% | 57% | 80%  | 27   | 45  | 62  |
| 60%  | 44%  | 56% | 68% | 60%  | 48   | 61  | 74  |
| 40%  | 63%  | 71% | 79% | 40%  | 68   | 77  | 85  |

Notes: Flooded area approx. 615,000 ha, damaged area 38,000 ha. Normal reported monsoon paddy yield is 3.7 MT/ha and production in flooded area is 109 million baskets (2.24 million MT). Fixed yield loss of 7 million baskets paddy due to 38,000 ha damaged land.

Source: PONJA Team estimates.

The reduction in paddy production is anticipated to be 40-70 percent of the officially reported, pre-Nargis crop, or an estimated 0.8-1.5 million MT.<sup>15</sup> The lower range is based on MOAI assumptions that 85 percent of the flooded area can be cultivated and 80 percent of the yield can be achieved, leading to an estimated loss of 0.8 million MT in the flood-affected areas, and implying a total loss of K160,000 million. However, if only 60 percent of the flooded area could be planted and only 60 percent of normal yield was achieved, the loss would be as high 1.5 million MT, implying a total loss of K283,000 million. A loss within this range is also commensurate with FAO estimates that the loss of draught animals and inability to make effective use of power tillers will affect land preparation activities on about 183,000 ha. Note that assumptions of lower, pre-Nargis baseline production due to lower normal yield rates would, however, suggest losses at the lower end of the range presented.

## LIVESTOCK

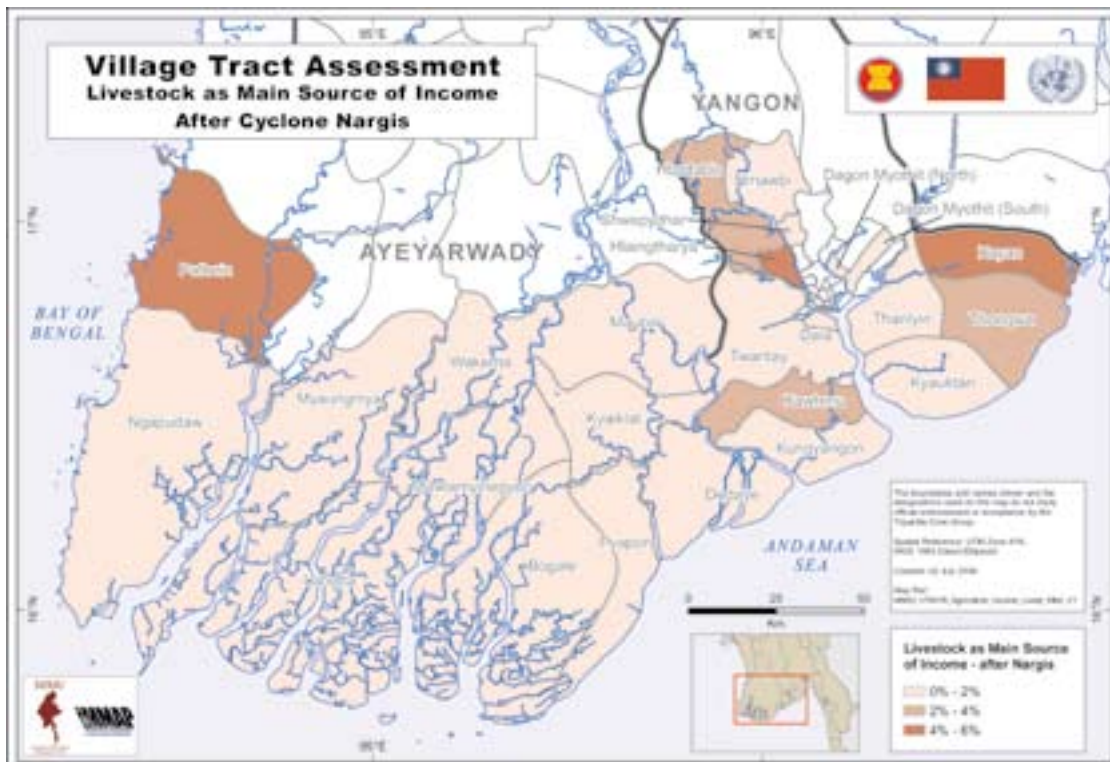
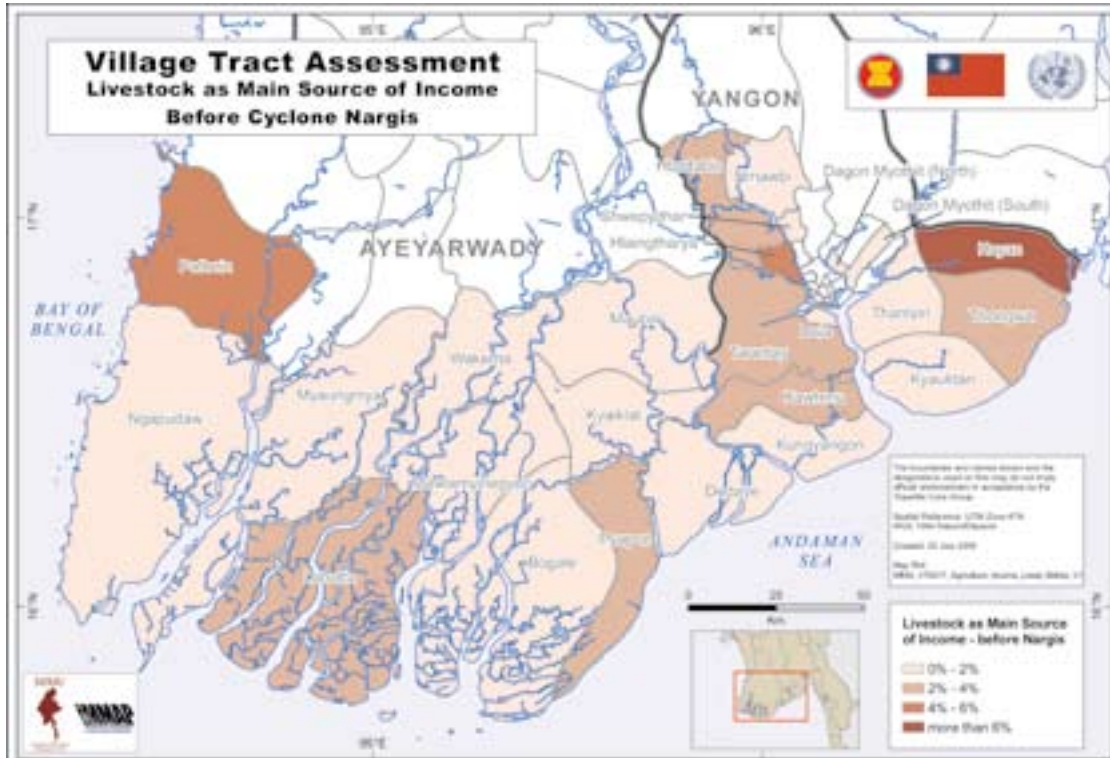
There was a significant mortality of livestock, including the deaths of approximately 50 percent of buffalo and 20 percent cattle in the worst-affected townships. Since buffalo and a large number of cattle (oxen) are used as draught animals (about 55 percent of large ruminants overall), this loss of livestock will have a significant impact on agricultural production. Many surviving animals

accompanying the cyclone. Saline intrusion is further discussed in Annex 12 (Coastal Environment and Natural Resources Management). However, the issue of salinity is not considered to be as severe a problem as previously thought due to the occurrence of the cyclone at the start of the monsoon season in early May, when much of the soil was already saturated by rainfall. Subsequent heavy rains appear to have flushed out much of the residual saline water, except in low-lying areas, such as natural depressions and open, fresh water ponds widely used for drinking water and fishery production.

<sup>15</sup> Annual monsoon paddy production in the flooded area is around 2.2 million MT, based on provisional 2007/08 yields and flooded area of 615,000 ha. In 2007/08, 904,000 ha were planted to monsoon paddy in the 13 worst-affected townships, producing 3.33 million MT.

are severely weakened due to ingestion of salt water during the storm and a lack of fodder (a lot of which was destroyed by the cyclone), and are unfit for work.

Maps 1-2: Percentage of households reporting livestock as a main source of income before and after cyclone



Source: VTA survey

Extensive damage was also reported to small livestock, including pigs, sheep, goats,

chickens and ducks, which are an important component of the backyard farming activities of small and marginal farmers and landless agricultural workers. Total damage to livestock is estimated at K45,200 million. In addition to the livestock itself, damage to holding pens and livestock shelters amounts to over K5,600 million. The impact of the cyclone in terms of losses is also significant as illustrated as follows: (i) 22,800 MT of beef production (ii) 4,000 Mt of pork production, (iii) 5,400 MT of chicken and duck meat, and (iv) 30 million chicken and duck eggs. Total estimated losses in livestock are K30,800 million.

## **WATER MANAGEMENT**

During the storm surge, most embankments overtopped and breached at numerous places, and 14 sluices were damaged. Embankments were damaged over a total length of 265 km in the Ayeyarwady Division and over a length of 1.4 km in Yangon Division. This damage has been included under the environmental and coastal zone management sector. There was also damage to water distribution schemes built and maintained by villages, with 9 percent of VTA survey respondents indicating partial damage and 5 percent indicating minor damage.

## **HOME GARDENS AND PLANTATION CROPS**

Small in terms of direct economic losses, but significant in terms of household well-being is the loss of small family vegetable gardens and small-scale cash crops that complement rice production. Almost all rural families, irrespective of their land holdings, plant vegetables, primarily for own consumption. While relatively low in terms of total calories, these gardens are critical for maintaining a nutritional balance, especially for children and mothers in poor households.<sup>16</sup> According to the VTA survey only 6 percent of the households have vegetable seeds after the cyclone.

About 33,900 ha of plantation crops worth K22,000 million were damaged, including mango (2,700 ha), coconut (8,700), rubber (2,700 ha), banana (3,900 ha), nipa palm (10,800 ha), betel leaf (400 ha), betel nut (3,300 ha) and cashew nut (1,400). The plantations, with the exception of rubber, are typically widely disbursed. Those most important to the poor are betel leaf, which is generally grown on small plots of less than 1 ha, and nipa palm, which is produced along river banks and edges of fields. Wind damage was widespread in the form of knocked down trees, and will take considerable amounts of capital to re-establish.

Given the time required to re-establish tree crops to production (typically 3-5 years), the losses in terms of foregone production are considerable; for 2008, these amount to an estimated K65,200 million. The magnitude of these losses will increase if the plantation crops are not re-established at an early date.

## **FISHERIES**

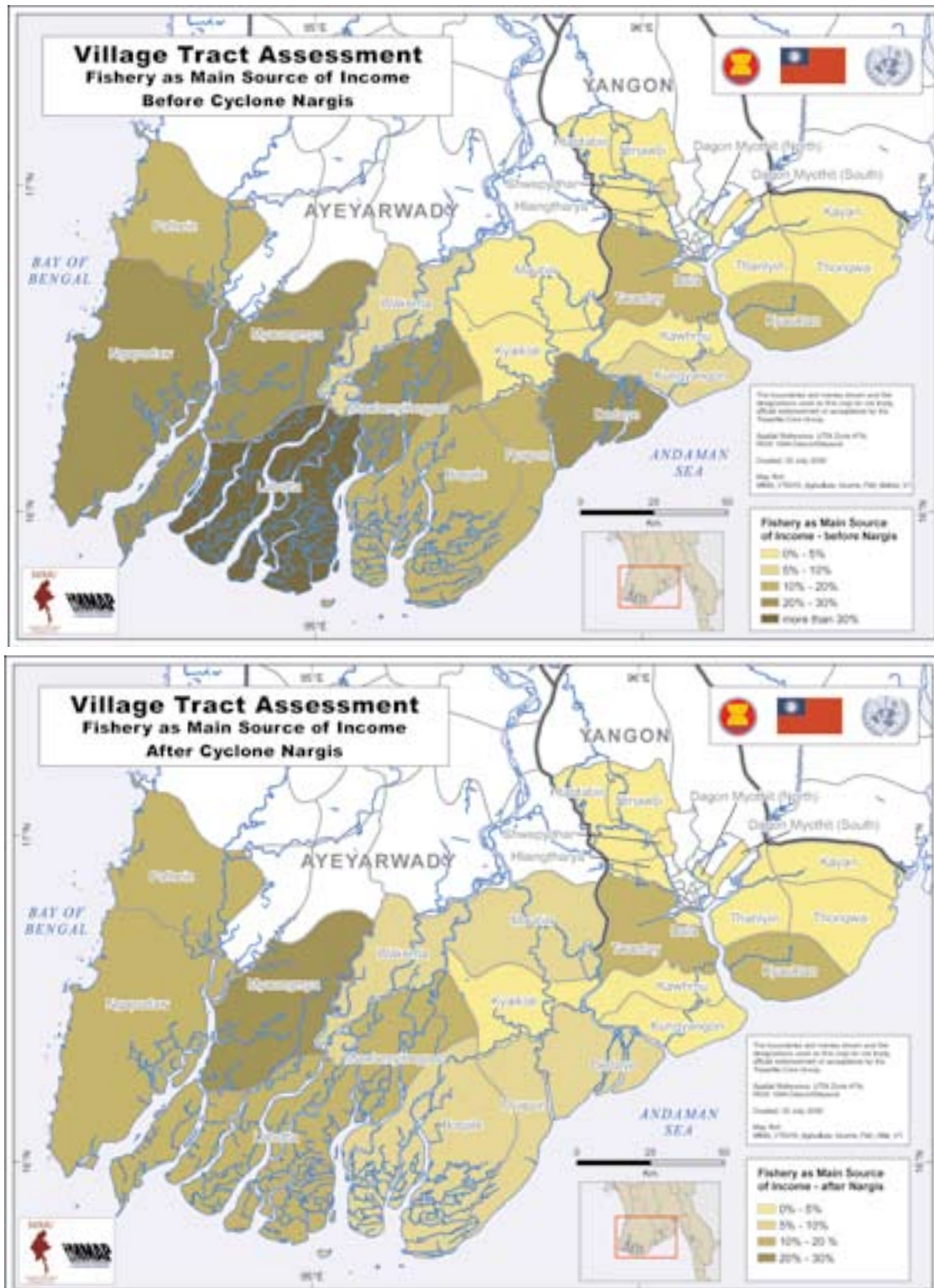
The damage to capture fisheries, both marine and inland, and aquaculture was mainly caused by the high winds and the storm surge. Damages to fisheries are estimated at K29,700 million; this includes damage to post-harvest capabilities, i.e. the loss of ice plants and cold storage facilities, fish processing, marketing and transport infrastructure. Total losses from foregone production amount to K129,500 million. The VTA reports that income from fishing has dropped by half as a result of the cyclone.

As observed in the maps below, before Nargis 33 per cent of households in Labutta reported fishing as their main income activity, as opposed to only half that number after the cyclone. In Dedaye and Bogale a fifth of all households reported fishing as their main activity before the cyclone, in contrast to only 8 per cent right after the disaster. Although to a lesser extent, Mawlamyinegyun and Ngapudaw also observed a significant fall in their earnings through fishing.

16 See Annex 3 (Food Security and Nutrition).



Maps 3-4: Percentage of households reporting fishery as their main income before and after cyclone Nargis



Source: VTA survey

Marine fisheries were struck hard, particularly in Pyawon township. A total of 136 marine fishing vessels are reported lost while 168 vessels were damaged but are in a salvageable condition. Fishing gear was also lost. More than 100 jetties mostly belonging to the owners of the marine fishing vessels were damaged; VTA data show almost 10 percent of jetties were partially and 14 percent slightly damaged. Rebuilding of the offshore fleet may take a year or longer as the owners may face difficulties in mobilizing the needed capital.



Inland fisheries suffered the largest damage in terms of number of lost or damaged boats. More than 1,800 licensed boats are officially reported lost, most of them non-motorized. However, the actual number of small boats may be significantly higher. The VTA survey reports that half of all small boats were lost, as was 70 percent of fishing gear. Since these boats are small compared to the marine fishing vessels, the overall damage value of the inland boats is significantly less than for the marine fisheries fleet. However, the massive loss of small multi-purpose boats will have a serious impact on the livelihoods of the households involved.

The cyclone and the storm surge also caused substantial damage to commercial intensive aquaculture, with more than 37,000 ha of aquaculture ponds, representing 38 percent of the total, damaged. Besides breached and eroded pond embankments, there was damage to pumps, cages, mobile aquaculture equipment such as aerators, and buildings for feed storage and processing. Hatcheries, which provide the fish and shrimp material to stock ponds and restock the lease-able fisheries water bodies also sustained damage. Aquaculture, as well as inland fisheries, employs large numbers of labourers, and the processing of the catch is an important source of employment for women. Many of these jobs have been lost and will take time to be recreated.

### EXISTING RELIEF AND RECOVERY EFFORTS

Although farmers are taking the initiative to prepare fields for the monsoon paddy crop, they lack the necessary inputs. In recent weeks the government, WFP, bilateral donors and international and national NGOs have launched a major recovery effort in the agriculture sector to ensure the timely planting of the monsoon paddy crop by end-July. This includes employing draught animals transported from other regions, replacing the lost animals with hand tractors/power tillers and providing farm equipment and key inputs (seeds, fertilizers and fuel) to farmers. Amongst the villages sampled in the VTA, plans to distribute fertilizers were confirmed by 11 percent of villages, seeds by 21 percent, tools 17 percent, and pesticides by 4 percent. Government also reports that emergency repairs to coastal embankments are almost completed.

However, efforts to enable timely planting of the monsoon paddy crop are facing some difficulties such as lack of farmers' experience with hand tractors, or cash to purchase fuel and lubricants. In some cases there are reports of unsuitable equipment, with missing or incompatible equipment parts supplied. Stored (un-milled) paddy is currently being distributed as seed, but its viability is reportedly low. Moreover, according to field assessments, inputs are provided on a loan basis with farmers having to repay the loans, which creates a risk of future indebtedness.<sup>17</sup>

### RECOVERY NEEDS AND STRATEGY

*Needs.* The most pressing need is to ensure the planting of the next monsoon crop in time to provide food and income for the coming year. The affected communities are currently heavily reliant on government and non-government sources of assistance, and will need considerable time and support to fully overcome the effects of the disaster.

This requires making available the rice seeds in sufficient quantity and adequate quality on time.<sup>18</sup> Feed needs to be made available for the draught animals. Where draught animals cannot be used for this season, power tillers with fuel should be made available as an alternative. Given the risk many farmers may miss this monsoon season, provision of seeds coupled with water pumps for the following summer season would also be required. With the fishing activities traditionally resuming after the monsoon, early restoration of fishing capacity is a critical need for households relying mainly on fishing and fish processing for their livelihoods. Grants, rather than credit, would be the preferred option, and land and water user rights need to be secured.<sup>19</sup>

*Strategy.* The main goal of recovery in the agriculture sector is two-fold: first, the re-establishment of food security; second, the re-establishment of household livelihoods, economic

<sup>17</sup> See also Annex 15 (Social Impacts).

<sup>18</sup> The Ministry of Agriculture and Irrigation estimates that 51,700 MT of seed are required to plant over 540,000 ha of the monsoon paddy crop within Ayeyarwady and Yangon Divisions (19,700 MT of high yielding variety seed and 32,000 MT of traditional seed varieties).

<sup>19</sup> See Annex 15 (Social Impacts).

security and standard of living.<sup>20</sup> Primary target groups are the small-scale farming and fishing communities as well as landless households.

Priority activities under this strategy include the provision of immediate inputs for the monsoon paddy season described above. Priorities for the summer cropping season will include expanding seed production and multiplication facilities; restoring the availability of fertilizer and other key inputs, as well as post-harvest facilities and marketing; providing assistance to replace lost draught animals. Given the vulnerability of the affected populations and the importance to regional and national level food security of re-establishing agricultural production as quickly as possible, accurate monitoring of food and nutrition status of affected populations, agricultural production and food markets should be an integral part of the recovery program. As in the case of any disaster of this scale, setbacks can be anticipated in the process of recovery. Accordingly, as has occurred in most countries following similar disasters, the current situation should be used to strengthen the accuracy of information collected as a means to adjust assistance strategies and avoid unnecessary further hardship or economic setbacks from the cyclone.

In the longer-term, priorities include the resumption of small ruminant, pigs and poultry rearing as income generation activities, particularly for poor, landless and disadvantaged families (including women- and single-parent households); and resumption of fishing and other non-agricultural livelihood activities. Starting under early recovery activities in the next twelve months and continuing until sustainable livelihoods are restored, community-based grant or micro-credit schemes would be an appropriate mechanism to support these households in regaining a sustainable source of income. Assistance to replace small fishing boats and gear that have been lost is also an important focus of early and medium-term recovery activities (costed under transport): prior to launching a major program to import or distribute boats centrally, it would be desirable to make an assessment of the options for provision of cash grants to communities to buy boats in neighboring villages. Where boats are provided in kind rather than through cash grants, prior consultation with fishers' communities is crucial to ensure that replacement boats are suited to communities' needs.

*Next steps.* The strategy for providing protection to the lower parts of the Delta against exceptional floods and storm surges may need to be reviewed and updated. This review should take into account the overall disaster risk reduction strategy (see Section VI), the dynamic hydro-meteorological processes in the Delta, current and medium and long-term development scenarios, and climate change scenarios. To provide the appropriate level of protection, flood and storm surge risk assessments should also be updated.

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<sup>20</sup> These objectives are consistent with the programme that FAO outlined for recovery in the agriculture sector, and which the assessment team supports; (see footnote 2)

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## ANNEX 7: INDUSTRY AND COMMERCE

### SUMMARY

Industry and commerce are two of the sectors most affected by Cyclone Nargis. Total damage and losses in industry account for almost K2 billion, of which economic losses are K1.48 billion and damages are K512 million. Nearly 45 percent of industry losses are attributable to the larger firms located in several industrial parks in Yangon division. Total losses in commerce are estimated at K483.4 million while damages amount to K37.2 million. Both industry and commerce include many micro-enterprises that typically represent easy entry, subsistence activities of poor households, including those headed by women. The salt production and fish processing industries in particular, concentrated in the Delta region, also suffered extensive losses of human life.

### PRE-DISASTER SITUATION

Myanmar is primarily a rural economy with agriculture accounting for 43.7 percent share of the GDP in 2007 compared to a 19.8 percent share of industry (manufacturing, mining and energy and power). The two affected divisions, Ayeyarwady and Yangon, cumulatively also are primarily agricultural, which accounts for 31 percent of the regional GDP. However, the two divisions are quite asymmetric: while industry accounts for 33 percent of Yangon division's GDP, the share of industry is only 7.1 percent in Ayeyarwady, where agriculture's share is 44.6 percent (GoUM data for 2007). Damage and losses in industry therefore reflect primarily the impact of the cyclone in Yangon division, and within that, Yangon city; Yangon Division accounts for almost 40 percent of national industrial output. The geographical scope of the assessment is limited to affected townships in Ayeyarwady and Yangon Divisions based on availability of data; while townships in other areas (Kayin and Mon States, and Bago Division) were also affected, the damage was relatively less and is not included.

It is worth noting the statistically constrained context of these data. Industrial statistics, perhaps more so than many others in the economy, are constrained in terms of completeness of coverage and timeliness. For this assessment information from GoUM statistics was supplemented by discussions with relevant industry associations and a rapid assessment survey of a hundred industrial firms and an equal number of commercial enterprises in the affected regions. Additionally, the same survey questionnaire was filled out by almost 70 firms located in industrial parks. The team is grateful to these enterprises for taking time to respond to the survey questionnaire.

The main components of the industrial sector in the two affected divisions are: salt farms, dried fish/shrimp and fish paste production, rice mills, factories located in industrial parks, other small and medium industrial enterprises, and micro-enterprises. The commerce sector includes: wholesale and retail markets, along with trading firms, many of which are micro-enterprises engaged in small-scale retail commerce.

Much of the country's salt production comes from salt farms located in the Ayeyarwady Delta region with some 30,000 acres of salt fields in Ayeyarwady division alone. Farms are located along the coastline and production is seasonal, with ground being prepared to hold seawater for evaporation during the last quarter of the year and salt harvested from January until the onset of the rainy season in April/May. Harvested salt is typically stored in warehouses during the rainy season and released gradually to the market.

The industry is labour intensive and has traditionally relied on a workforce imported from other parts of the country as agricultural workers in the Delta region are not used to the harsh environmental conditions that prevail on salt farms during harvest season. Workers are encouraged to settle in the area with their families, and in many cases families have been resident for several generations. As an incentive to stay, farm owners typically provide workers with small plots of land to grow crops and raise shrimp to supplement incomes. It is estimated that there were some 20,000 salt farm workers in Ayeyarwady Division along with their families at the time of the disaster.

Ayeyarwady Division is also a major production centre for dried fish and shrimp as well as fish

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paste. Most firms also own a number of offshore fishing vessels<sup>1</sup> that are used to both catch fish and shrimp and to carry out the drying process at sea. The dried fish and shrimp are further processed onshore in factories typically located along a riverbank with jetties for the boats. Factories may also produce and package fish paste and/or fish sauce in addition to the dried and salted products.

The largely agrarian Ayeyarwady Division also has a large number of rice mills, classified into two size categories based on output capacity: those below 15 tons/day are “small”, and the remainder considered “medium to large”. Larger mills can employ 100 workers or more during periods of peak output and are typically located near large towns along river banks—allowing for use of waterways in addition to rural roads to procure paddy. Small mills are typically family businesses employing 5-10 workers (including family members) and found in villages and towns throughout the countryside. These mills have higher running costs and typically produce lower quality output than the larger ones, but due to high transport costs in rural areas, they fill a significant niche and outnumber larger mills by a ratio of almost 10 to 1. The combined output capacity of small mills in the affected areas is roughly double that of the larger ones.

The majority of medium and large-sized factories in the affected areas are concentrated in Yangon, and much of this population is in turn contained within industrial parks located in 12 townships. These parks host a wide range of industries and together contain over 5,000 firms employing an estimated 250,000 workers. In addition, based on registration figures, there are an estimated 28,000 small and medium-sized manufacturing firms in the affected areas of Yangon and Ayeyarwady Divisions.<sup>2</sup> Data on micro-enterprises, typically household businesses for sale largely in local markets, are not available. Based on a recent UNDP household survey,<sup>3</sup> it is estimated that there may have been over 130,000 such enterprises in the affected areas.

Yangon is a major commercial hub with some 168 organized marketplaces housing over 130,000 individual shops and stalls. Retail markets range from modern shopping centres to more traditional covered markets as well as farmers’ markets. There are also two large wholesale markets that supply foodstuffs and building materials to retail shops throughout Yangon as well as much of the Delta region. Ayeyarwady has 53 organized marketplaces. These are comprised of both traditional covered markets as well as farmers’ markets and together they account for some 15,000 individual stalls. Commercial activity outside of organized marketplaces is typically conducted by home-based shops that sell a wide range of cheap consumer and other goods. Based again on the UNDP household survey, it is estimated that there may have been over 210,000 such businesses in the affected areas.

## DAMAGE AND LOSSES

Damage and loss assessment for industry and commerce are summarized in Table 1.

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1 Vessels range from 55’ to 70’ in length and average cost per vessel including equipment is about K30,000,000

2 A typical example of such a firm in Ayeyarwady Division might be a workshop that makes agricultural machinery (e.g. pumps and tillers).

3 UNDP. Ministry of National Planning and Economic Development (2007). *Integrated Household Living Conditions Survey in Myanmar*.

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Table 1: Summary of Damage and Losses: Industry and Commerce (Kyat million)

|                                   | Damage         | Losses           | Total            | Ownership (percent) |         |
|-----------------------------------|----------------|------------------|------------------|---------------------|---------|
|                                   |                |                  |                  | public              | private |
| <b>Industry</b>                   |                |                  |                  |                     |         |
| Salt farms                        | 35,334         | 15,230           | 50,563           | 12                  | 88      |
| Dried fish/shrimp, and fish paste | 26,240         | 36,080           | 62,320           |                     | 100     |
| Rice mills                        | 23,123         | 150,184          | 173,308          |                     | 100     |
| Rice processing future losses     |                | 112,000          | 112,000          |                     | 100     |
| Factories in industrial parks     | 209,880        | 673,200          | 883,080          |                     | 100     |
| Other SMEs                        | 218,122        | 290,250          | 508,372          |                     | 100     |
| Micro-enterprise manufacturing    |                | 206,605          | 206,605          |                     | 100     |
| <b>Total industry</b>             | <b>512,669</b> | <b>1,483,549</b> | <b>1,996,248</b> |                     |         |
| <b>Commerce</b>                   |                |                  |                  |                     |         |
| Wholesale markets                 | 757            | 13,420           | 14,177           |                     | 100     |
| Retail markets                    | 36,491         | 123,666          | 160,157          |                     | 100     |
| Future rice sales losses          |                | 22,400           | 22,400           |                     | 100     |
| Micro-enterprise (commerce)       |                | 323,927          | 323,927          |                     | 100     |
| <b>Total commerce</b>             | <b>37,248</b>  | <b>483,414</b>   | <b>520,662</b>   |                     |         |

Source: PONJA Team estimates.

## SALT FARMS

Salt fields are located in areas most vulnerable to sea surge. Cyclone Nargis not only destroyed almost 80 percent of the total salt field acreage in Ayeyarwady Division (see Table 2), but also killed virtually the entire workforce along with their families in the affected areas.

The cyclone's timing caused maximum damage to stocks, as warehouses in the affected areas were completely destroyed along with full inventories of salt from the just completed harvest. Salt prices subsequently soared—reaching a peak at one point of 1,300 kyat per viss (1.6kg) from a pre-cyclone price of about 200 kyat per viss. Prices have since fallen and stabilized, but are still about three times the pre-cyclone price and are not expected to further ease until the next harvest season. This will have a knock-on effect over the short term on the price of many goods in which salt is an important input. These notably include a number of foodstuffs (e.g. salt fish, fish paste, and fish sauce) which are widely consumed in Myanmar and serve as an important source of protein in people's daily diets.

Table 2: Estimated Damage and Losses to Salt Farms by Township

| Ayeyarwady Division | Total area (acres) | Affected area (acres) | Damage (Kyat m) | Losses (Kyat m) |
|---------------------|--------------------|-----------------------|-----------------|-----------------|
| Ngaputaw            | 19,855             | 15,781                | 22,882          | 9,863           |
| Labutta             | 9,011              | 7,162                 | 10,385          | 4,476           |
| Pyapon              | 1,794              | 1,425                 | 2,066           | 891             |
| <b>Total</b>        | <b>30,660</b>      | <b>24,368</b>         | <b>35,333</b>   | <b>15,230</b>   |

Sources: Ministry of Mines and PONJA Team estimates.

The extent of losses as a result of lost production will largely depend on the cyclone's impact on next season's output. To return to productive use, salt fields will need to be cleared of sand, warehouses and other facilities rebuilt, and equipment such as pumps and piping replaced. Compared to the challenge of replacing the lost workforce, however, these are relatively easy tasks and, by themselves, may only delay the start of the next harvest season by a month or so in affected areas.

Replacing the lost workforce will be a lengthier and more difficult process due to the nature of work as well as the scale of numbers involved. Salt farm owners have indicated that they will try and recruit skilled workers from salt farms in unaffected regions, but they will need to offer higher

wages and are unlikely to be able to source enough workers from this limited supply to adequately replace the lost workforce by the next harvest season. The remaining balance will, necessarily, have to come from workers new to the industry and these will need time to acquire skills and adjust to working conditions before they become fully productive. Higher wage costs and lower levels of output are likely to offset gains to revenue from higher salt prices over the next harvest season.

### DRIED FISH/SHRIMP AND FISH PASTE PRODUCTION

Three of the main towns where this industry is concentrated (Bogale, Labutta, and Pyapon) were hit hard by the cyclone resulting in heavy damage to both onshore production facilities and fishing boats. Out of some 300 vessels, about half were destroyed while much of the rest were heavily damaged.

Given the scale and extent of damage, a return to normal production levels will require at least another year. Fishing boats, in particular, will be difficult to replace quickly as they are expensive and require skilled labor as well as adequate supplies of wood to build.

### RICE MILLS

Over half of small mills and two-thirds of larger mills in the affected areas were damaged by the cyclone (table 3). Large inventories of paddy and rice from the recently harvested summer crop were destroyed or damaged. While some 88 percent of damaged mills are expected to be operational by the next harvest, the sector will suffer significant losses due to stoppages from cyclone damage, destruction of paddy stocks, and lower expected yields and quality of the next paddy crop.

Table 3: Damage and Losses to Rice Mills by Township

| Division          | Small |         | Medium to Large |         | Damage<br>(K million) | Losses (K<br>million) |
|-------------------|-------|---------|-----------------|---------|-----------------------|-----------------------|
|                   | Total | Damaged | Total           | Damaged |                       |                       |
| <b>Ayeyarwady</b> |       |         |                 |         |                       |                       |
| Ngaputaw          | 271   | 200     | 8               | 6       | 2,561                 | 19,712                |
| Labutta           | 149   | 100     | 22              | 22      | 3,008                 | 18,260                |
| Mawlamyinegyun    | 281   | 102     | 34              | 8       | 1,755                 | 12,238                |
| Pyapon            | 222   | 148     | 25              | 20      | 3,310                 | 21,469                |
| Bogale            | 254   | 170     | 31              | 31      | 4,532                 | 28,211                |
| Kyaiklat          | 323   | 142     | 28              | 20      | 3,250                 | 20,957                |
| Dedaye            | 259   | 159     | 30              | 21      | 3,512                 | 22,849                |
| <b>Yangon</b>     |       |         |                 |         |                       |                       |
| Kyauktan          | 8     | 40      | 26              | 5       | 535                   | 2,893                 |
| Twantay           |       |         | 7               | 2       | 181                   | 884                   |
| Kungyangon        | 11    | 55      | 4               | 4       | 474                   | 2707                  |
| <b>Total</b>      | 1,907 | 1,040   | 215             | 139     | 23,123                | 150,184               |
| Capacity (tons)   | 9,535 | 5,200   | 5,574           | 3,604   |                       |                       |

Sources: Ministry of Commerce, Myanmar Rice Millers' Association, and PONJA team estimates.

### INDUSTRIAL PARKS

Almost 75 percent of firms in industrial parks were damaged by the cyclone (see Table 4). While the extent of damage varied, firms on average reported stoppages of about three weeks for necessary repairs to damaged buildings and machinery. A majority of firms also reported significantly reduced sales following the cyclone and expect these conditions to persist for at least 3-6 months due to the cyclone's impact on customers. An overwhelming proportion of firms have, for the moment, retained regular workers, but unemployment may rise should output continue to remain depressed through next year.

Table 4: Damage and Losses to Factories in Industrial Parks by Township

| Yangon                 | Total        | Damaged      | Damage<br>(K million) | Losses<br>(K Million) |
|------------------------|--------------|--------------|-----------------------|-----------------------|
| Mingalardon            | 8            | 7            | 371                   | 1,295                 |
| Shwepyitha             | 507          | 174          | 9,222                 | 32,190                |
| Hlaingthaya            | 497          | 203          | 10,759                | 37,555                |
| South Okkalapa         | 132          | 81           | 4,393                 | 14,985                |
| North Okkalapa         | 91           | 91           | 4,823                 | 16,835                |
| Thakayta               | 156          | 150          | 7,950                 | 27,750                |
| DagonMyoThit (South)   | 2,392        | 2,309        | 122,377               | 427,165               |
| DagonMyoThit (East)    | 32           | 27           | 1,431                 | 4,995                 |
| DagonMyoThit (Seikkan) | 146          | 142          | 7,526                 | 26,270                |
| Thanlyn                | 1,075        | 532          | 28,196                | 98,420                |
| Shwe Paukkan           | 252          | 165          | 8,745                 | 30,525                |
| Shwe Lin Ban           | 92           | 79           | 4,187                 | 14,615                |
| <b>Total</b>           | <b>5,380</b> | <b>3,960</b> | <b>209,880</b>        | <b>673,200</b>        |

Sources: Ministry of Industry, industrial park management committees, MSR Survey, PONJA Team estimates.

### SMALL AND MEDIUM ENTERPRISES

An estimated two-thirds of small and medium industrial enterprises suffered some form of cyclone damage. In terms of value, the surveyed firms indicated that damage to inventories was greatest, followed by damage to buildings, and then to machinery. Most firms reported stoppages of about two weeks for necessary repairs. Sales following the cyclone have been less than 50 percent of prior levels on average, and most firms do not expect demand to recover for at least another three months.

### MICRO-ENTERPRISES

As enterprises in this sector are usually home-based, damages are presumed covered under housing and not included here. Homes are typically constructed of bamboo and thatch and can be rebuilt within a few days and it is assumed most micro-enterprises resumed operations within a week to minimize losses to income. Demand for handicrafts produced by micro-enterprises, however, is likely to be significantly reduced for at least 4-6 months until customers' incomes recover as such items are not normally considered necessities.

### COMMERCE: RETAIL AND WHOLESALE MARKETS

Almost all commercial markets in Ayeyarwady suffered cyclone damage, with a third of these being heavily damaged or destroyed. Markets in Yangon, in general, were not as badly affected with less than half of markets reporting damage—much of which was confined to loss of roofing panels and rain damage to goods.

Shops in most markets, in spite of damage, were back to business within 2-3 days. Sales on average, however, are estimated to be some 40 percent lower than pre-cyclone levels and demand is not expected to recover for another 4-6 months, until the next harvest. Even goods that are necessities and are in short supply such as rice have not risen in price as customers cannot afford them—opting instead for lower quality substitutes such as damaged rice which is plentiful in supply after the cyclone and sells for about one-third the price of regular rice (6,000 kyat vs. 16,000 kyat per 50kg bag).

Shops in Ayeyarwady have been particularly badly affected as most of their customers are farmers and fishermen who will not be able to earn income until the next harvest season or boats are rebuilt. Many shop owners in this area will also face losses from having to write off credit extended to customers who have been killed by the cyclone or can otherwise no longer repay due to changed circumstances.



**COMMERCE: MICRO-ENTERPRISES**

As with home-based manufacturing enterprises, damages here are presumed covered under housing. Shops are also assumed to have reopened within a week to resume needed income. Consumer demand, as in other sectors, is likely to be significantly reduced for at least 4-6 months until incomes recover in the economy.

**SOCIO-ECONOMIC IMPACT**

The socio-economic impact of damage and losses to industry and commerce is wide ranging but will be particularly severe on poor and vulnerable households, including those headed by women. An entire population of workers and their families has been wiped out literally overnight in the salt farms. Replacing this workforce will entail significant migration from other parts of the country and subsequent adjustment. Increased price of salt will have a knock-on impact on the price of foodstuffs such as fish-paste that are widely consumed and serve as an important source of protein particularly for the poor. Prices for these goods will be further affected by the heavy damage suffered by the dried fish/shrimp and fish paste industry in Ayeyarwady. The projected slow recovery of this industry will also adversely affect the circumstances of significant numbers of factory workers and fishing vessel crews it employs. Damage to rice mills and lower yields of paddy from the next harvest will reduce the need for workers by rice mills which serve as a major employer of farmers in the off season. Small-scale retail trading, often used by women and poor households to supplement incomes, will suffer from reduced earning over several months.

**RECOVERY NEEDS**

Losses to industry and commerce are entirely private in nature and, except for those in the Yangon industrial parks, were incurred by owners of industrial and commercial enterprises who are amongst the poorest sections of the population. These losses are not appropriate for compensation from public funds or international assistance. The exception is micro-enterprises, for whom recovery needs are estimated in Annex 14 (Employment and Livelihoods). This section, therefore, focuses on policy issues related to industrial and commercial recovery.

Recovery of salt industry will depend on the replenishment and recovery to full productivity of its decimated workforce. A key need and challenge from both a risk mitigation and economic perspective will be to provide effective protection for such exposed populations, including in fish processing, from future sea surges resulting from cyclones or tsunamis.

Recovery in industry and commerce will be constrained by access to finance. Many firm owners in fish processing lack the capacity to self-finance rebuilding and access to fresh bank loans may often be hindered by existing loans (that cannot be currently repaid due to lack of income) as well as lack of collateral (either destroyed or already pledged). Alternative sources of finance such as friends and family or local traders are likely to have also been adversely affected by the cyclone and unable to provide significant financing. Small and medium enterprises, which typically have relatively little access to institutional finance will also be constrained by lack of capital to invest in repairing or replacing damaged physical assets.

To support recovery, regulatory authorities and banks may need to allow for restructuring existing debt of industrial enterprises and even, under some circumstances, the writing off of loans, particularly for economically disadvantaged and vulnerable households. Other measures may also be needed, such as relaxation of collateral requirements and provision of fresh loans on terms appropriate to allow for reconstruction and recovery.

While much of the damage to factories in industrial parks was quickly repaired by owners, the cost of doing so has been substantial, and will dampen future investments from retained earnings. Few factory owners had insurance, and those that did typically had coverage only for fire damage. Undertaking measure to promote wider insurance coverage will, therefore, be important.

Inadequate credit will be most severe for micro-enterprises, in both industry and commerce, whose recovery will need infusion of well targeted and appropriate credit interventions. Consideration might be given to development and provision through partnership with NGOs where appropriate, of targeted micro-credit and training schemes to allow for supplementary or alternative sources of income. This is covered under Annex 14 (Employment and Livelihoods).

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## ANNEX 8: HOUSING

### SUMMARY

There are two types of housing in the Delta region: traditional houses and modern (solid) houses. Traditional houses are generally a combination of wooden and bamboo structures. Before the cyclone, it is estimated that about 50 percent of all housing units were built of wood and bamboo with wooden or bamboo floors on stilts. About 35 percent were all wooden and about 15 percent were brick or concrete. The construction technology most commonly in use is representative of traditional knowledge and skills.

It is estimated that Nargis destroyed or damaged approximately 450,000 housing units, and around 350,000 units lost all or part of their roof. The damage and losses are estimated at K 686,000 million.

People have made a tremendous collaborative effort and rebuilt an estimated 77 percent of houses already. Given the communities' meagre resources, there has been a significant shift to smaller bamboo houses; these are generally less stable and have a shorter life. The aim of the housing sector recovery strategy is, therefore, to support owners' efforts to rebuild on their own land and to strengthen the structures they put in place to improve disaster resilience. Due consideration should be given to the poor, and to equity in the provision of assistance. Experience with natural disasters and from recovery projects elsewhere should be applied to those requiring relocation to a safer and more sustainable environment through a proper consultative process.

### PRE-DISASTER SITUATION

With the last national census carried out in 1987, there are clear challenges in presenting an accurate profile of the pre-disaster situation in the housing sector of the affected area. The assessment team used various data sources<sup>1</sup> to gain an understanding of the situation.

*Ownership and tenure.* About 98 percent of rural residents and about 85 percent of urban dwellers own their houses. At the same time, most of the rural land in Myanmar is state-owned land and leased to residents. In urban areas there is both state-owned and privately-owned land.

*Housing types.* There are two types of housing in the Delta region: traditional houses and modern (solid) houses. Traditional houses are generally a combination of wooden and bamboo structures. Before the cyclone, it is estimated that about 50 percent of all housing units were built of wood and bamboo with wooden or bamboo floors on stilts. About 35 percent were all wooden and about 15 percent were brick or concrete.

The walls of traditional houses are mostly palm fronds or woven bamboo panels which are nailed or fastened to the main load-bearing structure. Roofs are generally palm thatch but there are some units with corrugated/galvanized iron or zinc sheets. In the affected areas, housing units average around 22 by 11 feet and are located on plots averaging 30 by 50 feet.

Traditional houses generally have a multi-purpose room, one small bedroom for adults, an entrance porch or veranda, and an outdoor kitchen. There are generally no windows or doors but some houses have open weave bamboo to allow light and breeze to enter. Typical household contents consist of kerosene lamps or candles, sleeping mats, cooking and eating utensils, a small radio/cassette player, wraparound clothing, rain water clay jars and a supply of rice and other basic necessities.

Modern houses are usually about 26 by 20 feet and comprise two stories. They are commonly found more in towns rather than in villages. They have wooden and/or brick walls, with wooden roof support structures, and corrugated/ galvanized iron or zinc sheets. Pillars are either wooden, concrete or in brick. Flooring is mostly stabilized cement. Typical plot sizes in urban areas are 40 by 60 or 80 by 80 feet.

1 Ministry of Interior; Myanmar Nargis Information Centre, Myanmar Survey Research (17 May 2008); Ministry of Planning and Economic Development, UNDP and UNOPS (2007). Integrated Household Living Condition Survey in Myanmar – Poverty Profile, Yangon June 2007; and Village Tract Assessment survey, June 2008.

*Water and sanitation.* Traditional houses usually have their own water wells and/or water jars, or rely on rainwater harvesting and water supply from nearby rivers, canals and ponds. Water collected from rivers and canals is usually consumed untreated, and can thus pose a considerable health risk to users. In the towns there exists some degree of coverage of public supply of piped water. However, in many cases, private water wells coexist besides the modern supply system. Toilets (latrines) in rural areas are normally separate outdoor shacks, and washing facilities are generally planks or stairs leading to the river. In urban areas, households use septic tanks with two chamber soak pits.

*Building practices and building code.* Most of the housing units appear to be owner or user-built or built by local craftsmen. Construction of a house is often a collaborative effort within the village and several households will work together to build any one household's house. The construction technology most commonly in use is representative of traditional knowledge and skills. In its field visits, the assessment team observed that while there appears to be a fair knowledge of construction with wood and thatch materials, bamboo mats and bamboo structures, appropriate construction techniques for joints of wooden poles and beams are often not properly applied for both traditional and modern houses. Steel reinforcing, bolts, grooved joints, etc., are rarely used. In many cases, the components are simply nailed or fastened in a rudimentary manner. Few roofs, whether thatched or covered with corrugated/galvanized iron or zinc sheets, appear to have had proper anti-cyclone protection such as nailed-on braces or traction resistant nails.

The country's first building code was published in 1947 by the Rangoon Trust, and revised as a national code in 1991 by the Ministry of Border Areas and National Races Development. It is not known how easily accessible this document is or what the monitoring or enforcement mechanisms are at this time. It seems that some basic design standards and building codes are not widely known or available.

## DAMAGE AND LOSSES

Data collected by the assessment team show that Nargis destroyed or damaged approximately 450,000 housing units. These figures have been corroborated, based on field observations by the assessment team, reports from various agencies working on the post-disaster response, and data from the Village Tract Assessment (VTA) survey.

The damage of roofs varies according to the condition of the building as well as Nargis' path, intensity and related features, as documented on geographically referenced cyclone impact maps.

**Table 1: Damage and Losses in the Housing Sector (Kyat million)**

| Disaster Effects |        |         | Ownership by Sector |         | Effects on |                  |
|------------------|--------|---------|---------------------|---------|------------|------------------|
| Damage           | Losses | Total   | Public              | Private | BOP 1/     | Fiscal Sector 2/ |
| 660,000          | 26,000 | 686,000 | -                   | 686,000 | 80,000     | -                |

1/ Balance of payments: lower exports, higher imports.

2/ Lower tax revenues, unexpected expenditures.

Source: PONJA Team estimates.

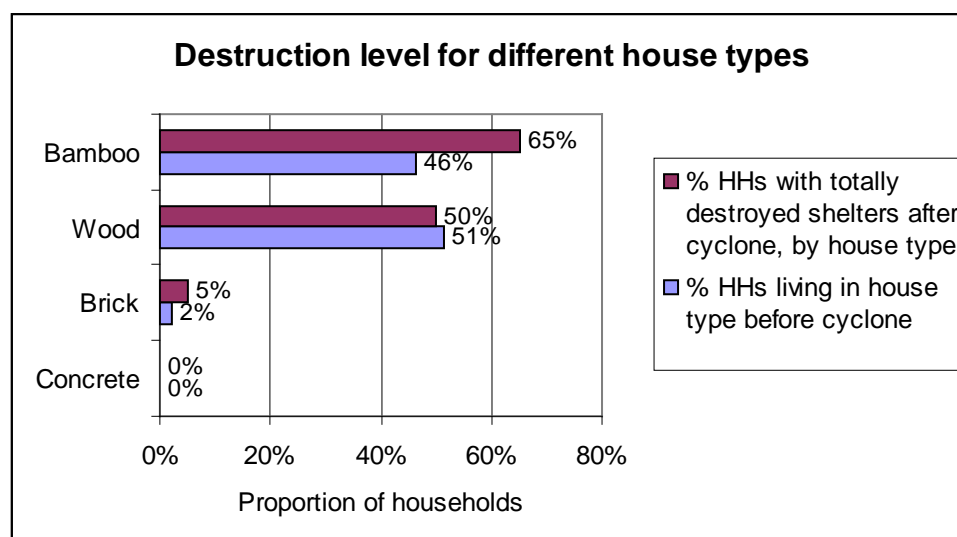
Damages are estimated at K427,000 million and K231,000 million in Ayeyarwady and Yangon divisions, respectively. Damages totalling K2,200 million were also incurred in Bago Division and Mon and Kayin states.

According to the VTA, the cyclone totally destroyed 57 percent and partially damaged 25 percent of the shelters among sampled households in the affected area. 16 percent of households indicated little damage and only 2 percent no damage to their houses. These figures appear to be consistent with the data provided by the government to the assessment team, the team's field visits, and various reports.

The results from the VTA household survey further reveal that the level of shelter destruction was closely linked to the type of shelter before the cyclone. The low-quality bamboo shelters have

been the hardest hit with 65 percent among them totally destroyed.<sup>2</sup> In order to understand better the implications of this destruction pattern across shelter types, the proportions of households living in the different shelter types before the cyclone have been added.

Figure 1: Destruction level per house type in 37 townships



Source: VTA household survey

## EXISTING RELIEF AND RECOVERY EFFORTS

The results of the VTA household survey show that overall, over three-quarters of households have rebuilt their homes already (Table 2).<sup>3</sup> In the villages and townships, in the process of salvaging construction material for emergency (or later) use, most of the debris volume of traditional and wooden houses has been reduced by the affected residents and owners.<sup>4</sup>

Table 2: Reconstruction rates per house type

| % totally destroyed per house type |      |       |          | % rebuilt per house type <sup>5</sup> |      | % not in their home <sup>6</sup> |
|------------------------------------|------|-------|----------|---------------------------------------|------|----------------------------------|
| Bamboo                             | Wood | Brick | Concrete | Bamboo                                | Wood |                                  |
| 65%                                | 50%  | 5%    | 0%       | 77%                                   | 67%  | 6%                               |

Source: VTA household survey

Given the communities' meagre resources, there has been a significant shift to smaller bamboo houses. VTA data indicate an increase in bamboo houses from 46 to 65 percent and a decrease in wood houses from 51 to 33 percent (see figure 2 below). Bamboo is generally less stable than wood with a short life if exposed to humidity. This is of particular concern given that the proportion of total destruction among bamboo shelters was much higher than among other types of shelter (see table above).

<sup>2</sup> Another explanation for this destruction pattern across house types could be that the cyclone passed through an area within the affected region where bamboo houses were more common.

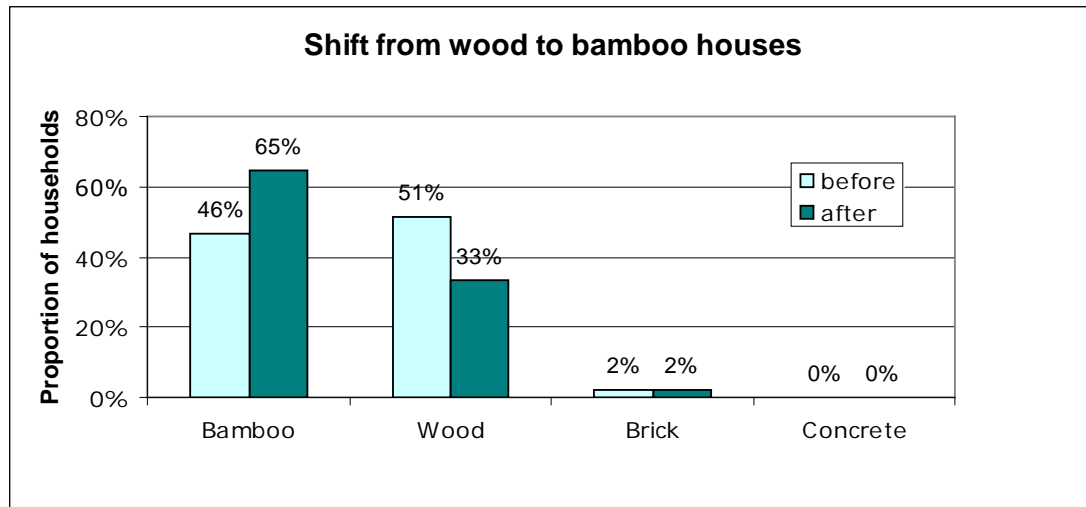
<sup>3</sup> In Ayeyarwady Division alone, an estimated 70 percent of houses has been rebuilt.

<sup>4</sup> In the case of heavier brick and concrete sections, debris removal has been much slower.

\* This does not reflect any possible changes in the type of shelter after rebuilding. The two categories for % rebuilt of brick and concrete shelters have been excluded as too few households live in these shelter types among the sampled villages.

\*\* Based upon the VTA household survey question 'Where are you staying?'

Figure 2: Proportion of house types in the Delta before and after cyclone



Source: VTA household survey

Following the disaster, three types of kits have been assembled for distribution: a Household Tarpaulin Kit (2 tarps and 30m rope), a Community Tool Kit (the standard tool kit of the International Federation of the Red Cross, one kit per five households), and a Household Relief Kit (blankets, mosquito nets, jerry can and kitchen set). These kits provide both short and longer-term assistance as beneficiaries construct temporary and/or permanent shelter solutions as conditions permit.

To date<sup>5</sup>, agencies and NGOs have distributed over 434,000 tarps, covering at least one-third of households needing such. More than 21,000 community tool kits have also been distributed reaching over 105,000 households. Of the household relief kits, 168,000 blankets, 578,000 mosquito nets, 249,000 jerry cans and 60,000 kitchen sets have been distributed. These items have helped many families who have lost all their belongings to rebuild a simple shelter and have enabled them to regain a minimum standard of living.

## RECOVERY NEEDS AND STRATEGY

*Needs.* About three-quarters of the housing units which were destroyed have been rebuilt by their owners and communities, but in most cases using very flimsy structures which will require replacement in a 1-2 year time frame. There is still about one-quarter of houses where it is estimated that rebuilding efforts have not yet started. There is thus a continued need to provide emergency shelter materials and proper building materials to needy households. Indeed, results from the VTA survey indicate that there is an urgent demand for assistance to rebuild homes. Depending on location, 68-97 percent of respondents stated that such assistance for material such as thatch, wood and bamboo was required.

Those who have already rebuilt their houses, have invested their labour and on occasion have also taken out loans (for example, to buy thatch from traders). However, a high percentage of these houses, rebuilt with bamboo and salvaged materials may require further assistance to improve quality. Consequently, in addition to helping rebuild the remaining replacement units, there is need for retrofitting units which have not been built to adequate anti-cyclone standards. Such support could include safer structural improvements and weather protection, as required.

*Strategy.* The goal of an early recovery strategy for the housing sector is to support all affected households over an initial 12-month period as they re-establish their livelihoods in safe and secure locations, living in cyclone-resistant improved dwellings meeting affordability, habitability, cultural adequacy, and access to potable water supply and sanitation facilities. To this end, the Myanmar Emergency Shelter Cluster and the PONJA team have developed guiding principles for housing reconstruction. Due consideration should be given to the poor, and to equity in the provision of assistance.

<sup>5</sup> July 7, 2008.

The proposed shelter support packages include a combination of some, or all, of the following components: construction tools kits; essential building materials at community sites; hands-on technical assistance; and grants/vouchers for the procurement of materials and/or construction activities in order to for the foundations of reaching a durable shelter solution. Income-generation and livelihood activities should be incorporated in transitional shelter provision to the extent possible. For instance, building materials and supplies would be sourced locally; skills of communities in 'building back better' practices would be developed, and artisans and builders would be trained in safer construction techniques, including assessing damages and house location.

The longer-term housing recovery strategy is to begin under the humanitarian phase to help owners to strengthen their existing efforts to rebuild on their own land, making the traditional rural house more disaster-resistant, but preparing the wooden structure with a thatched roof and bamboo or thatch walling. The average size of the core house is 26 square meter. The owners would need to be made aware of disaster-resistant construction techniques. Similarly, local artisans (carpenters, masons, etc.) would need training in disaster-resistant construction. It is proposed that financial assistance should cover the building cost of the core unit. Using local prices, the cost of the disaster-resistant core unit is around K 600,000, a figure that has been triangulated against local prices in affected areas during field visits, and benchmarks for material and construction costs in neighbouring countries.

Within this broad framework of financial needs, support to owners' own efforts to rebuild may be provided through a phased approach, with initial support to strengthen disaster resilience provided as part of immediate humanitarian activities and then supplemented over time with greater assistance to improve disaster-resistance. It should, however, be underlined that a further detailed housing assessment is needed to refine these costs. It is not known, for example, how many of the damaged houses belonged to adults who died, where children or other dependents will be housed with other relatives in future. This may result in a further refinement of needs.

Based on the above, the total need for around 450,000 houses estimated as the maximum that need to be rebuilt is around K285,000 million (see Table 3), out of which the need for the first year is estimated to be K47,000 million to provide basic support to owners' initial efforts to rebuild.

Houses that had lost parts of their roofs have by and large been repaired by the owners and are not included in recovery costs.

**Table 3: Estimated Needs for Building Greater Disaster-Resilience**

| Items to be replaced              | Number of units | Cost estimate (Kyat million) | Comments   |
|-----------------------------------|-----------------|------------------------------|--|
| Core traditional house            | 450,000         | 243,000                      | <ul style="list-style-type: none"> <li>Assumes a traditional rural house of wooden structure with thatched roof and with bamboo or thatch walling</li> <li>Assumes K 600,000 for a core unit of 26 square meter, including the support to rebuilding provided under the humanitarian appeal</li> <li>Assumes 10 percent of salvageable material from the debris</li> </ul> |
| Training and capacity development |                 | 1,575                        |  |
| Program management                |                 | 10,800                       |  |
| <b>Total</b>                      |                 | <b>282,375</b>               |  |

Source: Estimates by UN Habitat and PONJA Team.

*Risk reduction.* Preparedness for recurring cyclones, and disaster risk reduction plans at local and national levels will be key to achieving the goal of long-term sustainability. An assistance program for community-based reconstruction and retrofitting could be focused on the following risk reduction measures: design of cyclone-resistant standard housing units; provision of a roving

retro-fitting service which can provide advice to individual home builders and home owners, and supervise the compliance with cyclone-resistant building standards; training and capacity building of local labour, contractors and community members; installation of an early warning systems; and construction of safe havens and accessible cyclone shelters in all villages.

*Resettlement.* Nargis led to widespread temporary displacement. Those who left their villages after the cyclone tended to be from areas that were completely devastated. In those were some houses remained standing, villagers were more likely to stay with their neighbors than leave their villages. By May 20, there were an estimated 600 informal shelters and government-run temporary settlements housing more than 260,000 people.<sup>6</sup> Since then, this figure has declined dramatically.<sup>7</sup>

Preliminary results from the field assessments indicate that the majority of households who remain displaced wish to return to their own land, and this would be consistent with other natural disaster events in the region. However, no systematic data are available on the number of households who wish to resettle elsewhere, nor on land which is hazardous or on land where the entire family or the registered user of the land died.<sup>8</sup> Amongst those who are still living in camps or with relatives/friends may be families who: (i) do not want to go back to their village of origin for fear of another such disaster and/or because their economic base has been destroyed; (ii) cannot go back because land was lost due to erosion; and/or (iii) they should not go back because their abodes were, or are now, located in hazardous areas or in areas that are no longer environmentally sustainable. These households would, thus, need assistance to settle in another location on their own (for instance, close to relatives), or need to be relocated in groups to safer ground.<sup>9</sup>

Experience with natural disasters and from development projects from ASEAN countries and elsewhere indicates several principles that should guide such resettlement. First, the relocating communities (as well as the receiving ones, if applicable) should be consulted throughout the planning and implementation process, including on why a return to the villages of origin is no longer deemed feasible. Second, investments will be needed to make the new settlements economically, socially and environmentally sustainable; this requires ex ante in-depth analysis with beneficiary participation. Third, the relocating families should have access to land for housing and cultivation with plots of an equal value and size. This takes time to ensure a proper process, hence rapid identification and equipping of new sites should be avoided.

In order to avoid regressive impacts of the cyclone, changes to settlement and land use patterns should be minimized, avoiding the transfer of land away from smaller farmers. It will be particularly important to ensure that due process is established to protect access of survivors to their families' land and to settle any land claim issues transparently and expeditiously.

*Next steps.* Given the enormous needs in the sector, it would be beneficial to quickly establish guidance for the type and standard of housing assistance to be provided as part of relief and early recovery operations. In this regard, it would be preferable that local and international agencies limit their geographical focus and assume responsibility for providing comprehensive assistance to recipient villages so that no other housing-related organization may need to extend services to the same location. In parallel, a detailed housing assessment should be conducted at the local level, ideally through a participatory process drawing on the capacities of community-based groups and local NGOs. This would inform approaches to supplementing household attempts to rebuild. Teams of specialists should also review the safety of the reconstructed buildings, especially where materials and fittings are being reused in the repairs of such structures.

Even though a large share of the damaged and destroyed houses is being recycled in the reconstruction effort, there will be greater demand on natural construction materials. Consequently, the sustainable harvesting of bamboo, palm fronds and related materials, as well as the implications

6 Myanmar Information Management Unit (2008). "Summary of Assessment of Areas Affected by Cyclone Nargis Submitted to MIMU between 3-20 May, 2008." Draft, 7 June, 2008.

7 By the first week of June, numbers of internally displaced persons in camps were much smaller. In Labutta, the camp population declined from 40,000 to 10,000. In Bogale all camps were closed, although some transitional sites were opened. In Myaung Mya, the official camp population decreased to 3,700 from 13,000, with another 800 in informal settlements. All camps in Patheingyi and Mawlamyinegyun townships were closed, and camps in Pyawon (housing 17,000) were in the process of closure.

8 This is normal at this stage after the disaster – it is not generally possible to estimate resettlement and land use/land claim implications until a later stage.

9 Annex 12 (Coastal Environment and Natural Resources Management) provides lessons on appropriate approaches to submerged coastal areas, protecting land and usage rights.



of using young leaves and fallen betel nut trees in the reconstruction process, should be analyzed.

In parallel, there is an urgent need to consult on approaches to coastal zoning, resettlement and land claims. These issues require ex-ante analysis with beneficiary participation. Rapid action should, therefore, be avoided; rather, an initial consultative process should be carried out to establish guidelines which can be used to ensure the full involvement of affected communities in decision-making. A survey of coastal zoning issues, supported by international technical assistance, is an important complement to the community-based consultative process.

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## ANNEX 9: WATER SUPPLY AND SANITATION

### SUMMARY

In the cyclone affected areas, the drinking water supply before the cyclone was mostly provided through self provision arrangements, which included household level rainwater harvesting tanks, communal rain water ponds, open wells, tube wells and rivers. Government records show that there were at least 4,540 ponds in the affected area. While latrine use was common, few latrines were sanitary latrines, with the use of straight drop or floating latrines widespread, which is as risky as open defecation for the spread of water borne diseases.

The destruction of housing during the cyclone led to the loss of many household rainwater harvesting systems, while the storm surge and flooding that followed the cyclone led to the salination of many community rainwater ponds. This has led to drastic shift in primary sources of water from ponds to rain water tanks. Damage to latrines appears to have been extensive, with the assessment indicating that 40-45 percent of respondents have switched from pit latrines to open defecation. Total damage and losses amount to c. 8,500 million, of which almost 95 percent were incurred by private owners and communities.

The immediate humanitarian needs are rehabilitation of communal rain-water ponds, rehabilitation and restoration of household rain-water harvesting systems and household latrines, rehabilitation of tube wells/hand-pumps and promotion of better hygiene practices. The strategy for the longer-term recovery phase should aim at a sustained water quality monitoring program, hygiene promotion, and emergency preparedness to address future natural disasters. Relief and early recovery needs are estimated at K21,600 million whilst longer-term recovery needs amount to c. K11,700 million (Table 3), for a combined total of about K33,300 million.

### PRE-DISASTER SITUATION

Coverage of piped water supply system is low, with only 6 percent of households connected to piped water supply networks in towns, and 2 percent of households in rural areas.<sup>1</sup> The piped water supply networks distribute non-potable water mostly from rivers for domestic uses. In the affected areas, between 2.5 percent to 15 percent of the population living in Ayeyarwady Division and 13 percent to 42 percent in Yangon Division were connected to the piped water network, for which consumers pay a flat rate of approximately K1,000 per month. In some locations, local vendors supply water at the rate of about K1/litre.

In the cyclone affected areas, the drinking water supply before the cyclone was mostly provided through self provision arrangements, which included household level rainwater harvesting tanks, communal rain water ponds, open wells, tube wells and rivers. There are no fees for water supplied from community ponds, dug wells and rain water harvesting.

Most households had a rainwater harvesting system that collected rainwater through a gutter (made of metal, plastic or bamboo) into a number of large earthen pots. In the dry season, the communal ponds that collected rainwater served as the primary source of water, with most communities having at least one or two such ponds. Government records show that there were at least 4,540 ponds in the affected area (2,972 in Ayeyarwady Division and 1,578 in Yangon Division).

In most areas in the region, there is a basic awareness about household water treatment using chlorine. The practice, however, is not common and generally household water treatment is limited to holding water in large earthen containers for a few days before filtering it through a clean cloth.

<sup>1</sup> WHO/UNICEF Joint Monitoring Program for Water Supply and Sanitation Database.

Table 1: Sources of water for drinking and washing before and after the Cyclone

| Type of source  | Percent of respondents using various sources (average) for |       |            |       |         |       |            |       |
|-----------------|--|-------|------------|-------|---------|-------|------------|-------|
|                 | drinking   |       |            |       | washing |       |            |       |
|                 | Yangon   |       | Ayeyarwady |       | Yangon  |       | Ayeyarwady |       |
|                 | before   | after | before     | after | before  | after | before     | after |
| Tube well       | 14   | 15    | 4          | 4     | 18      | 17    | 5          | 4     |
| Hand pump       | 23   | 21    | 2          | 2     | 25      | 26    | 2          | 2     |
| Open dug well   | 8  | 8     | 21         | 19    | 26      | 3     | 2          | 17    |
| Pond            | 48   | 40    | 42         | 24    | 46      | 45    | 27         | 22    |
| Rain water tank | 25   | 30    | 16         | 30    | 20      | 21    | 5          | 8     |
| River           | 2  | 2     | 21         | 19    | 4       | 4     | 49         | 49    |
| Water trucking  | 6  | 5     | 1          | 2     | 1       | 1     | 0          | 0     |

Note: The sum of the percent of different users may not be 100 percent because some respondent use multiple sources.  
Source: Village Tract Assessment.

*Sanitation facilities.* Assessment results show that open defecation is not common in Yangon or Ayeyarwady Divisions. Only 11 percent of respondents in Ayeyarwady Division and 6 percent in Yangon Division reported open defecation before the cyclone. However, while latrine use was common, few latrines were sanitary latrines, with the use of straight drop or floating latrines widespread, which is as risky as open defecation for the spread of water borne diseases<sup>2</sup>.

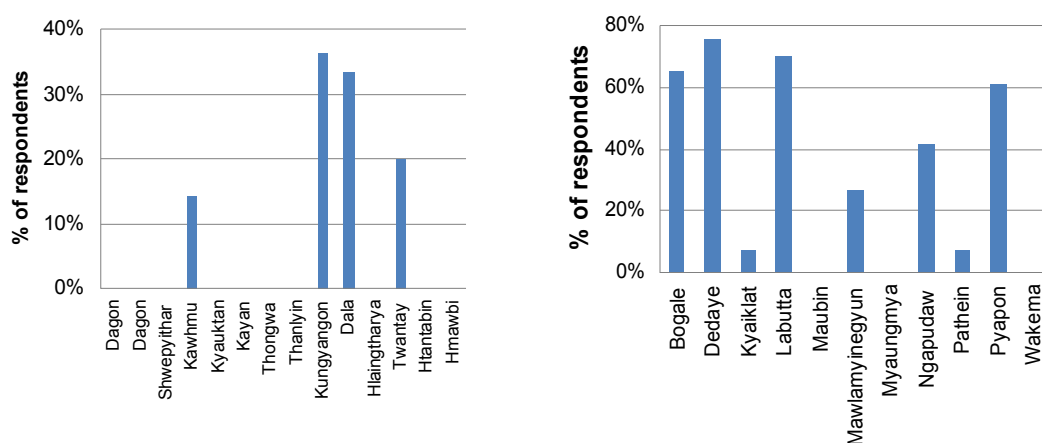
## DAMAGE AND LOSSES

*Damage to primary sources of drinking water.* The destruction of housing during the cyclone led to the loss of many household rainwater harvesting systems, while the storm surge and flooding that followed the cyclone led to the salination of many community rainwater ponds, affecting up to 13 percent of the ponds in Yangon Division and up to 43 percent of ponds in Ayeyarwady Division. This has led to drastic shift in primary sources of water from ponds to rain water tanks. Up to 26 percent respondents have added rainwater tanks in Yangon Division and up to 36 percent in Ayeyarwady Division as their drinking water sources. River water and water trucking also became major means for drinking water for some affected townships.

*Damage to defecation facilities.* Damage to latrines appears to have been extensive, with the assessment indicating that up to 40 percent of respondents have switched from pit latrines to open defecation in Yangon Division after the cyclone, and up to 45 percent in Ayeyarwady Division. Some of the respondents also reported using floating and trench latrines.

*Others.* Damages were also reported to a less significant extent to other sources of water, including the piped water supply system, tube-wells and open wells.

Fig 1: Salinity in Communal Rainwater Ponds



Source: Village Tract Assessment.

2 A floating latrine is a latrine built on stilts above a flowing river or a stream. The excreta drops straight into the water and not in a pit as in the case of a 'sanitary pit latrine'. In a pit latrine, the waste is held in a pit where the pathogens are killed due to natural aerobic digestion. The floating latrines are therefore as risky as open defecation.

*Macro-economic impact.* The above mentioned damages to existing water supply and sanitation infrastructure and further losses because of the damage is shown in the table below.

**Table 2: Summary of Damage and Losses in the Water Supply Sector**

(Kyat million)

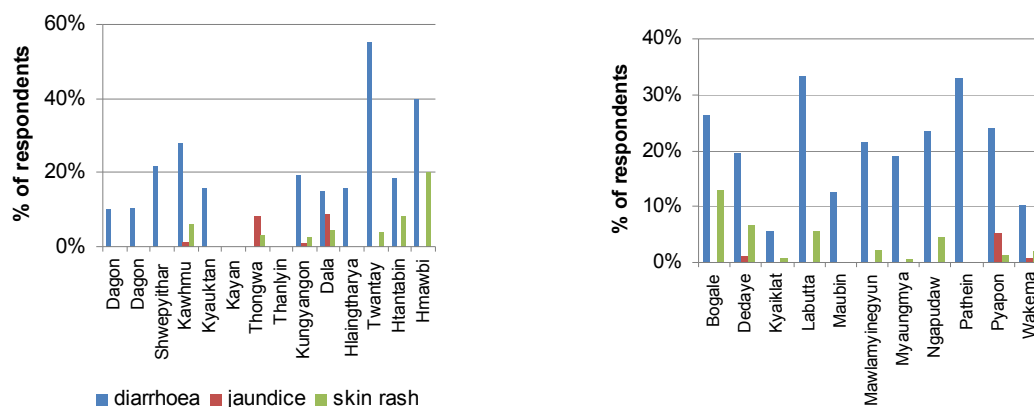
| Sub-sector components                      | Disaster Effects |            |              | Ownership  |              |
|--|------------------|------------|--------------|------------|--------------|
|  | Damage           | Losses     | Total        | Public     | Private      |
| Household rain water harvesting facilities | 7,900            | ..         | 7,900        | ..         | 7,900        |
| Water treatment plant                      | 1                | -          | 1            | 1          | -            |
| Pipe network                               | -                | -          | -            | -          | -            |
| Pump machine                               | 4                | -          | 4            | 4          | -            |
| Pump house                                 | 53               | -          | 53           | 53         | -            |
| Dug well                                   | -                | -          | -            | -          | -            |
| Manual pump                                | 179              | -          | 179          | 179        | -            |
| Cleaning of rain water pond                | -                | 270        | 270          | 270        | -            |
| Consumer purchase of drinking water        | -                | 110        | 110          | -          | 110          |
| <b>Grand Total</b>                         | <b>8,137</b>     | <b>380</b> | <b>8,517</b> | <b>507</b> | <b>8,010</b> |

Note: Exact data for damage to dug wells and tube-wells/hand pumps is not available, rough estimate is given in table 6. Damage to household rain water facilities is based on a total of fully damaged and roof-damaged houses with a unit cost of K7,000 per house for collection system excluding storage pots. Costing for ponds considered for rehabilitation of 1,352 estimated large sized saline ponds at K200,000 per pond.

Source: PONJA team estimates.

*Socio-economic impact.* The loss of access to safe drinking water and sanitation facilities has serious implications for the potential spread of disease (see Figure 2 below).

**Fig 2: Prevalence of Diseases post-Nargis**



Source: Village Tract Assessment.

*Increased stagnant water in the hamlets.* Some of the flood waters caused by the cyclone have remained in villages as stagnant water, creating difficulties in accessing village hamlets and individual houses and in building latrines. The stagnant water is also providing a breeding ground for dengue fever and malaria mosquito. VTA result shows that 75 percent of respondents reported the presence of stagnant water in their vicinity.

*Pattern change in household and communal water treatment.* Traditionally, people treated water by filtering suspended solids from drinking water using a piece of clean cloth. VTA data shows that chlorination treatments at the household and community levels have increased following the cyclone, with almost 20 percent of respondents citing chlorination as a means of treating water.

## RECOVERY STRATEGY AND NEEDS

The immediate humanitarian needs are rehabilitation of communal rain-water ponds, rehabilitation and restoration of household rain-water harvesting systems and household latrines, rehabilitation of tube wells/hand-pumps and promotion of better hygiene practices. The strategy for the recovery phase should also consider meeting sphere standards so that systems established are more sustainable. The attachment summarizes the recommended strategy to be adapted during the first 12 months of recovery.

The main stakeholders related to the disaster response are the communities, who are in charge of leading recovery. Assistance in the context of humanitarian and recovery assistance involves the communities summarized as follows: (i) involvement of communities in the planning and implementation of the programme with support from civil society organizations and NGOs to define appropriate technical criteria for water and sanitation; (ii) building trust among communities and NGOs by organizing regular coordination meetings; and building capacity of community and community based organizations in community management and providing them appropriate technical responsibilities. In order to ensure this, assistance should recognise appropriate leadership roles for communities and local agencies in developing and implementing programmes in their respective communities, including providing training to them where required.

*Immediate needs.* Based on the analysis presented in the previous sub-sections, major areas of urgent humanitarian need are: (i) rehabilitating and sanitizing damaged rainwater ponds and household level rainwater harvesting systems; restoring damaged latrines and promoting further construction; (iii) emergency hygiene promotion such as hygiene kit distribution and training and mobilizing hygiene promoters; and (iv) water quality monitoring program.

The humanitarian operation can also start to address recovery needs, through: further provision and promotion of rainwater harvesting; (ii) improvement to ponds by providing additional protection, filtration and facilities for safer collection of water; (iii) promotion of household sanitary latrines and institutional water and sanitation facilities; and (iv) rehabilitation of dug wells and hand pumps and tube wells. These efforts will continue after the second year to sustain water quality monitoring, hygiene promotion, and emergency preparedness.

*Recovery needs.* A more sustainable recovery program is needed after the initial relief and early recovery, which should be up to three years at the beginning and should consider the following initial strategies: (i) sustained water quality monitoring program; (ii) long-term hygiene promotion; and (iii) emergency preparedness to address future natural disasters.

*Cost estimate.* Relief and early recovery needs are estimated at K21,500 million whilst longer-term recovery needs amount to c. K11,700 million (Table 3).

**Table 3: Water Supply, Sanitation and Hygiene Needs Estimate**

(Kyat million)

| <b>Subsector</b> | <b>Relief and Early Recovery</b> | <b>Longer-term Recovery</b> | <b>Total</b>  |
|------------------|----------------------------------|-----------------------------|---------------|
| Water supply     | 13,428                           | 8,519                       | 21,946        |
| Sanitation       | 8,090                            | 1,478                       | 9,568         |
| Hygiene 1/       | -                                | 1,740                       | 1,740         |
| <b>Total</b>     | <b>21,518</b>                    | <b>11,737</b>               | <b>33,255</b> |

1/ Latrine construction for the relief and early recovery phase amounting to c. K14,000 million is included in the housing needs. Source: PONJA team estimates.

**Attachment**  
**Summary Intervention strategies for the Humanitarian and Early Recovery Phases**

| Type of settlement                                    | Water Supply   | Sanitation  | Hygiene Promotion   | Remarks    |
|---|--|---|---|------------|
| Camps / temporary settlements                         | <ul style="list-style-type: none"> <li>Treat and distribute water</li> <li>Distribute water storage containers</li> </ul>  | <ul style="list-style-type: none"> <li>Promote gender segregated shared temporary sanitation facilities - trench and simple pit latrines.</li> <li>Provide gender segregated latrines in schools, health, and religious institutions (if any).</li> </ul>   | <ul style="list-style-type: none"> <li>Distribution of hygiene kits and additional soaps.</li> <li>Posting key hygiene messages in public places.</li> <li>Training and mobilising Hygiene promoters.</li> <li>Running cleaning campaigns.</li> <li>Preparing community action plan (CAP) and implementing the hygiene program based on CAP.</li> <li>Monitoring Hygiene behaviours.</li> </ul> | H          |
| Village communities<br>Urban / peri-urban communities | <ul style="list-style-type: none"> <li>Treat and distribute water</li> <li>Distribution of chlorine and other household (HH) treatment chemicals or equipments</li> <li>Provide and promote HH and community level rainwater systems.</li> <li>Distribute water storage containers to re-establish HH storage</li> </ul> | <ul style="list-style-type: none"> <li>Provide and promote gender segregated temporary sanitation facilities - trench and simple pit latrines.</li> <li>Provide gender segregated latrines in schools, health, and religious institutions.</li> <li>Support rehabilitating damaged communal toilets, sewage systems and other sanitation facilities.</li> </ul> | <ul style="list-style-type: none"> <li>Distribution of hygiene kits and additional soaps</li> <li>Training and mobilising Hygiene promoters</li> <li>Monitoring Hygiene behaviours</li> </ul>   | H&R<br>H&R |
| Isolated / mobile communities                         | <ul style="list-style-type: none"> <li>Distribute water storage containers</li> <li>Provide HH water treatment chemicals – PUR, water guard and others, and equipments.</li> </ul>   | <ul style="list-style-type: none"> <li>Raise awareness on safe excreta disposal</li> </ul>  | <ul style="list-style-type: none"> <li>Distribution of hygiene kits and additional soaps</li> <li>Training and mobilising Hygiene promoters</li> <li>Monitoring Hygiene behaviours</li> </ul>   | H          |
| Host communities                                      | <ul style="list-style-type: none"> <li>Supplement existing water supply infrastructure by water treatment and distribution as required</li> <li>Rehabilitate existing water supply arrangements/systems</li> <li>Promote HH water treatment</li> </ul>   | <ul style="list-style-type: none"> <li>Provide gender segregated shared temporary sanitation facilities - trench and simple pit latrines,</li> <li>Promote gender segregated latrines in schools, health, and religious institutions,</li> <li>Support rehabilitating damaged toilets, sewage systems, and other sanitation facilities.</li> </ul>              | <ul style="list-style-type: none"> <li>Distribution of hygiene kits and additional soaps</li> <li>Training and mobilising Hygiene promoters</li> <li>Monitoring Hygiene behaviours</li> </ul>   | H          |

Note: H = Applies to humanitarian phase; H&R applies to humanitarian and recovery phases.

## ANNEX 10: TRANSPORT AND COMMUNICATIONS

### SUMMARY

The transport and communications sectors include road, rail, water and air transport, and post and telecommunications.

The total damages are estimated to be above K 120 billion and the total losses would amount to close to K 65 billion. It should be noted that the public sector prices are generally low or subsidized in Myanmar. As these sectors are dominated by the public sector, the damage and loss estimates may be lower than the actual resource costs.

**Table 1: Damage and Losses in Transport and Communications (Kyat million)**

| Sector                       | Disaster Effects |               |                | Ownership by Sector |               | Effects on:   |                 |
|------------------------------|------------------|---------------|----------------|---------------------|---------------|---------------|-----------------|
|                              | Damage           | Losses        | Total          | Public              | Private       | BOP*          | Fiscal Sector** |
| Road Transport               | 12,609           | 28,033        | 40,642         | 18,216              | 22,426        | 19,275        | 17,216          |
| Water Transport              | 99,929           | 30,887        | 130,815        | 76,186              | 54,629        | 56,113        | 76,186          |
| Rail Transport               | 2,357            | 140           | 2,497          | 2,497               | 0             | 707           | 2,497           |
| Air Transport***             | -                | 23            | 23             | 23                  | 0             | 12            | 23              |
| Post and Tele-communications | 7,073            | 3,621         | 10,694         | 10,694              | -             | 6,419         | 10,694          |
| <b>Total</b>                 | <b>121,968</b>   | <b>62,703</b> | <b>184,671</b> | <b>107,616</b>      | <b>77,056</b> | <b>82,526</b> | <b>106,616</b>  |

\* Lower exports; higher imports

\*\* Lower tax revenues; unexpected expenditures

\*\*\* For Myanmar Airlines only

Source: PONJA Team estimates

**Table 2. Quantitative Needs Assessment (Kyat billion)**

| Transport and Communications |      |
|------------------------------|------|
| Yangon port                  | 26.8 |
| Road repair and maintenance  | 21.6 |
| Telecoms*                    | 5.1  |
| Railways*                    | 2.8  |

Note : these needs estimates include up to 15% additional costs for management and monitoring of the construction programs in the road and water transport sectors.

\* Rehabilitation work for rail transport and telecommunications has already been initiated by the respective Ministries; after further assessment, may include passenger ferries (initial estimate at K20 billion).

Source: PONJA Team estimates

## I. ROAD TRANSPORT

### PRE-DISASTER SITUATION

The Ministry of Public Works is responsible for the national highways (for example, primary roads from Yangon to the divisional capitals), divisional roads (for instance, secondary roads from a national highway to a township capital), and township roads (for example, those from township capital to other towns or villages within the township), as well as all bridges in the network. The Ministry for Progress of Border Areas and National Races and Development Affairs is responsible for village to village roads and bridges in the coastal townships of the Ayeyarwady Delta. The urban streets within the township capitals are the responsibility of the respective township authorities.

The primary and secondary road network in the cyclone affected areas mainly links the largest cities (Yangon and Patheingyi) and township capitals, as well as larger towns within the township. The road network is contiguous to almost all township capitals in the Ayeyarwady Division, due to major



bridges across the large rivers in the Delta. Only the capitals of Mawlamyinegyun and Ngapudaw Townships are not connected to the road network and are accessible by inland water transport.

The national highway from Yangon to Patheingyi is a 6-meter wide, bituminous sealed road. Most of the other main roads in the Delta are unsealed, typically with 3-4 meter wide, water bound macadam surface. They were only in fair conditions before Cyclone Nargis. In the remote rural areas around the township capitals and in the coastal areas, there were few engineered roads and bridges. Most of the villages in the areas were accessible either by informal vehicle tracks in the dry season or by boats.

### DAMAGE AND LOSSES

The direct effects of Nargis included major damages to some lower standard secondary and tertiary roads and bridges as well as trails and bamboo foot bridges that were very close to the coastline in Labutta, Ngapudaw and Bogale townships. The cyclone also made some minor damages to other roads (mainly because of flooding, fallen trees and telephone/electric power posts). Damage to roads and bridges in Yangon Division, particularly in the Yangon city areas, was minimal due to higher design standards, more favorable ground conditions and lower intensity of Nargis.

Subsequent to Nargis, major damage has occurred to the main road network and some minor damage to bridges caused by the high traffic volumes and heavy loads of trucks bringing the relief goods and supplies to the cyclone affected areas. Most of the primary road network (particularly the unsealed roads) and some key bridges were not designed to handle the kind of relief trucks.

Losses are mainly incurred in the form of higher vehicle operating costs (VOC) and longer freight and passenger travel time associated with the worsened road conditions on the key primary and secondary road network. Losses are further increased due to the much higher volumes of traffic, especially heavy vehicles, using the main road network for relief assistance. The higher volumes of traffic are expected to continue for an extended period of time during the recovery of the Delta area. Losses in tertiary roads and bridges are considered minimal, as either transport volumes are so low that the amounts are effectively negligible or are handled by inland water transport services which have been partially resumed.

Loss of revenues to transport freight and passenger operators caused by minor interruption of services immediately after Nargis have been offset by higher freight and passenger volumes once services were fully restored. Revenue gains have not been calculated due to lack of reliable data for the pre- and post-Nargis operating conditions. The estimated damages and losses by township are shown in Table 3.

**Table 3. Road Transport: Damage and Loss by Township (Kyat million)**

|              | Damage        | Losses        | Total         |
|--------------|---------------|---------------|---------------|
| Pyapon       | 3,262         | 9,063         | 12,325        |
| Maubin       | 1,226         | 7,362         | 8,587         |
| Myaungmya    | 6,291         | 1,758         | 8,049         |
| Patheingyi   | 1,105         | 4,766         | 5,870         |
| South Yangon | 621           | 5,084         | 5,705         |
| North Yangon | 39            | n.a.          | 39            |
| East Yangon  | 35            | n.a.          | 35            |
| West Yangon  | 31            | n.a.          | 31            |
| <b>Total</b> | <b>12,609</b> | <b>28,033</b> | <b>40,642</b> |

Source: PONJA Team estimates

The effects on the balance of payment and fiscal sector are also assessed (see Table 1). The import content for the road and bridge civil works mainly includes construction equipment, fuel, lubricant and steel, and is estimated to be approximately 25 percent of the civil work value. About 70 percent of the VOC is associated with imported goods such as vehicle itself, parts and fuel. The increases in VOC due to poorer condition of roads results in faster depreciation of vehicles and more consumption of fuels, thus more demand for import. For the fiscal aspect, additional public expenditures are needed to restore the road conditions at least back to the pre-Nargis conditions.

## EXISTING RECOVERY EFFORTS FOR ROADS

Load restrictions have been enforced on some roads and bridges after the Nargis. This should help minimize further bridge damage but road pavement damage is likely to continue due to poor load limit enforcement and wet season rainfall weakening of the road subgrade strength. Current maintenance efforts are focused on repairing areas of significant damage, but these are considered only as temporary measures to ensure that road connections remain open to heavy vehicles. Maintenance and rehabilitation of roads aiming to restore the pre-Nargis conditions is only practical after the current wet season ends in October 2008.

## RECOVERY STRATEGY AND NEEDS FOR ROADS

The recovery need includes increased road maintenance budget to ensure that existing and expected short-term damages to road pavements can be controlled, and the main road network remains open. The partially and fully damaged roads and bridges need to be repaired after the end of the wet season. The estimated cost for this is estimated at about K 21 billion, representing the damage cost to which has been added a 20% inflation cost. The period in which these works can be completed is from September/October 2008 (end of the monsoon season) to June 2009 (beginning of next monsoon season), about 8 months of time, with a need for some continued exceptional maintenance efforts in the following year.

## II. WATER TRANSPORT

### PRE-DISASTER SITUATION

The water transport sector in Myanmar consists of international ocean shipping, domestic coastal shipping, and inland water transport. The Yangon Port is the country's premier port that handles most of the seaborne international trade cargos. It had an annual turnover of 12 million tonnages in 2007. The coastal shipping services are operated along the country's long coastal line by the Indian Ocean and Andaman Sea. Inland water transport is highly developed in the Ayeyarwady Delta which is crisscrossed by a dense river network. Almost all townships and sub-townships in the Delta rely heavily on inland water transport for freight and passenger transport.

The Ministry of Transport is the responsible agency for water transport. Both the public and private sectors are involved through ownership of assets (for example, jetties, pontoons, vessels and boats) and provision of freight and passenger transport services. The Myanmar Port Authority (MPA) is a major public entity responsible for providing terminal facilities and services for shipping.

The size and quality of water transport infrastructure vary substantially between Yangon and the Delta region. Yangon has several public and private ports along the Yangon River, both for international and domestic traffic. The two main ones are the MPA and the Thilawa Port. The MPA has 17 wharves with a maximum capacity of 15,000 DWT, and handles 85% of the total export and import traffic of the country. The Thilawa International Terminal has 6 wharves, and a capacity of 20,000 DWT. The ports in Yangon together handle 80% of the estimated 20 million gross tonnage of freight, both domestic and international.

In contrast, the inland water transport infrastructure in the Delta townships is far more rudimentary, basically consisting of wooden jetties and occasionally floating pontoons. However, they are vital to the local economy. There were a large number of boats in the Delta before the Nargis; close to 15,000 private boats under 20-horsepower were registered. Total certified private boats over 20-horsepower amounted almost to 4,000 in 2006. As for the public sector, about 300 powered vessels were recorded in the 2006 Statistical Yearbook.

**DAMAGE AND LOSSES**

The Nargis has caused substantial damages to the jetties, vessels and boats, and relevant buildings. Many jetties and pontoons sank, broke, or collapsed. A large number of vessels and boats sank, capsized, were blown/washed ashore, or lost at sea. The transport office buildings and handling equipment were also damaged to varying degrees.

Yangon ports suffered the heaviest damage in terms of asset value: 24 steel jetties and pontoons out of 37 were sunken or heavily damaged. Each jetty is evaluated between K 130 and 250 million. Nearly one hundred sizable vessels were either grounded or sank in the Yangon River and traffic stopped completely for two weeks after the cyclone. The MPA expects a period of 1-2 years before its facilities fully recover.

Substantial revenue losses have incurred due to service interruption, and further losses are expected due to lower level of services caused by shortage of vessels and boats. The international ports of Yangon suffer the highest amount of revenue losses, including sizable amount of foreign currency revenues.

In the Delta region, the publicly provided inland water transport services were resumed just a few days after the cyclone, but the service supply has fallen short of demand due to the heavy losses of vessels and boats. On the other hand, inland water transport demand is expected to increase due to the delivery of material supplies related to the recovery program. As a result, the private sector freight tariffs and passenger fares have increased. This situation will continue for an extended period of time, as a year of time would normally be required to build a medium- to large-sized vessel. Building a small boat takes at least 2 months but it this is likely to take considerably longer over the next three years due to the death of boat-builders and the exceptional demand on the time of surviving boat-builders.

On average, approximately 50 percent of the vessel value is associated with imported items (especially the engines). The replacement costs of relevant damaged buildings and structures would have 25 percent imported content. The loss of revenues in foreign currencies in Yangon ports further affects the balance of payment. The main effects on the fiscal sector result from the needed replacement costs for the damaged public sector assets and the revenue losses of the Yangon Port (which normally receives sizable revenues from international and coastal shipping and inland water transport).

For the delivery of humanitarian assistance in the immediate aftermath of the cyclone, the damage to infrastructure necessitated a large-scale logistics operation to reach the 2.4 million people most severely affected, including the establishment of an air bridge from Bangkok to Yangon, with onward transport to the delta by trucks, river barges, and ten helicopters, at a total cost of around US\$50 million.

**RECOVERY STRATEGY AND NEEDS**

Repairs to the major infrastructure needed to deliver the humanitarian and recovery program have already been completed in most sectors and are not included as recovery needs, due both to the fast action taken to repair damaged electricity transmission lines and telecommunications infrastructure, and the relatively low damage done to the primary road and rail network and other large-scale infrastructure. Using the basic principle of restoring essential infrastructure to pre-cyclone levels (but not beyond), probable recovery activities would include: (i) in water transport, provision of small boats for household transport (these will also be used for fishing); (ii) replacement of ferries (based on further assessment); (iii) repairs to Yangon port. Aside from this, infrastructure needs are all at community level, including feeder roads, small jetties, water and sanitation points, and religious buildings such as churches, temples and mosques. These needs are addressed through the recovery activities outlined in the livelihoods annex.

For the Yangon ports, clearing the channel of sunken ships and replacing the 27 destroyed pontoons and jetties are the immediate priorities. To clear the channel, a bathymetric survey is needed along the Yangon River Channel and as an option in the neighboring areas, in order to identify the wrecks. Full repair to the port will occur over a longer period and should be preceded by

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a more detailed assessment.

In the Delta area, timber jetties have to be rebuilt with premium quality timber and more resilient engineering so as to be more resilient to disaster. The new boats are expected to be built locally, but there will be a major need for timber supplies and imported motors.

### **III. POST AND TELECOMMUNICATIONS**

#### **PRE-DISASTER SITUATION**

Posts and telecommunications services are entirely government-owned and operated by the public sector. The Ministry of Communications, Posts and Telegraphs (MCPT) is the responsible agency. Postal services are provided by a network of post offices located in each of the townships and sub-townships. The telecommunication services are carried by both fixed-line telephone system and mobile phone system. The city of Yangon is the telecommunication center of the country. It possesses a significant portion of the telecommunication assets, and accounts for 50 percent of the country's subscribers.

The phone network coverage used to be quite limited in the Delta area and concentrated in cities and towns. However, by the time the cyclone happened, mobile phone systems – the GSM and the Code Division Multiple Access (CDMA) systems – were being expanded to a great part of the Delta through micro-wave towers and optical fiber routes. According to the MCPT, the mobile phone systems covered roughly 70 percent of Delta area. However, most of the remote rural communities did not have access to telephone services, due mainly to the high costs of acquiring mobile phone sets. Most cities and towns had fixed-line telephone services carried by the digital auto telephone systems. The old rotary telephone systems (i.e. magneto phones) were phasing out but still existed in a few small towns.

Overall, most of townships in the Delta had low levels of telephone usage. A combination of low level of usage and very low level of charges resulted in low level of telephone service revenues in the Delta townships, which ranged from less than K 1 million to K 15 million per month. As a comparison, while the average Delta monthly revenue (including the division capital city Patheingyi) stands at K 240 million, the city of Yangon recorded monthly revenues of K 4,850 million in April 2008.

#### **DAMAGE AND LOSSES**

Cyclone Nargis caused major damages to the post offices, fixed-line telephone systems and a few microwave towers. Telephone posts, overhead cables and drop wires were destroyed. Several microwave towers fell. Many telephone sets were damaged together with the buildings and houses. A number of communication office buildings (including post offices) collapsed or had their roof blown off. As a result, services were interrupted. Fortunately, the CDMA mobile phone systems were largely unaffected.

Most towns were able to restore services within 1 to 3 weeks while a few others had not yet fully been restored at the time of the assessment. For example, about 90 percent of the digital auto telephone service to subscribers in the city of Yangon was restored. The interruption of services results in revenue losses. Further revenue losses are expected until the full recovery of the systems and the acquisition of new phones by the users who lost their old ones. The estimated damages and losses by township and division are presented in Table 5. Only division level data are provided.

All equipment in the sector is imported. Replacement of the damaged telephone equipment requires more import. The damaged buildings have an estimated 30% of imported content (such as construction machinery, fuel, and steel). The effects on the fiscal sector are the full extent of the damages and losses in this sector as it is entirely publicly owned and operated through the government budgetary process.

Table 5. Post and Telecommunications: Damages and Losses by Division (Kyat million)

|              | Damage       | Losses       | Total         |
|--------------|--------------|--------------|---------------|
| Yangon*      | 5,461        | 3,569        | 9,030         |
| Ayeyarwady   | 1,472        | 52           | 1,524         |
| Mon          | 126          |              | 126           |
| Bago         | 12           |              | 12            |
| Kayin        | 3            |              | 3             |
| <b>Total</b> | <b>7,073</b> | <b>3,621</b> | <b>10,694</b> |

Source: PONJA Team estimates

### EXISTING RECOVERY EFFORTS IN TELECOMMUNICATIONS

Reconstruction is already underway for all Nargis-affected townships. At the time of assessment, about 40% of the damages have been repaired and recovered. Most towns were able to restore services within 1 to 3 weeks. For example, about 90% of the digital auto telephone service to subscribers in the city of Yangon had been restored. A few towns had not yet fully been restored at the time of the assessment but the process is not expected to take more than a few months.

### RECOVERY NEEDS AND STRATEGY

The remaining 60% damage replacement cost plus 20% cost increase would be the recovery need, which amounts to K 5 billion. As the sector is entirely under the public ownership and public sector pricing regime, the material and equipment supply may not be a severe constraint. However, skilled labor for system installation may be in shortage and the Ministry may need to find a quick way to mobilize skilled labor elsewhere.

## IV. RAIL AND AIR TRANSPORT

The infrastructure assets of both rail and air transport in the cyclone affected areas are mainly concentrated in the city of Yangon. Much of the railway network is located beyond of cyclone affected areas. While both air and rail transport infrastructure largely managed to weather the storm, some buildings suffered damages. A few days interruption caused moderate losses in both sectors.

Yangon International Airport declared minor damage. However, the traffic was interrupted for 2 days after the cyclone hit. There were around 20 national and international flights per day. The only loss estimate available amounts to USD 20,691 of net revenues for the public air companies.

As for rail transport, damage was declared neither on rail tracks nor on rolling stocks and locomotives. However, damages were reported on Ministry-owned buildings, mills, workshops, warehouses, machinery, and electric lines, with an estimated total damage of about K 2 billion, for which repair are already under way. Revenue losses of K 140 million were reported from 4 days of total interruption and 2 weeks of partial interruption of rail services especially the Yangon urban commuter rail services. Reconstruction of damaged buildings and facilities could take 6 months with cost spreading evenly.

**ANNEX 11: ELECTRICITY****SUMMARY**

As of April 2007, the total installed capacity in Myanmar was 1,750 MW, of which 1,645 MW was connected to the National Grid System (the Grid), and 106 MW was off-grid generation. Nationally, the transmission facilities exceed 1,352 km (845 miles) at 230 kV voltage level, 1,692 km (1,056 miles) at 132 kV, and 2,173 km (1,358 miles) at 66 kV.

Total damage and loss has been estimated at K15,718 million. Damages of K15,429 million greatly exceeded losses (K289 million). Shortly after the passing of Cyclone Nargis, when many administrative centres were left without electricity, the Ministry of Energy and Power-2 (MOEP2) took special measures to provide emergency diesel-fuelled generation facilities to the townships' administrative centres for provision of basic services. Reconstruction of damaged transmission lines also started early.

**Table 1: Estimated Damage and Losses – Electricity Sector**  
(Kyat million)

| Sub-sector, Component         | Disaster Effects |            | Total         |
|-------------------------------|------------------|------------|---------------|
|                               | Damage           | Losses     |               |
| <b>Ayeyarwady</b>             | <b>6,455</b>     | <b>-4</b>  | <b>6,451</b>  |
| Sales                         | -                | -4         | -4            |
| Generation                    | 731              | -          | 731           |
| Transmission and Distribution | 5,724            | -          | 5,724         |
| <b>Yangon</b>                 | <b>6,814</b>     | <b>332</b> | <b>7,147</b>  |
| Sales                         | -                | 332        | 332           |
| Generation                    | -                | -          | -             |
| Transmission and Distribution | 6,814            | -          | 6,814         |
| <b>Other Divisions</b>        | <b>2,160</b>     | <b>-39</b> | <b>2,120</b>  |
| Sales                         | -                | -39        | -39           |
| Generation,                   | -                | -          | -             |
| Transmission and Distribution | 2,160            | -          | 2,160         |
| <b>Total</b>                  | <b>15,429</b>    | <b>289</b> | <b>15,718</b> |

Source: PONJA Team estimates.

**PRE-DISASTER SITUATION**

As of April 2007, the total installed capacity in Myanmar was 1,750 MW, of which 1,645 MW was connected to the National Grid System (the Grid), and 106 MW was off-grid generation. Nationally, the transmission facilities exceed 1,352 km (845 miles) at 230 kV voltage level, 1,692 km (1,056 miles) at 132 kV, and 2,173 km (1,358 miles) at 66 kV.

**Ayeyarwady Division Impact Areas**

Table 2 shows that the off-grid installed capacity (1,491 kVA) in the Nargis impact area in Ayeyarwady Division is a small fraction (0.07 percent) of the total national installed capacity. Annual sales in the Nargis impact area at about 45 GWh/year account for only about 1 percent of national annual sales of electricity. Table 2 also shows the length of the transmission and distribution line, which is again only a fraction of the national Grid and Off-grid network.

Grid load shedding of about six to eight hours a day was common in the Nargis impact area before the disaster. In Labutta Township, the power plant was operated for about one hour daily between 20:00 and 21:00 hours; likewise in other off-grid systems. Therefore, some consumers (wealthier consumers, hotels, restaurants, shops, small industries) opted to procure their own generating sets (typical size 5-10 kVA). No systematic data was available on these sets. Furthermore, some villages not connected to the grid have formed cooperatives to procure and operate small generating units. Typically for lighting only, these consist of petrol fuelled generating sets or steam turbines using rice husk and vegetable oils as fuel, and are also excluded in the analysis.

**Table 2 – Generation, Transmission and Distribution Facilities in Ayeyarwady Division Impact Areas – MOEP21**

| Township       | Generating Capacity,1 kVA | Transmission and Distribution Lines, km (miles)2 |          |           |
|----------------|---------------------------|--|----------|-----------|
|                |                           | 66 kV  | 33 kV    | 11/6.6 kV |
| Pathein        | 160                       | 16 (10)  | -        | 8 (5)     |
| Ngapudaw       | 264                       | -  | -        | 26 (16)   |
| Myaungmya      | -                         | 10 (6)   | -        | 22 (14)   |
| Labutta        | 939                       | -  | -        | -         |
| Wakema         | 100                       | -  | -        | 8 (5)     |
| Mawlamyinegyun | -                         | -  | -        | 21 (13)   |
| Bogale         | 28                        | -  | 12 (8)   | 20 (13)   |
| Maubin         | -                         | -  | 22 (14)  | -         |
| Kyaiklat       | -                         | -  | 27 (17)  | -         |
| Pyapon         | -                         | -  | 31 (19)  | -         |
| Dedaye         | -                         | -  | 23 (14)  | -         |
| Total          | 1,491                     | 26 (16)  | 115 (72) | 105 (66)  |

1 Source: Government of Myanmar, MOEP2

2 Listed only those diesel generating units owned by MOEP2

3 Lengths within Township are approximate

With 48,038 consumers in the impact area, the household electrification ratio is only about 7 percent. Sales in April amounted to 3,542 MWh. The urban areas of Pathein and Myaungmya account for 76 percent of total sales in the impact area. Demand is however, suppressed because of 6-8 hours of daily load shedding in the grid.

**Table 3 –Consumers and April 2008 Sales in Ayeyarwaddy Division Impact Areas**

| Township       | Consumers <sup>1</sup> | Electrification ratio, 2, 3 percent HH | Sales in April 1,4 (MWh) | Proportion of total Sales | Unit Sales (kWh)/ Consr | Grid/Off-Grid     |
|----------------|------------------------|--|--------------------------|---------------------------|-------------------------|-------------------|
| Pathein        | 18,045                 | 26 %                                   | 2,200                    | 62.1 %                    | 122                     | Grid and Off-Grid |
| Ngapudaw       | 1,054                  | 2 %                                    | 23                       | 0.6 %                     | 22                      | Grid and Off-Grid |
| Myaungmya      | 5,899                  | 9 %                                    | 494                      | 13.9 %                    | 84                      | Grid              |
| Labutta        | 1,320                  | 2 %                                    | 12                       | 0.3 %                     | 9                       | Off-Grid          |
| Wakema         | 2,230                  | 3 %                                    | 34                       | 1.0 %                     | 15                      | Grid              |
| Mawlamyinegyun | 2,010                  | 4 %                                    | 20                       | 0.6 %                     | 10                      | Grid              |
| Bogale         | 2,926                  | 4 %                                    | 44                       | 1.2 %                     | 15                      | Grid and Off-Grid |
| Maubin         | 4,967                  | 8 %                                    | 273                      | 7.7 %                     | 55                      | Grid              |
| Kyaiklat       | 2,648                  | 6 %                                    | 69                       | 1.9 %                     | 26                      | Grid              |
| Pyapon         | 5,480                  | 10 %                                   | 332                      | 9.4 %                     | 61                      | Grid              |
| Dedaye         | 1,458                  | 3 %                                    | 41                       | 1.2 %                     | 28                      | Grid              |
| Total          | 48,038                 | 7 %                                    | 3,542                    | 100 %                     | 74                      |                   |

1 Source: Ministry of Electric Power 2 (MOEP2)

2 Ratio between number of consumers and number of households in the whole township based on 2008 population estimates by UNICEF

3 Household assumed to consist of 5 people.

4 Typically, due to load shedding electricity is only available 16-18 hours per day for grid-connected consumers, while off-grid load centers only have from 1 hour (Labutta) to 3 hours/day of electricity.

## YANGON DIVISION IMPACT AREAS

The installed capacity in the Yangon Division impact areas amounts to 470.7 MW at four gas-fired power plants in and around Yangon. The transmission and distribution lines comprise lengths of

102 km of 66 kV, 1731 km of 33 kV, 2731 km of 11 kV and 4288 km of 0.4 kV (detailed township-level data were unavailable). With about 768,000 consumers, the Yangon Division represents 60 % of the consumers in Myanmar. The household electrification ratio outside Yangon Division varies between 3 % and 57 %, with an average of 49 %. Yangon City also consumed the bulk of the sales (97 %) in the Yangon Division impact area.

**Table 4 –Consumers and April 2008 Sales in Yangon Division Impact Areas**

| Township     | Consumers <sup>1</sup> | Electrification ratio, <sup>2</sup><br>% Households | Sales in April <sup>1,3</sup><br>(MWh) | Proportion of total Sales | Unit Sales (kWh)/Consumer | Grid/Off-Grid |
|--------------|------------------------|---|--|---------------------------|---------------------------|---------------|
| Htantabin    | 1,032                  | 3 %   | 137                                    | 0.1 %                     | 133                       | Grid          |
| Twantay      | 4,385                  | 8 %   | 323                                    | 0.2 %                     | 74                        | Grid          |
| Kawhmu       | 2,716                  | 9 %   | 48                                     | 0.0 %                     | 18                        | Grid          |
| Kungyangon   | 2,880                  | 13 %  | 119                                    | 0.1 %                     | 41                        | Grid          |
| Yangon       | 729,852                | 57 %  | 133,926                                | 97.3 %                    | 183                       | Grid          |
| Thanlyin     | 13,881                 | 37 %  | 2,265                                  | 1.6 %                     | 163                       | Grid          |
| Kyauktuan    | 4,507                  | 15 %  | 433                                    | 0.3 %                     | 96                        | Grid          |
| Kayan        | 4,023                  | 10 %  | 186                                    | 0.1 %                     | 46                        | Grid          |
| Thongwa      | 4,509                  | 11 %  | 164                                    | 0.1 %                     | 36                        | Grid          |
| <b>Total</b> | <b>767,785</b>         | <b>49 %</b>   | <b>137,601</b>                         | <b>100 %</b>              | <b>179</b>                |               |

<sup>1</sup> Source: Government of Myanmar, MOEP2

<sup>2</sup> Ratio between number of consumers and number of households in the whole township based on 2008 population estimates by UNICEF and five persons per household

<sup>3</sup> Power is generally available between 18 and 12 hours a day throughout the Division.

## DAMAGE AND LOSSES

### DAMAGE ASSESSMENT FOR THE AYEYARWADY DIVISION

Of the 1,490 kVA of diesel-fuelled off-grid power plants in the affected area, about 1,075 kVA were damaged, or lost. On Hainggyi Island, three generating sets totaling 136 kVA providing power to 139 consumers, were partly damaged by salt water during the storm; they were repaired and are back in operation. The 860 kVA genset at Labutta Township providing power to 1,320 consumers was also partly damaged, but is now in operation. On Pyin Sa Lu, however, the 79 kVA genset providing electricity to 192 consumers was washed out to sea by the tidal surge. The village was destroyed, and the unit has not yet been replaced, as there is no surviving staff and very few or no consumers left in the village. Damages were estimated at Ks 731 million (Table 5).

There is no data on damages, and subsequent repairs, to private sector generating units. It is expected, however, that those generating units in villages that were close to the coast, and that were affected by the tidal surge, may have suffered extensive salt damages.

As to transmission and distribution facilities, most of the damage (82 % of 33 kV lines and 30 % of 11/6.6 kV lines) occurred in Mawlamyinegyun, Bogale, Kyaiklat, Pyapon and Dedaye townships (Table 5). In the affected areas, transmission and distribution lines have poles made of reinforced concrete (rectangular and cylindrical) as per Myanmar technical standards, or railway rails. The railway rails cannot be considered as being a permanent solution for any medium voltage line. The initial cost estimates provided by the Government included only materials, and have been adjusted to also include labour, installation and transport costs. It has been assumed that materials account for 70 % of total costs. The total transmission line damages in Ayeyarwady Division are estimated at Ks 5,724 million.



Table 5 – Generation, Transmission and Distribution Facilities Damage in Ayeyarwady Division Impact Areas – MOEP21

| Township  | Installed Capacity, <sup>2</sup><br>kVA | Transmission and Distribution Lines, km (miles) |                  |                  |                  |
|---|---|---|------------------|------------------|------------------|
|   |   | 66 kV   | 33 kV            | 11/6.6 kV        | 0.4 kV           |
| Pathein   | -                                       | 24 (15)   | -                | 0 (0.3)          | NA               |
| Ngapudaw  | P: 136                                  | -   | -                | 1 (0.5)          | 3 (2.0)          |
| Myaungmya   | -                                       | -   | -                | 4 (2.5)          | 1 (0.5)          |
| Labutta   | P: 860; T:<br>74                        | -   | -                | -                | 7 (4.2)          |
| Wakema  | -                                       | -   | -                | 4 (2.6)          | 1 (0.9)          |
| Mawlamyinegyun                                    | -                                       | -   | -                | 11 (6.7)         | 2 (1.5)          |
| Bogale  | -                                       | -   | -                | 1 (0.6)          | 5 (3.4)          |
| Maubin  | -                                       | -   | 10 (6.0)         | 1 (0.5)          | 2 (1.5)          |
| Kyaiklat  | -                                       | -   | 9 (5.3)          | 1 (0.4)          | 8 (4.7)          |
| Pyapon  | -                                       | -   | 57 (35.8)        | 4 (2.3)          | 30 (19.0)        |
| Dedaye  | -                                       | -   | 18 (11.6)        | 6 (3.8)          | 5 (3.4)          |
| <b>Sum</b>  |   | <b>24 (15)</b>                                  | <b>94 (58.7)</b> | <b>32 (20.3)</b> | <b>67 (41.7)</b> |
| %age damage<br>(by length)                        |   | NA  | 82 %             | 30 %             | NA               |
| Replacement<br>Costs, <sup>3</sup><br>1,000 Ks/km | -                                       | 40,600  | 30,900           | 15,300           | 20,300           |
| <b>Total, Ks mn</b>                               | <b>731</b>                              | <b>974</b>                                      | <b>2,900</b>     | <b>496</b>       | <b>1,354</b>     |

<sup>1</sup> Source: Government of Myanmar, MOEP2.

<sup>2</sup> T = Total damage – needs replacement; P = Needs repairs only.

<sup>3</sup> Materials (towers, conductors, insulators) as per MOEP2 + 30 % for labour, installation and transport.

## LOSS ASSESSMENT FOR THE AYEYARWADY DIVISION

The estimation of losses is based on comparing the sales in April with estimates of post-disaster sales. Sales in May are available, and have been considered as the starting point for the computation of losses. It is assumed that previous consumers will be reconnected; the same electrification ratio in each township as in April has also been assumed. Although there was high loss of life in Labutta (23 %), most of it occurred in the rural areas, where electricity was not available. Loss of human life in the urban areas and townships was much less. Assuming the same number of consumers is thus deemed reasonable considering all other uncertainties. The analysis also assumes a linear growth in sales from May to an expected date for complete reconnection (end July 2008 according to MOEP2 plans), when previous consumption pattern is resumed.

Of interest, is the increase in sales from April to May in Pathein (increase of 12 %) and Myaungmya (+49 %). This may be attributed to the increased activities for reconstruction assistance in Labutta. In Wakema and Maubin there was a reduction of 59 % and 34 % respectively, and this reflects that connection to the grid was only achieved in the middle of the month. The figure for Maubin may also reflect increased economic activity, possibly, as it may be a hub for assistance to the township to the south. It has been assumed that by end September, sales will be the same as in April in all townships.

Table 6 – May 2008 Sales and Recovery in Ayeyarwady Division Impact Areas

| Township       | Surviving population in Township <sup>1</sup> | Sales in May, <sup>1,2</sup> MWh | Fraction of April sales, % | Date emergency genset became operational <sup>1</sup> | Expected date distribution system will be operational <sup>1</sup> |
|----------------|---|----------------------------------|----------------------------|---|--|
| Pathein        | 100 %   | 2,464                            | 112 %                      | -   | 5 May  |
| Ngapudaw       | 98 %  | 23                               | 100 %                      | -   | 11 May   |
| Myaungmya      | 100 %   | 736                              | 149 %                      | -   | 5 May  |
| Labutta        | 77 %  | -                                | -                          | 12 May  | 15 May   |
| Wakema         | 100 %   | 14                               | 41 %                       | -   | 22 May   |
| Mawlamyinegyun | 97 %  | -                                | -                          | 100 kVA, 8 May  | 30 June  |
| Bogale         | 85 %  | -                                | -                          | 100 kVA, 9 May  | 30 June  |
| Maubin         | 100 %   | 179                              | 66 %                       | -   | 16 May   |
| Kyaiklat       | 100 %   | -                                | -                          | 100 kVA, 11 May                                       | 2 June   |
| Pyapon         | 100 %   | -                                | -                          | 100 kVA, 11 May                                       | 3 June   |
| Dedaye         | 98 %  | -                                | -                          | 100 kVA, 11 May                                       | 30 June  |
| <b>Total</b>   |   | <b>3,417</b>                     | <b>96 %</b>                |   |  |

<sup>1</sup> Source: Government of Myanmar, MOEP2

<sup>2</sup> Generation by emergency gensets not recorded and billed.

To compute losses for the period April to September 2008, sales have been estimated for the condition with and without Nargis yielding the net loss in revenues to MOEP2 (Table 7). Without Nargis, estimated sales between April and September would have reached 21.3 MWh, while in the present situation sales are expected to reach about 21.5 MWh (1 % higher than the without Nargis), or an increase of 0.26 MWh. The increase, rather than an expected decrease, could be attributed to the increased sales in Pathein and Myaungmya, which dominate the sales figures (76 % of total sales in the affected area). Computation of revenue assumes a tariff of Ks 25/kWh for domestic and agricultural consumers, and Ks 50/kWh for industrial consumers. The increased sales result in a net loss of revenue to MOEP2 that is negative, i.e. there is an increase in revenue of Ks 10 million.

Table 7 – Estimates of April – September 2008 Revenues (Ks million) in Ayeyarwady Division Impact Areas with and without Nargis Cyclone

| Township       | Total Sales without Nargis (GWh) | Total Sales with Nargis (GWh) | % domestic sales | % Industrial sales | Revenues without Nargis | Revenues with Nargis | Net Loss in Revenue |
|----------------|----------------------------------|-------------------------------|------------------|--------------------|-------------------------|----------------------|---------------------|
| Pathein        | 13.20                            | 13.79                         | 59               | 41                 | 465                     | 486                  | -21                 |
| Ngapudaw       | 0.14                             | 0.14                          | 100              | -                  | 4                       | 4                    | -                   |
| Myaungmya      | 2.96                             | 3.50                          | 54               | 46                 | 108                     | 128                  | -20                 |
| Labutta        | 0.07                             | 0.05                          | 100              | -                  | 2                       | 1                    | 1                   |
| Wakema         | 0.20                             | 0.18                          | 95               | 5                  | 5                       | 5                    | 1                   |
| Mawlamyinegyun | 0.12                             | 0.07                          | 99               | 1                  | 3                       | 2                    | 1                   |
| Bogale         | 0.26                             | 0.15                          | 75               | 25                 | 8                       | 5                    | 3                   |
| Maubin         | 1.64                             | 1.54                          | 57               | 43                 | 59                      | 55                   | 4                   |
| Kyaiklat       | 0.41                             | 0.33                          | 52               | 48                 | 15                      | 12                   | 3                   |
| Pyapon         | 1.99                             | 1.59                          | 50               | 50                 | 75                      | 60                   | 15                  |
| Dedaye         | 0.25                             | 0.14                          | 87               | 13                 | 7                       | 4                    | 3                   |
| <b>Total</b>   | <b>21.25</b>                     | <b>21.51</b>                  | <b>83</b>        | <b>17</b>          | <b>750</b>              | <b>761</b>           | <b>-11</b>          |

## DAMAGE ASSESSMENT IN YANGON DIVISION

There was no major damage to any of the four gas-fired power plants in the Yangon area. No data was available on damages to private sector gensets, normally used for backup during load shedding periods. However, damages were incurred in distribution and transmission system worth an estimated Ks 6,816 million using the same unit costs as in Ayeyarwady since the terrain is similar (generally flat).

Table 8 – Generation, Transmission and Distribution Facilities Damage in Yangon Division Impact Areas – MOEP2

| Township                                   | Generating Capacity, kVA | Transmission and Distribution Lines |                  |              |                  |
|--|--------------------------|-------------------------------------|------------------|--------------|------------------|
|  |                          | 66 kV                               | 33 kV            | 11/6.6 kV    | 0.4 kV           |
| Htantabin                                  | -                        | -                                   | -                | 6            | 2(1.0)           |
| Twantay                                    | -                        | -                                   | 8 (5.0)          | 3            | 2 (1.5)          |
| Kawhmu                                     | -                        | -                                   | 7 (4.4)          | 7            | 2 (1.4)          |
| Kungyangon                                 | -                        | -                                   | 13 (8.0)         | 3            | 1 (0.8)          |
| Yangon                                     | -                        | 24                                  | 51 (31.8)        | 75           | 53 (33.4)        |
| Thanlyin                                   | -                        | -                                   | 1 (0.7)          | 1            | 6 (3.7)          |
| Kyauktuan                                  | -                        | -                                   | 6 (4.0)          | 3            | 4 (2.8)          |
| Kayan                                      | -                        | -                                   | -                | 1            | 4 (2.5)          |
| Thongwa                                    | -                        | -                                   | -                | 1            | 4 (2.8)          |
| <b>Sum</b>                                 | -                        | <b>24</b>                           | <b>86 (53.9)</b> | <b>102</b>   | <b>80 (49.9)</b> |
| %age damage (by length)                    | -                        | 24 %                                | 5 %              | 4 %          | 2 %              |
| Replacement Cost, <sup>1</sup> 1,000 Ks/km | -                        | 40,600                              | 30,900           | 15,300       | 20,300           |
| <b>Total</b>                               | -                        | <b>974</b>                          | <b>2,665</b>     | <b>1,554</b> | <b>1,621</b>     |

<sup>1</sup> Source: Government of Myanmar, MOEP2

<sup>2</sup> Materials (towers, conductors, insulators) as per MOEP2 + 30 % for labour, installation and transport

### LOSS ASSESSMENT IN YANGON DIVISION

The computation of losses for the impacted areas in Yangon Division follows the same methodology as for Ayeyarwady Division. For the month of May, electricity sold in the affected Yangon Division townships ranged between 0 % (Kawhmu) to 72 % (Yangon) of the April sales. Overall, sales amounted to 71 % of the sales in April.

Table 9 – May 2008 Sales and Recovery in Yangon Division Impact Areas<sup>1</sup>

| Township     | Sales in May (MWh) | Fraction of April Sales, % | Date emergency genset became operational                  | Expected date distribution system will be operational |
|--------------|--------------------|----------------------------|---|---|
| Htantabin    | 6                  | 4 %                        | 7 May, 140 kVA  | 13 June   |
| Twantay      | 14                 | 4 %                        | 17 May, 365 kVA   | 30 May  |
| Kawhmu       | -                  | 0 %                        | 6 May – 33 kVA mobile transformer & 22 May 200 kVA genset | 2 June  |
| Kungyangon   | 2                  | 2 %                        | 18 May, 340 kVA   | 3 June  |
| Yangon       | 97,202             | 72 %                       | -   | 3 May – 8 June  |
| Thanlyin     | 638                | 28 %                       | 30 May  | 17 June   |
| Kyauktuan    | 15                 | 3 %                        | 7 May   | 28 May  |
| Kayan        | 50                 | 27 %                       | 17 May  | 16 June   |
| Thongwa      | 59                 | 36 %                       | 17 May  | 16 June   |
| <b>Total</b> | <b>97,986</b>      | <b>71 %</b>                |   |   |

<sup>1</sup> Source: Government of Myanmar

Without Nargis, estimated sales from April to September are 825.6 GWh, while in the present situation sales are expected to reach 772.3 GWh (94 % of the without Nargis condition), or a reduction of 53.4 GWh. In terms of losses of revenue to MOEP2, this amounts to Ks 1,431 million. (Table 10)

Table 10 – Estimates of April – September 2008 Revenues (Ks million) in Yangon Division Impact Areas with and without Nargis Cyclone

| Township     | Total Sales, GWh without Nargis | Total Sales, GWh with Nargis | % domestic sales | % Industrial sales | Revenues without Nargis | Revenues with Nargis | Net Loss in Revenue |
|--------------|---------------------------------|------------------------------|------------------|--------------------|-------------------------|----------------------|---------------------|
| Htantabin    | 0.82                            | 0.69                         | 61               | 39                 | 29                      | 24                   | 5                   |
| Twantay      | 1.94                            | 1.63                         | 44               | 56                 | 76                      | 64                   | 12                  |
| Kawhmu       | 0.29                            | 0.24                         | 96               | 4                  | 8                       | 6                    | 1                   |
| Kungyangon   | 0.71                            | 0.62                         | 80               | 20                 | 21                      | 19                   | 3                   |
| Yangon       | 803.56                          | 766.83                       | 55               | 45                 | 29,103                  | 27,773               | 1,330               |
| Thanlyin     | 13.59                           | 11.96                        | 62               | 38                 | 468                     | 412                  | 56                  |
| Kyauktuan    | 2.60                            | 2.18                         | 41               | 59                 | 103                     | 87                   | 17                  |
| Kayan        | 1.12                            | 0.98                         | 65               | 35                 | 38                      | 33                   | 5                   |
| Thongwa      | 0.98                            | 0.88                         | 97               | 3                  | 25                      | 23                   | 3                   |
| <b>Total</b> | <b>825.61</b>                   | <b>772.25</b>                | <b>55</b>        | <b>45</b>          | <b>29,871</b>           | <b>28,440</b>        | <b>1,431</b>        |

### OTHER DIVISIONS IMPACT AREAS

The other divisions experiencing damages to their transmission system were Bago, Mon and Kayin to the East of Yangon.

### DAMAGE ASSESSMENT

There was no damage to generating facilities, except some minor damage to roofing. Transmission lines however, suffered some damage totaling Ks 2,167 million.

Table 11 – Generation, Transmission and Distribution Facilities Damage in Bago, Mon and Kayin Division Impact Areas – MOEP21

| Division                                    | Installed Capacity, MVA | Damaged Capacity, MVA | Transmission and Distribution Lines |            |            |            |
|---|-------------------------|-----------------------|-------------------------------------|------------|------------|------------|
|   |                         |                       | 66 kV                               | 33 kV      | 11/6.6 kV  | 0.4 kV     |
| Bago  | 166                     | -                     | -                                   | 11 (7)     | 14 (9)     | 13 (8)     |
| Mon   | 120                     | -                     | -                                   | 10 (6)     | 13 (8)     | 11 (7)     |
| Kayin                                       | 38                      | -                     | -                                   | 8 (5)      | 11 (7)     | 10 (6)     |
| Sum   |                         | -                     | -                                   | 29 (18)    | 38 (24)    | 34 (21)    |
| Replacement Costs, <sup>2</sup> 1,000 Ks/km |                         |                       | 40,600                              | 30,900     | 15,300     | 20,300     |
| <b>Total</b>                                |                         | -                     |                                     | <b>890</b> | <b>588</b> | <b>682</b> |

<sup>1</sup> Source: Government of Myanmar, MOEP2

<sup>2</sup> Materials (towers, conductors, insulators) as per MOEP2 + 30 % for labour, installation and transport

### LOSS ASSESSMENT

Table 12 – May 2008 Sales and Recovery in Bago, Mon and Kayin Division Impact Areas<sup>1</sup>

| Division     | Sales in April (MWh) | Sales in May (MWh) | Fraction of April Sales, % | Date distribution system operational |
|--------------|----------------------|--------------------|----------------------------|--------------------------------------|
| Bago         | 811                  | 935                | 115 %                      | 5-10 May                             |
| Mon          | 594                  | 616                | 104 %                      | 4-15 May                             |
| Kayin        | 807                  | 1,171              | 145 %                      | 10-11 May                            |
| <b>Total</b> | <b>2,212</b>         | <b>2,722</b>       | <b>123 %</b>               |                                      |

<sup>1</sup> Source: Government of Myanmar, MOEP2

Sales in May were about 23 % higher than before the disaster. Assuming all consumers will be reconnected by June, sales between April and September without Nargis are estimated at 13.3

GWh, while in the present situation sales are expected to reach 15.8 GWh (119 % of without Nargis condition), or an increase of 2.5 GWh. The losses of revenue to MOEP2 are therefore negative at Ks 110 million (Table 13).

**Table 13 – Estimates of April – September 2008 Revenues (Ks million) in Bago, Mon and Kayin Division Impact Areas with and without Nargis Cyclone**

| Division           | Total Sales without Nargis, GWh | Total Sales with Nargis, GWh | % domestic sales | % Industrial sales | Revenues without Nargis | Revenues with Nargis | Net Loss in Revenue |
|--------------------|---------------------------------|------------------------------|------------------|--------------------|-------------------------|----------------------|---------------------|
| Bago               | 4.9                             | 5.5                          | 64               | 36                 | 165                     | 186                  | -21                 |
| Mon                | 3.6                             | 3.7                          | 63               | 37                 | 122                     | 126                  | -4                  |
| Kayin <sup>1</sup> | 4.9                             | 6.7                          | 12               | 88                 | 228                     | 313                  | -85                 |
| <b>Total</b>       | <b>13.3</b>                     | <b>15.8</b>                  | <b>45</b>        | <b>55</b>          | <b>516</b>              | <b>626</b>           | <b>-110</b>         |

<sup>1</sup> The high industrial sales are attributed to a cement factory in this Division.

## NET LOSS

When computing losses because of lower sales, it is necessary to consider both loss of revenue and reduction in generation costs. Average cost of generation of Ks 20/kWh was provided by MOEP2, and represents the cost of buying electricity from MOEP1 from hydropower plants. Generating costs of gas and steam turbines were not available, but are likely to be higher than Ks 20/kWh. The figure provided has been used as an approximation in these calculations, and may be on the lower side. Systems losses were assumed at 28 % and include technical and administrative losses. The net loss considering generation savings and lower sales is found to be negative, i.e. a net gain can be expected in all divisions except Yangon. Using higher generation costs would have resulted in a higher gain, and this is attributable to the low tariff and high system losses.

**Table 14 – Net Loss Computation April to September 2008**

| Division     | Generation without Nargis, GWh | Generation with Nargis, GWh | Net Generation, GWh | Net Generation Cost, Ks million | Net Revenues, Ks million <sup>1</sup> | Net Loss   |
|--------------|--------------------------------|-----------------------------|---------------------|---------------------------------|---------------------------------------|------------|
| Ayeyarwady   | 29.5                           | 29.9                        | 0.40                | 7                               | 11                                    | -4         |
| Yangon       | 1,146.7                        | 1,072.6                     | -74.10              | -1,100                          | -1,432                                | 332        |
| Other        | 18.5                           | 22.0                        | 3.40                | 61                              | 110                                   | -39        |
| Divisions    |                                |                             |                     |                                 |                                       |            |
| <b>Total</b> | <b>1,194.8</b>                 | <b>1,124.5</b>              | <b>-70.30</b>       | <b>-1,406</b>                   | <b>-1,311</b>                         | <b>289</b> |

<sup>1</sup> From Tables 7, 10 and 13

## SUMMARY OF THE DAMAGE AND LOSS

Table 15 summarizes the damages and losses computed in Tables 5 through 14. Total damage and loss has been estimated at Ks 15,718 million. Damages of Ks 15,429 million greatly exceeded losses (Ks 289 million).

Table 15 – Estimated Damage and losses – Electricity Sector (Ks mn)

| Subsector, Component                     | Disaster Effects |            |               |
|--|------------------|------------|---------------|
|  | Damage           | Losses     | Total         |
| <b>Ayeyarwady</b>                        | <b>6,455</b>     | <b>-4</b>  | <b>6,451</b>  |
| Sales – Table 14                         | -                | -4         | -4            |
| Generation – Table 5                     | 731              | -          | 731           |
| Transmission and Distribution – Table 5  | 5,724            | -          | 5,724         |
| <b>Yangon</b>                            | <b>6,814</b>     | <b>332</b> | <b>7,147</b>  |
| Sales – Table 14                         | -                | 332        | 332           |
| Generation                               | -                | -          | -             |
| Transmission and Distribution – Table 8  | 6,814            | -          | 6,814         |
| <b>Other Divisions</b>                   | <b>2,160</b>     | <b>-39</b> | <b>2,120</b>  |
| Sales – Table 14                         | -                | -39        | -39           |
| Generation,                              | -                | -          | -             |
| Transmission and Distribution – Table 11 | 2,160            | -          | 2,160         |
| <b>Sum</b>                               | <b>15,429</b>    | <b>289</b> | <b>15,718</b> |

## RECOVERY NEEDS

Shortly after the passing of Cyclone Nargis, when many administrative centers were left without electricity, MOEP2 took special measures to provide emergency diesel-fuelled generation facilities to the townships' administrative centers for provision of basic services. Only two-three days after the disaster, the first 100 kVA emergency gensets started arriving at these centers.

Reconstruction of damaged transmission lines also started early. MOEP2 had concrete poles in stock, but not enough to supply the 381 km (238 mi) of damaged 33 kV and 11/6.6 kV lines, and was therefore forced to borrow from other projects, and to obtain steel railway rails from Ministry of Railways. Using steel rails can only be considered as a short-term emergency measure as such rails do not meet the requisite standards of transmission line towers/poles. Part of the 33 kV transmission line between Pyapon and Bogale were built with such rails, and during Nargis the wind had along sections of line bent the poles to the ground. The scheduled completion for reconstructing the damaged transmission and distribution system is 30 June 2008 in all affected areas. Therefore the short term reconstruction of the medium voltage can be said to be practically complete by end June, or latest middle of July. Low voltage connection to consumers is ongoing and has been assumed to be completed in July.

For structural reasons, there is also a need to replace the railway rails used as poles to steel or concrete poles that meet the requisite engineering standards. It was not clear how many kilometers of lines have been built with these poles, but during the field visit to Kawhmu, Kungyangon and Dedaye, the field team saw a significant length being provided with these railway rails as poles while in some sections, proper concrete poles were being provided.

## ANNEX 12 : COASTAL ENVIRONMENT AND NATURAL RESOURCES MANAGEMENT

### SUMMARY

The Ayeyarwady and Yangon Divisions of the Irrawaddy Delta are among the most exposed areas along Myanmar's southwest coast. These low-lying areas, interspersed with many tidal waterways are naturally exposed to storms and monsoon winds blowing from the southwest. Their vulnerability to natural hazards, like Cyclone Nargis, however, was significantly enhanced by losses of natural forest cover and coastal vegetation that have accompanied transformation of the land for paddy cultivation.

The damage assessment for the environment is conservatively estimated only on the basis of replacing the damage to existing mangrove forests, both natural forests and plantations, and the loss is based on the loss of environmental services in the natural forests. Some 16,800ha of natural forest and 21,000ha of forest plantations were damaged, with an estimated cost of K 14 billion. Loss of environmental services of the natural mangrove forests is estimated at K 46 billion.

The loss of mangrove forests and associated ecosystem goods and services will have a significant impact on those segments of the rural population that are heavily or partially dependent on forestry for their livelihood. Precise socio-economic information on how this would impact the most dependent and vulnerable groups is not available at this writing but it can be assumed that marginal farmers and landless will be particularly affected. The mangrove forests have been aptly described as the poor man's overcoat in that a large number of artisanal fishermen, landless poor, and marginal farmers are dependent on them for their direct and indirect incomes.<sup>1</sup> Besides cash employment from the forestry sector (in woodcutting, charcoal production, casual labour in forestry operations, minor forest produce collection and processing, etc.), villagers also obtain lots of construction material and food (fish especially) from the mangrove forests. This loss, which usually does not enter the cash economy, can be substantial for many forest-dependent people.<sup>2</sup>

### PRE-DISASTER SITUATION

#### MANGROVES

Mangrove forests provide a number of important ecosystem services: They can dissipate the force of storm surges and heavy winds by virtue of their stilt roots, and broad branches and trunk structure. Their ability to serve as windbreaks when they occur in dense stands of tall-canopied trees makes them particularly beneficial during cyclones<sup>3</sup>, and their capacity to trap sediments in their prop roots and accelerate the accretion of coastline seaward makes them a first line of defense against sea level rise and adaptation to climate change. An important supplemental dividend is their ability to store carbon from the atmosphere, creating the opportunity for carbon emission credits to communities who restore and protect them.

As important as healthy mangrove forests are in protecting human settlements and agricultural lands established landward of this living barrier, mangroves play an equally important role on the seaward side for fisheries—both capture and farmed. The stilt roots of mangroves form fertile nursery grounds and safe havens for countless juvenile fish and shellfish, particularly important for the prawn industry and for ground fish which later migrate to deeper water to feed and reproduce. Although the value of this service in terms of fisheries productivity has yet to be monetized, it is considered to be substantial.<sup>4</sup> Mangroves also filter out excess nutrients (P and N) from agricultural runoff and human sewage, absorb pollutants including heavy metals, and reduce sedimentation in nearby waters, improving the quality of coastal waters for aquaculture and capture fisheries. With population density in the delta exceeding 150/km<sup>2</sup> and more than half of the population landless, fisheries have become a significant source of employment in the delta and of export earnings for the country. Thus, the welfare of the fishing industry is directly linked to the health and biological

<sup>1</sup>FAO Assessment

<sup>2</sup> Eg: 2007/08 Figures for non-timber forest products (NTFPs) in affected area: 7000 cubic tons of firewood, 32000 cubic tons charcoal, 26200000 bamboo, 66440000 thatch, 285000 phoenix spp.

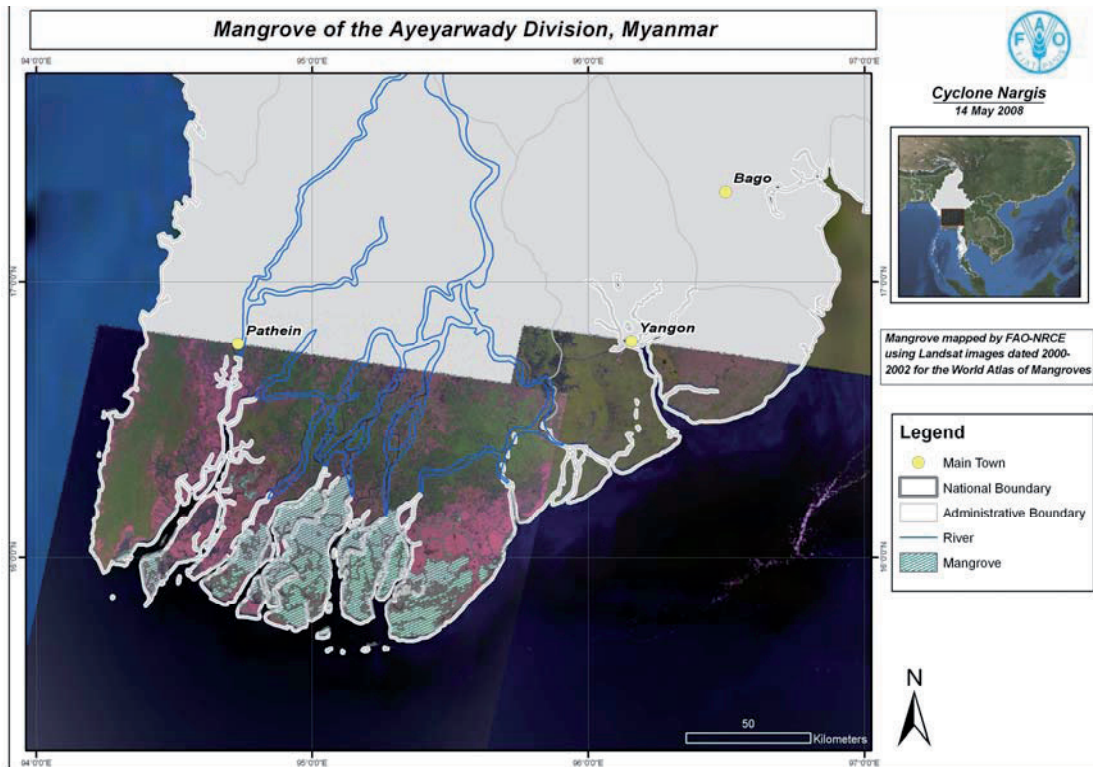
<sup>3</sup> The Sunderbans played a key role in protecting vulnerable communities and property in Bangladesh during Cyclone Sidr in November 2007. Similarly, mangroves can provide protection against the incremental effects of sea level rise, particularly if alluvial sediments continue to flow down from rivers that are not heavily regulated.

<sup>4</sup> Barbier, E. E. Koch, B. Silliman, S. Hacker, E. Wolanski, J. Primavera, E. Graneck, S. Polasky, S. Aswani, L. Cramer, D. Stoms, C. Kennedy, D. Bael, C. Kappel, G. Perillo, D. Reed. (2008) Coastal ecosystem-based management with nonlinear ecological functions and values. *Science* 319(18) 321-323



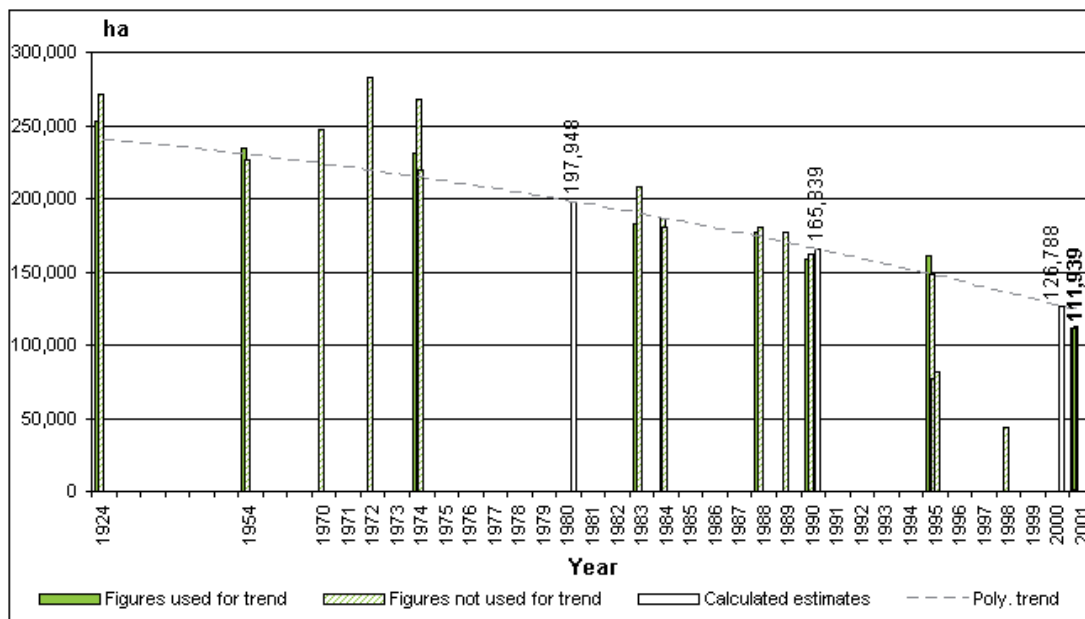
productivity of the mangrove forests.

Map 1: Mangrove Forests in the Ayeyarwady Delta



However, there was substantial loss to the forest area due to human encroachment prior to the cyclone (see Figure 1). Even those areas not fully encroached for paddy farming or shrimp cultivation have been degraded through felling of trees for timber and charcoal.<sup>5</sup> This has further diminished the amount of remaining healthy mangrove forest, now estimated at about 100,000 ha.<sup>6</sup>

Figure 1: Mangrove Deforestation in the Ayeyarwady Delta



Source: FAO World Atlas of Mangroves 2002

5 M. Than 2000.

6 Myanmar Forestry Statistics 2006.



To try to counteract this trend in loss of critical forest cover, the government and NGOs have embarked on a number of mangrove restoration initiatives through plantation forests. A total of 65,108 ha plantation forests, including mangrove and other species have been established in both the Ayeyarwady and Yangon Divisions to increase forest cover. Community forestry is being promoted by the government to manage remaining stands of reserve forests on a sustainable basis.

### ENVIRONMENTAL IMPACT

Cyclone Nargis combined the devastation of strong winds with that of a massive tidal surge and flooding, entailing a number of environmental impacts as listed in Table 1.

Table 1: Environmental Impact of Cyclones and Tidal Surges

| Type of Disaster              | Associated Environmental Impact  |
|-------------------------------|--|
| Hurricane/Cyclone/<br>Typhoon | <ul style="list-style-type: none"> <li>• Loss of vegetation cover and wildlife habitat</li> <li>• Short-term heavy rains and flooding inland</li> <li>• Mud slides and soil erosion</li> <li>• Saltwater intrusion to underground fresh water reservoirs</li> <li>• Soil contamination from saline water</li> <li>• Damage to offshore coral reefs and natural coastal defence mechanisms</li> <li>• Waste (some of which may be hazardous) and debris accumulation</li> <li>• Secondary impacts by temporarily displaced people</li> <li>• Impacts associated with reconstruction and repair to damaged infrastructure (e.g. deforestation, quarrying, waste pollution)</li> </ul>  |
| Type of Disaster              | Associated Environmental Impact  |
| Tsunami/Tidal Surge           | <ul style="list-style-type: none"> <li>• Ground water pollution through sewage overflow</li> <li>• Saline incursion and sewage contamination of groundwater reservoirs</li> <li>• Loss of productive fisheries and coastal forest/plantations</li> <li>• Destruction of coral reefs</li> <li>• Coastal erosion and/or beneficial deposition of sediment on beaches/small islands</li> <li>• Marine pollution from back flow of wave surge</li> <li>• Soil contamination</li> <li>• Loss of crops and seed banks</li> <li>• Waste accumulation – additional waste disposal sites required</li> <li>• Secondary impacts by temporarily displaced people</li> <li>• Impacts associated with reconstruction and repair to damaged infrastructure (e.g. deforestation, quarrying, waste pollution)</li> </ul> |

Source: UNEP, *Environmental Needs Assessment in Post-Disaster Situation*

Due to data constraints, the damage and loss assessment focuses on the impact on the mangrove ecosystem, with additional impressions on salinization/sedimentation. The latter phenomena, as they relate to water supply and water quality are also dealt with in the water and sanitation cluster.

### EROSION AND SEDIMENTATION

Satellite imagery indicates that there was considerable riverbank and coastal erosion within the delta, along the major rivers and waterways, as a result of the cyclone—both as a result of the high river flows and wave action. While no comprehensive estimates of erosion damage have

yet been made, the FAO Agricultural Assessment<sup>7</sup> indicates that some 130,000 ha of paddy land is in need of rehabilitation as a result of Cyclone Nargis, much through bund erosion and debris deposition. Although erosion is a natural process, river bank stability can be improved through the maintenance of healthy marginal vegetation such as mangrove forests.

### MANGROVE FOREST

According to satellite and ground surveys of forest cover pre- and post-Nargis, some 16,800ha (30%) of natural forest were lost as a result of the cyclone. In addition, an estimated 21,000ha of forest plantations were damaged. The total damaged forest area is thus estimated at 37,800 ha in the Ayeyarwady and Yangon Divisions. The total value of damages to mangrove forest are estimated on the basis of replanting costs of \$400/ha (Kyat 440,000/ha) for reserved and protected area forests and \$300/ha (Kyat 330,000/ha) for plantation forests.

### SALINIZATION/SEDIMENTATION

It was originally thought that salt water intrusion and debris, such as stones, sand, tree trunks and housing materials, would be a seriously limiting factor in the restoration of paddy rice production. Based on preliminary observations, it can be assumed that salinity levels have been significantly reduced, as the floods drained away within a few days, and subsequent heavy rains further washed out saline water. These observations must be reconciled, however, with findings from the VTA and DALA, which do report salinization of ponds and wells used for water supply.<sup>8</sup> To obtain a better picture of soil damage and water pollution, proper sampling needs to take place. The same holds true for an assessment of sedimentation and siltation, which have proved to be more deleterious in the 2004 Tsunami than the effects from salt water intrusion.<sup>9</sup>

### OVERALL ASSESSMENT OF DAMAGE AND LOSSES

The damage assessment for the environment is conservatively estimated only on the basis of replacing the damage to existing mangrove forests, both natural forests and plantations, and the loss is based on the loss of environmental services in the natural forests.

The assessment also includes the damage that occurred to the embankments. During the storm surge, most embankments overtopped and breached at numerous places, and 14 sluices were damaged. Embankments were damaged over a total length of 265 km in the Ayeyarwady Division and over a length of 1.4 km in Yangon Division. The volume of earthwork repairs is estimated at about 1.0 million cubic meters.

**Table 2: Estimates of Environmental Damage and Loss (Kyat million)**

|                 | Disaster Effects |               |               |
|-----------------|------------------|---------------|---------------|
|                 | Damage           | Losses        | Total         |
| Coastal Forests | 14,264           | 46,112        | 60,376        |
| Embankments     | 2,588            |               | 2,588         |
| <b>Total</b>    | <b>16,852</b>    | <b>46,112</b> | <b>62,694</b> |

Source: PONJA Team estimates

### RISK MANAGEMENT ISSUES

While Cyclone Nargis is an extreme event, the Delta has suffered from a number of lesser storms and inundations, including the 2004 Asian Tsunami. Global climate change models downscaled for different regions of the world indicate that extreme weather events, including heavier downpours and more intense hurricanes in areas of high seasonal rainfall, are predicted to increase as atmospheric CO<sub>2</sub> increases. This has significant implications for people living in the Ayeyarwady Delta. The continuing population expansion and encroachment on coastal margins and river embankments have gradually increased the exposure and vulnerability to the coastal population. This is the direct result from environmental damage to the natural resource base such as

<sup>7</sup> FAO, 2008 Myanmar Emergency & Rehabilitation Programme, Needs Assessment for the Cyclone Nargis Affected Areas: Agriculture (crops, livestock, fisheries, forestry) (June).

<sup>8</sup> VTA Survey.

<sup>9</sup> FAO Salt Water Study Aceh

the alteration of the landscape, loss of forest cover, erosion of coastlines and embankments. Taken together with predictions of more extreme weather events, the vulnerability of these communities increases several fold.

Therefore, any recovery and rehabilitation efforts have to take place in the broader context of a more detailed vulnerability assessment and disaster reduction framework.<sup>10</sup> In addition capacity and institutional constraints will have to be taken into account as part of risk management activities. This includes:

- Land availability for reforestation on a larger scale;
- Technical capacity building for scaling up replanting activities at the community level;
- The need to consult fully with communities over any change in land use; and,
- Lack of a policy framework for coastal resources use, governing access to resources, zoning of coastal areas for different use and resolving conflicts between user groups, regulating industry and conversion of habitat, and establishing and enforcing protected areas, with the full participation of communities on protected lands.

### LONGER-TERM RECOVERY NEEDS

While PONJA and other assessments have provided some insights into the environmental dimensions of Cyclone Nargis, further work is needed to determine evidence-based recovery and needs for the major ecosystems and their services in the affected areas. Based on these preliminary findings, three major components of an environmental recovery strategy have been identified:

**Environmental Assessment (Short term):** While PONJA and other assessments have provided a rough sketch of environmental damages and associated losses, recovery and reconstruction work must be guided by a more thorough and dedicated analysis, which focus on four distinct but related issues:

- Direct environmental damage of Nargis: This component would expand and ground-truth the preliminary findings on mangrove damage and supplement them with more detailed reviews of surface and groundwater pollution, salinization, sedimentation and waste generation;
- Environmental footprint of recovery: Relief and recovery activities should be conducted in an environmentally friendly manner, and any additional damages to natural assets need to be identified, and, where possible, mitigated;
- Institutional assessment: Policy constraints and capacity gaps to manage environmental rehabilitation in the short to medium term need to be identified; and
- Vulnerability Assessment: Undertake long-term disaster, risk-reduction strategic planning.

**Mangrove Rehabilitation (Medium term):** A reforestation programme would be needed to replace and rehabilitate the damaged mangroves and ensure that future productivity is not lost. Such a programme could include the following components and activities:<sup>11</sup>

- Reforestation cum regeneration of accessible mangrove reserves in the delta;
- Improve the capacity of all relevant stakeholders in reforestation of mangroves that is based on scientifically-proven approaches, with particular emphasis on active participation of forest-dependent communities in the reforestation work;
- Assistance to the Forest Department to recover basic facilities for it to continue its operations in the cyclone-affected area;
- Determination of the area that needs to be rehabilitated; and,
- Pilot coastal land-use planning and zoning to rationalize competing natural resource use options.

<sup>10</sup> See chapter on disaster risk management.

<sup>11</sup> See FAO Assessment.

**Long-term vulnerability reduction and disaster preparedness** Reduce vulnerability of communities and production systems to future cyclone and anticipated impacts of climate change (e.g., sea level rise, changes in monsoon patterns) through, inter alia:

- Changes in house construction practices which provides increased protection against winds;
  - Construction setbacks and mangrove buffer zones ranging from 200 m landward from the mean low tide mark along exposed coasts to 100 m along major river embankments;
  - Rehabilitating and upgrading coastal embankments and polders to improved design standards;
  - Improving quantity and quality of forest cover in reserve lands where much of the area is under cultivation and at risk from storm surge and salt water intrusion;
  - allocation of land (preferably) on higher ground for construction of safe houses/havens from storms; and
  - early warning system that would give people enough time to evacuate or seek shelter in safe houses.
-

**ANNEX 13: MACROECONOMIC IMPACT**

This section presents estimates of the economic impacts of Cyclone Nargis related damage and losses, measured at the macroeconomic level, namely:

- Gross Domestic Product
- Balance of payments
- Fiscal deficit, and
- Inflation.

To estimate the macroeconomic impacts, the baseline data were comprised of the performance of the Myanmar economy in fiscal years 2002 – 2007 using both official and independent sources.<sup>1</sup> This analysis shows how the forecast will be affected by Nargis-related losses.

**SUMMARY**

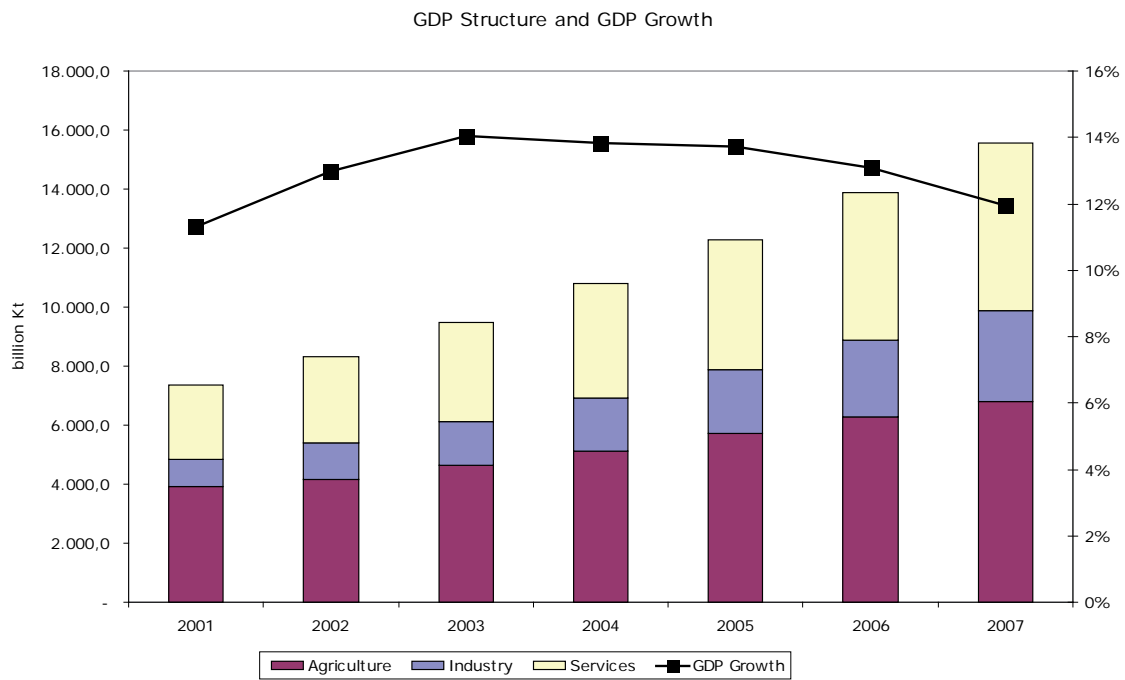
The overall macroeconomic impact is likely to be moderately significant in terms of GDP and high in relation to other large-scale disasters. The impact is largely spatial, with a more pronounced decline in GDP in the affected divisions of Yangon and Ayeyarwady. The impact on the balance of payments is likely to be manageable, given the large current account surplus, estimated at 10 percent of GDP in 2007. The fiscal deficit, already large at around 3 percent of GDP before Nargis, is likely to increase. Previous monetization of the fiscal deficit has led to high inflation since the beginning of the decade. Inflation, already high before the cyclone, is likely to grow because of the disruption of distribution channels as well as increased demand from the recovery effort. An increasing fiscal deficit could further accelerate inflation, particularly in the areas affected by the cyclone.

**THE ECONOMY PRE-NARGIS**

Myanmar's economy since 2002 has been characterized by modest growth and relatively high inflation. Projections of GDP growth rates using official statistics show growth rates above 11 percent per annum for 2008 and 2009, consistent with equally high double-digit growth rates since 2000. These statistics however are constrained by weaknesses in the underlying data in terms, for example, of completeness and timeliness. Data for other variables typically closely correlated with GDP such as energy use, use of fertilizers, imports of capital goods and expansion of agricultural acreage are also not fully consistent with double-digit GDP growth. Other estimates from publicly available independent sources show growth rates to be 3.9 percent and 3.3 percent in 2006 and 2007 respectively, with comparable projections for the near future. GDP growth in the past two years has been driven primarily by high exports, particularly natural gas, good agricultural performance and high capital expenditures.

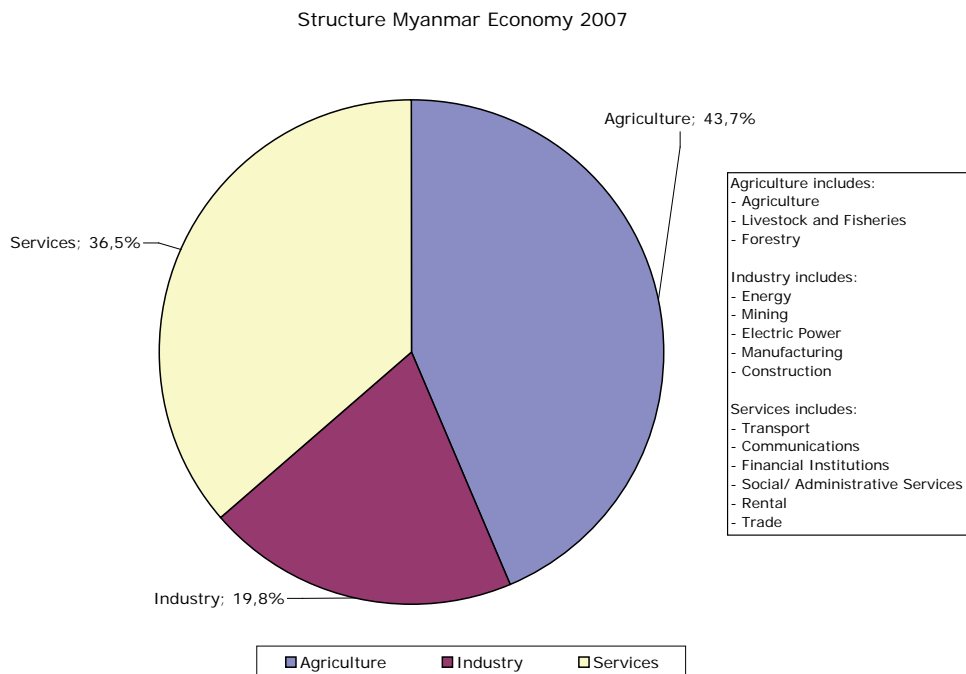
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<sup>1</sup> Independent sources include publicly available data from the IFS and EIU.



Source: Ministry of National Planning and Economic Development; PONJA Team estimates.

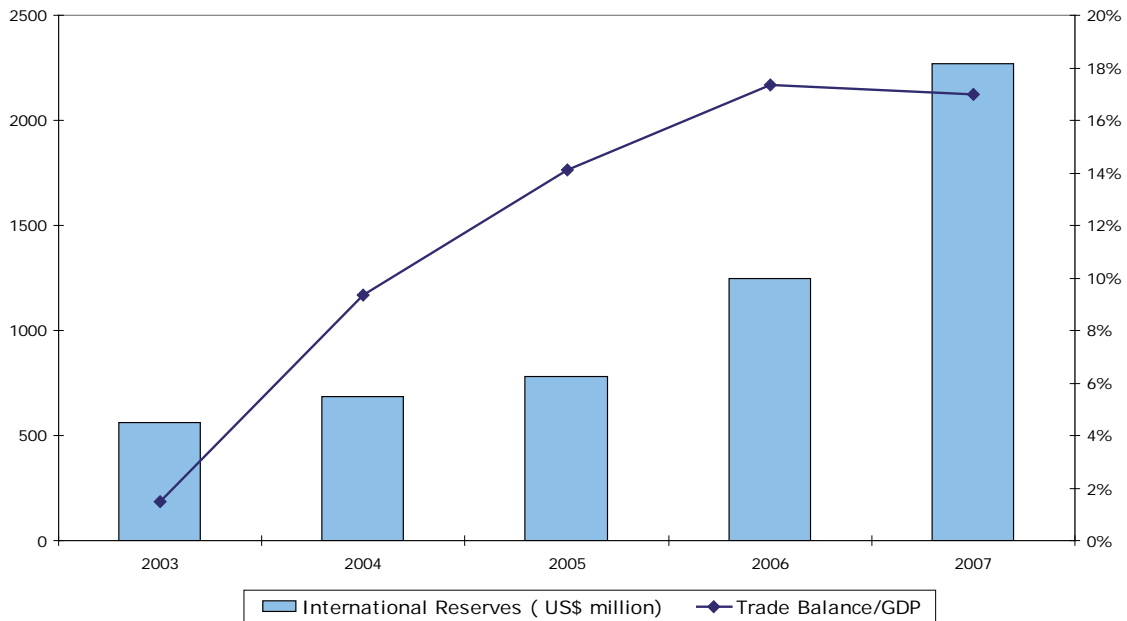
Myanmar’s estimated GDP per capita is USD 234 and population is almost 58 million people in 2007 (World Economic Outlook Database, International Monetary Fund, April 2008). A snapshot of the economy in FY07 shows a dominant agriculture sector accounting for 43.7 percent of GDP, with an industry share of 19.8 percent, and services comprising 36.5 percent of the economy.



Source: Ministry of National Planning and Economic Development

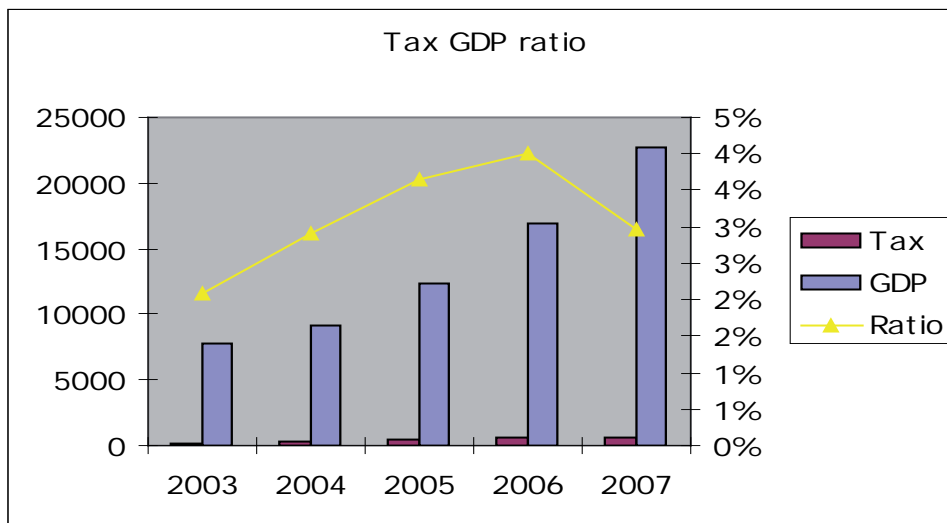
The external balance has improved significantly in the last 5 years, largely the result of buoyant natural gas exports. Total export growth in 2007 was 37 percent and the trade balance was estimated at USD3.3 billion. The current account has been in surplus, with improvements in the capital account as well, which has benefited from increased foreign direct investments related to the oil and gas sector. Official reserves have thus grown rapidly and were estimated at USD2.3 billion before the cyclone, enough to cover 8 months of imports.<sup>2</sup> The strong balance of payments has resulted in the parallel market exchange rate for the Kyat staying relatively stable in the past 2 years in the range of K 1,100-1,300 per US dollar despite high inflation and monetary growth. The official exchange rate has remained at an immense disparity from the market rate, at an average of K 6.08 per USD in 2007.

Trade and International Reserves, Myanmar



Source: Economist Intelligence Unit

Tax revenues have been rising as percentage of GDP since reforms undertaken starting in 2003 to improve tax administration, reduce evasion, increase tariff revenues from use of more depreciated (than official) exchange rate, and price reforms enabling state-owned firms to increase revenues and their resulting contribution to the state treasury.

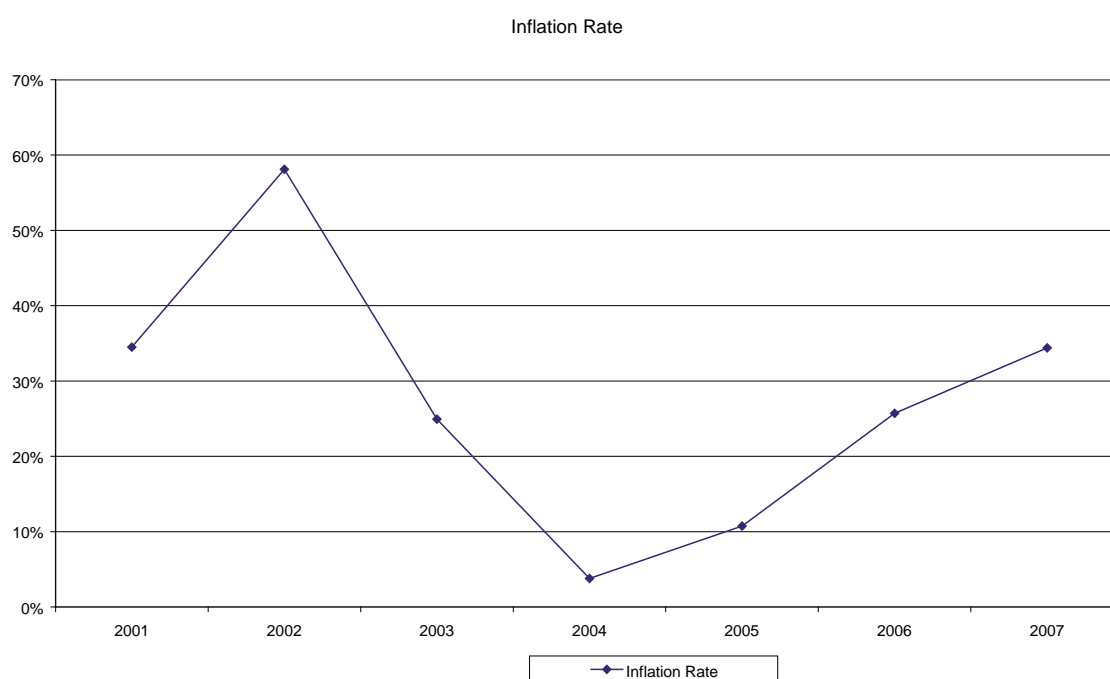


Source: Central Statistical Office and Ministry of National Planning and Economic Development

2 Economist Intelligence Unit, 'Country Risk Service Myanmar', June 2008

However continuing high expenditures have offset revenue gains, driven primarily by large increases in civil servants' salaries in 2006 and ongoing large capital expenditures. The fiscal deficit has remained between 3 and 4 percent of GDP for most of the last decade. Fiscal deficits have been largely financed through borrowing from the Central Bank, putting upward pressure on prices. The extent to which the Government can reallocate capital expenditures toward those needed for recovery efforts, together with availability of external financing, will be a key determinant of the fiscal – and monetary – impact of Cyclone Nargis.

Broad money grew 27 percent in FY2007, on top of 27 percent in FY2006 and over 30 percent growth in the year preceding. Inflation rates – both official and from other sources – have been in double digits, with inflation rates in 2006 and 2007 of 25.7 percent and 34.4 percent respectively (International Monetary Fund, World Economic Outlook Database, April 2008). The price of rice, a staple crop, had increased nearly 40 percent at the time the government increased fuel prices in mid-August 2007. The price of diesel oil was doubled in August 2007 from K 1,500 to K 3,000 per gallon, gasoline price increased from K 1,500 to K 2,500 per gallon, and the price of natural gas was increased by 500 percent. Higher prices for food and fuel have added to the inflationary pressures from monetized fiscal deficits.



Source: Central Statistical Office and International Financial Statistics

#### Impact of Nargis on Gross Domestic Product

|                         | Nominal<br>GDP 2008<br>(Kyat<br>billion) | Gross<br>Losses<br>(Kyat<br>billion) | Value<br>Added<br>Coefficients | Value<br>Added<br>Losses<br>(Kyat<br>billion) | Impact<br>on<br>Sector/<br>Total<br>GDP (%) |
|-------------------------|--|--------------------------------------|--------------------------------|---|---|
| Agriculture             | 10,631.7                                 | 225.1                                | 0.8                            | 185.3   | 1.7   |
| Livestock and Fisheries | 2,329.7                                  | 160.1                                | 0.6                            | 98.3  | 4.2   |
| Industry                | 5,130.0                                  | 1,362.4                              | 0.2                            | 238.7   | 4.6   |
| Commerce                | 6,707.5                                  | 461.0                                | 0.7                            | 333.8   | 5.0   |
| Total GDP               | 31,671.7                                 |                                      |                                | 856.1   | 2.7   |

Source: Ministry of National Planning and Economic Development; PONJA Team estimates.



Based on this report's estimate, the aggregate estimated loss in value added in the current fiscal year (FY08) from the cyclone amounts to K856 billion or approximately USD 780 million at the current exchange rate. The economic losses are estimated to be around 2.7 percent of the projected national GDP in 2008 using official statistics.<sup>3</sup> The choice of official vs. non-official GDP data does not alter this estimate dramatically, since the negative impact of the cyclone on GDP using independent estimates of GDP would be 3.1 percent of GDP instead of 2.7 percent. Economic losses are relatively high, particularly when compared to other disasters of similar magnitude which resulted in a lower impact on national production, such as the cyclone Sidr in Bangladesh, which resulted in a loss to GDP of 0.5 percent. This relatively high impact on economic losses is the result of the disaster affecting the largest city in the country (Yangon) as well as a main agriculture producing region (Ayeyarwady Delta).

Economic losses were concentrated in the Yangon and Ayeyarwady Divisions and estimated to be almost 11.3 percent of the region's economy. This concentration has also happened in other disasters. Damage and losses of the Indian Ocean Tsunami affected only 2 percent of the Indonesian GDP, but it was over 100 percent of Aceh's GDP, the province that suffered the brunt of the disaster. These two divisions together account for over 30 percent of Myanmar's economy, with particular relevance for the agricultural and fisheries sectors in the Ayeyarwady Division, and manufacturing, where Yangon accounts for 40 percent of all manufacturing in the country.

In terms of subsectors, the impact of the cyclone on GDP is by far the most severe in the industry and commerce sectors, at more than K235 billion (USD 215 million) and K335 billion (USD 300 million) respectively. Particularly hit was the small informal retail sector in commerce, larger firms in the industrial parks in Yangon as well as rice crops in agriculture. The Government of Myanmar has in place a program to avoid large losses in rice production – a key staple in the Ayeyarwady area. As such, the Government estimates that only 0.84 MT of rice production will be lost because of the cyclone. A more conservative estimate of production losses of 1.52MT, would result in higher economic losses in the field crops sector, worth almost K 300 billion, which would increase the impact of the cyclone on GDP to 2.9 percent, up from 2.7 percent. A large share of all damage and losses are in the private sector – accounting for over 92 percent of all damage and losses. In that sense, the Government of Myanmar may not have to bear all costs related to reconstruction and recovery.

#### Impact of Nargis by Subsectors

| <b>Impact of Nargis by Subsectors</b> |  |
|---------------------------------------|--|
| <i>Sector</i>                         | <i>Value Added Losses<br/>(Kyat billion)</i> |
| <i>Industry</i>                       | <i>238,7</i>                                 |
| Firms in industrial parks (Yangon)    | 117,1  |
| Rice mill industry                    | 26,1   |
| Fish processing industry              | 6,3  |
| Salt mining and processing            | 2,7  |
| Other industries                      | 50,5   |
| Micro-industry                        | 35,9   |
| <i>Commerce</i>                       | <i>333,8</i>                                 |
| Wholesale markets                     | 9,7  |
| Retail Markets                        | 89,5   |
| Small Retail Sector                   | 234,5  |
| <i>Agriculture</i>                    | <i>185,3</i>                                 |
| Field crops                           | 131,6  |
| Permanent plantations                 | 53,7   |
| <i>Livestock and Fisheries</i>        | <i>98,3</i>                                  |
| Livestock                             | 18,9   |
| Fisheries                             | 79,4   |

Source: PONJA Team estimates.

<sup>3</sup> Excluding the informal sector, economic losses are estimated at 1.8 percent of GDP.

The negative impact of the cyclone on GDP and the deficit might be compensated by increased economic activity, particularly in sectors related to the recovery effort, in the next couple of years. It is too early to estimate the pace of recovery, which will be a function of resources available, and the likely positive impact on the economy. Aggregate investment has been on average 11 percent of GDP since 2001.<sup>4</sup> The yearly investments necessary to rebuild damaged assets will be around 20 percent of current aggregate investment (both private and public). Although reallocation of resources will be necessary, both for the public and the private sector, investment as a share of GDP is likely to increase in the coming years, fostering economic growth.

### **IMPACT OF NARGIS ON BALANCE ON PAYMENTS**

The cyclone may increase the country's import bill by USD 385 million, including fuel, construction materials and machinery, and it may also hurt exports in specific sectors, particularly rice and shrimps. Exports in the fisheries sector are projected to decrease by over USD 145 million. An area of concern is an increase in domestic demand for fuel as the recovery effort starts. Myanmar depends on imports of oil and fuel to meet domestic demand. A combination of increasing demand with higher fuel prices could increase imports of fuel but given the relatively large current account surplus this should be manageable. An increase in the consumption of fuel could however result in an increasing budget deficit given fuel subsidies. The impact of the cyclone on the production of rice in the Ayeyarwady division is likely to be limited. As such, the country should have enough rice for its own consumption without needing imports.

The trade to GDP ratio is projected to fall by less than a percentage point. Higher imports are likely to be offset by stable/increasing revenues from the export of natural gas at record high prices. High revenues from energy exports have supported rising current account surplus, which in 2007 was estimated at over USD1.5 billion or 10 percent of GDP. To the extent the current account balance is the sum of the private investment and savings gap and the government budget deficit, the large current account surplus is a manifestation of low private investment relative to savings in the economy. The current account surplus is thus, likely to be sufficient to absorb the increase in aggregate economic investment, both private and public, arising from the recovery effort. Equivalently, the current account is expected to continue to stay in surplus, albeit lower than current levels. As such, international reserves will continue to increase and the local currency is unlikely to depreciate due to the recovery effort.

### **IMPACT OF NARGIS ON FISCAL DEFICIT**

On the expenditure side, estimates by the Government have indicated that the Government of Myanmar had already spent over K27 billion in the first two months after the cyclone on relief and early recovery operations. Assuming a similar rate of spending for the remainder of the year and the start of the recovery period, expenditure could increase by almost K400 billion or 23 percent as a result of the cyclone. The upcoming IMF Article IV mission will provide a further opportunity to discuss the fiscal impact of the cyclone with Government.

On the revenue side, the cyclone is unlikely to have a discernible adverse impact. Tax revenues are expected to decline slightly, as many businesses in Yangon and the Ayeyarwady division will suffer losses. But tax revenues represent around 25 percent of all public revenue, limiting the extent of the impact of the cyclone.

The impact of the cyclone on expenditures has intensified the fiscal pressures already created by other shocks such as high oil and food prices. The budget deficit, estimated to be relatively high at over 3 percent of GDP in 2007, might increase to approximately 4 percent of GDP in FY08 as a result of increased expenditures for rehabilitation activities (see above) as well as reduced revenues. Monetization of budget deficits has in the past led to an acceleration of inflation. It is important for the Government of Myanmar to avoid monetization of this additional expenditure and instead reallocate expenditure from other capital investment projects toward recovery activities.

As mentioned above, a large share of all damage and losses will be borne by the private sector, particularly larger industries that will have access to capital through insurance claims, own resources or access to credit markets.

4 Economist Intelligence Unit, 2008.

### **IMPACT OF NARGIS ON INFLATION**

Press reports in the immediate aftermath of the cyclone showed significant increases in prices of several commodities, together with a spike in fuel and transport prices. However, anecdotal evidence as well as interviews during field visits have shown that those price hikes were for the most part temporary and with the restoration of supply networks inflation has eased again.

Inflation was and is likely to remain a concern in Myanmar, estimated at 34 percent in 2007. The damage to infrastructure, markets, food stocks and the loss of life caused by the cyclone may intensify existing inflationary pressures by affecting the supply of commodities. Once recovery efforts in the cyclone-affected areas get underway, there is the possibility of inflationary pressures intensifying due to increasing demand for labor and rising demand for specific items like construction materials. There is ample evidence from previous disaster recovery efforts that recovery periods are accompanied by a period of inflation acceleration, such as in Aceh, where inflation went up from 7 percent in December 2004 to over 40 percent in December 2005, one year after the tsunami. Rising inflation can in turn both drive up the cost of recovery and slow its pace.

Depending on the recovery plan, pace and how needs are met, inflation could accelerate. Previous increases in government spending were largely financed through credit from the central bank, adding to the budget deficit and upward pressure on prices. Recent projections put inflation at over 40 percent in 2008 and over 30 percent for 2009.

Containing inflation would require a prudent monetary and fiscal policy stance. The Government of Myanmar could finance recovery and rehabilitation in the affected divisions through a reallocation of resources, reducing spending in other capital investments. In addition, there will need to be a concerted effort by the Government of Myanmar and the international community to take upward pressure on prices into account in the design of the recovery phase, to avoid putting additional pressure on inflation. The Government of Myanmar could also consider the issuing of domestic bonds to partly sterilize the inflow of funds.

### **OTHER IMPACTS**

It is very difficult at this stage to estimate the negative impact of losses in some sectors, such as the environment, on economic growth. Firstly, given that the environment is mostly a public good, it is difficult to assign a value to the benefits lost or the costs of rehabilitating it. Similarly, given its public good character, it is difficult to measure to what extent individuals, private firms and the society as a whole will incur higher expenditures to cope with the worsened environment as a result of the cyclone. Nevertheless, there is little doubt that changes in the natural environment in the delta will force individuals and firms to incur extra costs to adapt to the new environment, costs that are not captured in the estimates above.

The macroeconomic impact estimated through this exercise deals with the short to medium term impact that losses in the productive and other sectors will have on some key macroeconomic variables, such as growth, the balance of payments, the budget deficit and inflation. However, there are other likely impacts that are not necessarily captured in this report. The typical response to the financial burden of a disaster to a government is reallocation of resources, which could affect spending in the provision of public services such as health and education as well as the share of the budget allocated to investment programs and development plans. The cyclone may also have an impact on the distribution of income as well as poverty levels independent of the impact it may have on growth, an area beyond the scope of this report, but that nonetheless merits attention.

Similarly, large disasters such as cyclone Nargis will affect the provision of public services in the affected areas, such as the provision of health and education services. To the extent that this interruption in the provision of public services has an impact on productivity of the affected population, say by reducing the education of children for a prolonged period of time or leaving behind chronic illnesses and disabilities that impair the capacity of people to work, there will be longer term impacts on the productivity and the livelihoods of affected populations, which might not necessarily be captured by this assessment.

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## ANNEX 14: EMPLOYMENT AND LIVELIHOODS

### SUMMARY

In terms of livelihoods, the area affected by the cyclone can be broadly divided into three different livelihood zones. The coastal area of the Delta region (with 24 percent of the population) is a fragile eco-system. Most of households were in one way or the other engaged in fisheries activities. The agriculturally productive area (29 percent) is dominated by rice farming. A number of people in the peri-urban zone are still dependent on agriculture, livestock and fisheries. By contrast, the bulk of the economy in urban areas is dependent mostly on the industry and service sectors. The peri-urban and urban areas account for 47 percent of the population.

The total loss in employment due to Nargis is estimated at 200 million working days, leading to a loss of earnings of K663,600 million. Results from the Village Tract Assessment (VTA) survey indicate that employment in fisheries and agriculture has decreased and there has been an increase in people depending on casual labour and other income generating activities. The VTA indicates that half of all village leaders (49 percent) perceive the recovery of their livelihoods to be their most difficult challenge.

The assessment team proposes an integrated strategy based on two sets of intertwined actions: immediate measures (coping measures) to address the impact of cyclone Nargis in the first year; and longer-term measures that aim to reduce the probability that livelihood risks materialise (prevention measures) as well as at decreasing the potential impact of future shocks (mitigation measures). If designed and implemented in an integrated manner, these measures will contribute to orient the overall recovery effort in a way that it not only achieves the reconstruction of the physical capital lost in the cyclone but also creates a virtuous cycle of job creation, income generation and stimulation of local markets. The total costs of this strategy are estimated at K159,800 million.

### PRE-DISASTER SITUATION

In terms of livelihoods, the area affected by the cyclone can be broadly divided into three different livelihood zones.<sup>1</sup> These zones are the coastal area (with 24 percent of the population), the agriculturally productive area (29 percent), and the peri-urban and urban area (47 percent).

*Coastal zone.* As discussed in Annex 12, the coastal area of the Delta region is a fragile eco-system comprising of thick mangrove forests, paddy lands, fisheries and estuaries. The area is characterised by saline soils on which low yields are experienced. Fresh drinking water is scarce. Families living closer to the rivers and sea had marginal and complex livelihoods, supplementing incomes with casual labour, fishing, livestock, salt farming (Labutta), fish and sea food processing using simple traditional techniques and small trade in rice and fish products. Most of households living in this area were in one way or the other engaged in fisheries activities. The coast and offshore trawler fishing employed a large amount of people. The township centres produced fish products, such as fish paste and dried fish/shrimps that were sold all over the country. Landless and very poor households relied on casual labour in agriculture, fishing and other activities such as wood cutting (Labutta), charcoal making (Ngapudaw), and nipa-thatch making.<sup>2</sup>

*Agricultural zone.*<sup>3</sup> The agriculturally productive area is located approximately 10 kilometres away from the coastal area. This is a richer zone, characterised by a fairly fertile plain with sandy soils watered by the numerous branches of the Ayeyarwady River (streams and creeks). The area has higher crop yields from fresh water and brackish water environment. The region is prone to floods. This area is dominated by rice farming. There is a high percentage of casual labourers.<sup>4</sup> Estimates from some affected townships show between one-half and almost three-quarters of the population as being landless.<sup>5</sup> They were the poorest and relied on seasonal labour during peak

1 Livelihood zone is defined by geography, agro-ecological areas, and an area where people broadly share the similar production and trade patterns.

2 Morris, Heather and Kyaw Ngwe (2003). Report on Rural Rapid Appraisal in Bogalay, Mawlamyinegyun and Laputta Townships of Ayeyarwady Division in Myanmar. Main Report. 6 February 2003.

3 Myanmar Information Management Unit (MIMU) (2008), Summary of Preliminary Assessments of Areas Affected by Cyclone Nargis, 11 June 2008.

4 MIMU (2008); Save the Children in Myanmar (2007), Household Economy of Kangyidaunt Township, Ayeyarwady Division, Myanmar, February 2007; UNDP ICDP Project (2007), Impact Assessment Baseline Survey Report - of the Integrated Community Development Project, April 2007.

5 For instance, 51 percent in Mawlamyinegyun, 62 percent in Bogale, and 71 percent in Labutta. UNDP et al. (2007), op. cit.

periods in agriculture and fisheries, and a combination of other livelihood strategies to survive. They were also self-employed as masons, builders and carpenters. Poorer households migrated to the coastal area from October to March for salt and charcoal making. The landless are often trapped in a cycle of debt from taking loans and advance payments from informal sources such as relatives and friends, employers and money lenders.

*Peri-urban and urban zones.* A number of people in the peri-urban zone are still dependent on agriculture, livestock and fisheries. By contrast, the bulk of the economy in urban areas is dependent mostly on the industry and service sectors. The commerce sector, including a myriad of informal micro-commerce activities, provides substantial employment to a large part of poor urban families. Professional and government administration services, public services, hotels, restaurants and tourism related services also provide employment opportunities to the educated and skilled work force in Yangon.

*Household income, poverty and coping strategies.* Agriculture (including hunting and forestry) was the main source of income, employing over 50 percent in Ayeyarwady and 13 percent in Yangon Divisions. Although many farmers also fish, in particular in the off-season, less than 5 percent lived exclusively off fisheries in Ayeyarwady Division, and 1 percent in Yangon Division.<sup>6</sup> The mostly rural household income in these areas derives from a complex combination of farming and non-farming activities, involving different forms of informal and low skilled labour. Wage rates for casual labour in agriculture prior to the cyclone were on average between 1,000 kyat/day in Bogale to 2,000 kyat/day in Labutta, while the cost of feeding an average sized family was never less than 1,800kyat/day. While the Ayeyarwady Division as a whole was considered one of the most affluent parts of the country, given relatively high rates of rice production,<sup>7</sup> the southern coastal zone was the poorest part of the Delta. The average consumption expenditure (excluding health expenditure) is very close to the poverty line calculated at 162,136 kyats/year in 2005.<sup>8</sup> This means that a significant number of people were already at risk of falling close to or below the poverty line before the disaster.

*Access to credit.* Due to credit restrictions since 2003, loans for farmers and SMEs were no longer easily available. Only larger farmers and entrepreneurs have access to the limited credit available from the state owned banks in the affected areas. Smaller farmers had only access to loans at subsidized interest rates at 2-4 percent per annum from the Myanmar Agricultural Development Bank. But the size of these loans was in general too small, inadequate to cover the working capital for paddy production.<sup>9</sup> Loans were not available for summer paddy which pushed the farmers to take substantial loans from private moneylenders at interest rates of over 10 percent per month. Sometimes borrowers (farmers) had to repay loans to moneylenders in kind at double the quantity at the time of harvest. Poorer farmers and household-based micro and small enterprises only have access to micro-credit from the UNDP Microfinance project, which is operational since 1997.

*Markets.* The markets in the Ayeyarwady are supplied from Yangon with the exception of upper Ngapudaw which also receives supplies from Patheingyi. All primary markets were normally accessible by road with the exception of Mawgyun in Mawlamyinegyun which was serviced by a steamer (ferry). Most secondary markets were mostly accessible either by tertiary roads and paths or by canals and rivers, using boat or canoe as a means of transportation.<sup>10</sup>

## DAMAGES, LOSSES AND IMPACT

Cyclone Nargis caused extensive damage and loss of livelihoods, employment and income of an estimated 2.4 million people living in the most affected areas of the coastal zone, the agriculturally productive zone, and the urban and peri-urban area. Smallholder farmers, communities dependent on small-scale inshore and offshore fishing, landless poor dependent on wage-labour in agriculture, and skilled workers previously employed in a wide range of small and medium manufacturing and processing enterprises have lost income earning opportunity for a substantial period of time.

Results from the Village Tract Assessment (VTA) survey indicate that employment in fisheries and agriculture has decreased and there has been an increase in people depending on casual labour

6 UNDP, Ministry of Planning and Economic Development Government and IDEA International (2007), Integrated Household Living Conditions Survey in Myanmar – Poverty Profile. June 2007.

7 UNDP et al. (2007), op. cit.

8 UNDP et al. (2007), op. cit.

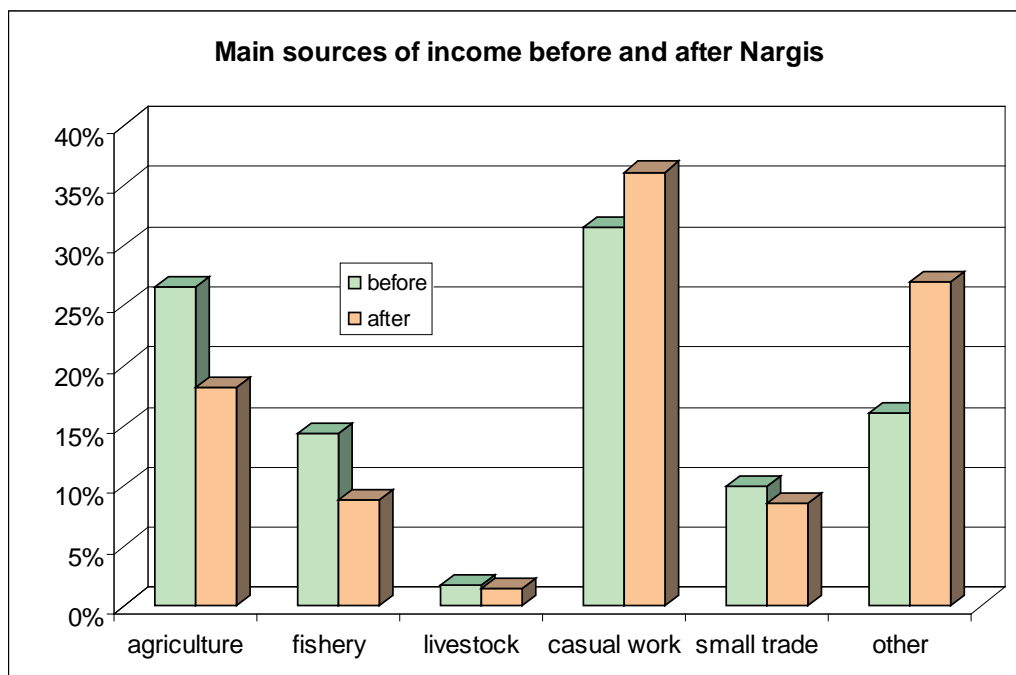
9 Morris, Heather and Kyaw Ngwe, op. cit.

10 IDE Myanmar (2008), Rapid Market Assessment of Affected Areas, 28 May 2008.

and other income generating activities (see Figure 1). This implies that the cyclone which severely affected agriculture and fisheries has reduced income earning opportunities for the local people who were previously dependent on these resource-based income sources. It is likely that households are selling off productive assets to meet their immediate needs and employing risky/irreversible coping mechanisms. There has also been an increase in subsistence fishing activities and collection of crabs. Recent NGO assessments reported that some current labour opportunities are found in loading and offloading boats, repairing of roofs, agricultural labour and wood cutting.

*Impact on the coastal zone.* Saline intrusion has further degraded the soil. Marginal farmers may not be able to plant their monsoon paddy even if seeds are available as they have lost their draught animals.<sup>11</sup> The protective mangrove forests have been further destroyed rendering the coastal area more vulnerable to further floods and storms.<sup>12</sup> Fish stock in the mangrove has also been depleted. Fish ponds and aquaculture areas have been damaged. The coastal and community fishing is even further affected by the destruction of small boats and fishing nets. As boats are used for transportation of goods and people, this has considerably reduced the general access to the area. Income earned from salt production, charcoal making and wood cutting has been seriously impacted. This is likely to affect also the landless poor in the agricultural zone who normally move to the coastal zone in search of additional income in salt production, fishing and other casual labour during the dry season. The poor and poorest in this zone have few possibilities to find sufficient income sources until March 2009 when they may be able to have some income from cash crops (October season) and coastal and off-shore fishing.

**Figure 1: Main sources of income, as reported by households living in the Delta, before and after cyclone**



Source: VTA Survey.

*Impact on the agricultural zone.* Farmers who are dependent on cultivation in the brackish water are likely to sustain considerable loss if they are unable to have access to adequate agricultural inputs on time to plant the monsoon paddy. Small and medium scale farmers will not have sufficient power tillers and draught animals to prepare land for cultivation due to damage incurred by the cyclone. Additionally, landless poor and poorest who have previously relied on casual labour in medium and large farms are likely to have fewer job opportunities. Some small and medium-size enterprises in the fishing and fish processing industry will be unable to undertake replacement

11 See Annex 6 (Agriculture).

12 See Annex 12 (Coastal Zone Management and Environment).



investment for re-stocking their assets. Therefore, job opportunities for many casual labourers will not occur until the early part of 2009.

*Impact on peri-urban and urban areas.* The bulk of the physical destruction in these zones was caused by cyclonic winds. Businesses and enterprises such as fish and food processing and cold storage have sustained damage to infrastructure (buildings), equipment and transport means (vehicles, boats) and inventories. A number of fish processing plants are being repaired and restored by the entrepreneurs. Currently these enterprises are operating at 30 percent to 50 percent of their capacity because of shortage in fish.

*Affected livelihood outputs.* The losses to livelihood will certainly have an impact on the capacity of poor families to sustain health and education expenditure. Households incur related costs, for instance, for school fees, uniforms and books as well as for drugs and private health care and services.<sup>13</sup> With the loss of household earnings due to the damage of the cyclone, a number of school-age children will not be able to attend school.<sup>14</sup>

*Coping strategies.* Half of the VTA household respondents indicated that they have access to food including relief supplies. Food is generally available in secondary markets. Coping strategies include using up savings (to the extent that any are left), selling any remaining assets, borrowing money from money lenders, or mortgaging cattle to better off farmers, with the consequence of further de-capitalization and impoverishment.<sup>15</sup>

Among the greatest needs for support the VTA has identified, access to grants and credits to restart small businesses comes on top of the list. Only 27 percent of villages report having access to credit, but, besides many villages in Shwepyithar, Thongwa and Pathein, most of other villages have very little, if at all, access to credit. The most affected villages are situated in Labutta and Bogale; to a lesser, but still significant extent, Dedaye, Mawlamyinegyun and Pyapon. These areas will need strong support to restart their economic activities and grant them self sufficiency.

*Markets.* Field observations<sup>16</sup> indicate that markets are quickly responding to the pattern of demand that is evolving in the affected area. Goods and services for markets in the delta are still supplied from major urban centres and Yangon. Primary markets are accessible by road or steamer (ferry). Many secondary markets can only be accessed by canals and rivers. Access roads and paths leading to markets need urgent restoration and upgrading. Smaller markets (secondary and tertiary) sustained systematic destruction and damage due in part to their semi-permanent structures. Small retail stores and groceries have spontaneously emerged in those villages that have received different types of cash programme support. This has facilitated access for village populations to basic commodities and products brought from secondary and primary market to the villages. Immediately after the cyclone prices of food items, household goods and building materials rose sharply. But traders and suppliers quickly moved to the affected areas – district and township capitals – to respond to the market demand and gaps in inventories.

*Employment.* The total loss in employment is estimated to be about 200 million working days resulting in a loss of earnings of K663,600 million. This impact on livelihoods will create a surge of additional demand in the already limited local labour market, in the affected townships and surrounding villages. If the local economies do not fully recover within the next 12 months, a large number of job seekers may be obliged to permanently migrate, seeking economic opportunities in other regions or abroad.

13 See Annex 5 (Education) and Annex 4 (Health).

14 See Annex 16 (Vulnerable Groups).

15 MIMU (2008), op. cit.

16 IDE (2008), op. cit.

Table 1: Estimated Losses in Employment

| Sector       | Number of working days lost (million) | Loss of Earnings (Kyat million) |
|--------------|---------------------------------------|---------------------------------|
| Agriculture  | 76.0                                  | 415,600                         |
| Fisheries    | 10.2                                  | 25,600                          |
| Industry     | 23.3                                  | 45,200                          |
| Commerce     | 88.6                                  | 177,200                         |
| <b>Total</b> | <b>199.8</b>                          | <b>663,600</b>                  |

Source: PONJA team estimates.

*Agriculture.* The damage caused a total loss of 76 million working days for a total loss of earnings of K415,600 million. Ayeyarwady division sustained the worst loss, and the most affected townships were Dedaye (7.4 million days), Pyapon (19.0 million working days) and Labutta (17.0 million working days). In Yangon Division the most affected township was Kyauktan (7.6 million working days). The loss in employment in the fisheries sector is estimated at 10.2 million working days for a total loss of K25,600 million in earnings.

*Industry.* Many establishments sustained partial or total destruction to business premises, equipment and inventories. Many had to suspend or reduce their production for periods expected to range from 2 to 5 months. An estimated 23.3 million working days have been lost resulting in a loss of K45,200 million. The most affected townships in the Ayeyarwady division are Ngaputaw (1.9 million working days lost, mostly casual labour) and Labutta (1.6 million working days). In Yangon Division the most affected townships are Dagon Myo Thit South (9.0 million working days) and Thanlyin (2.0 million working days).

*Commerce.* This sector has been the most affected with a loss of 88 million working days. The total loss is estimated at K177,200 million. An estimated 20,000 establishments, self-employed tradesmen and craftsmen and micro and small retail shops in the informal market places (such as grain shops, seamstresses, food shops, small restaurants, handicraft shops) had their business premises (largely located within the house) damaged or destroyed. These micro/small businesses also lost raw materials, equipment and tools. Most of the entrepreneurs are reported having re-established their operations, but many micro-businessmen are not likely to recover unless they have access to financial support or credit.

## RECOVERY NEEDS AND STRATEGY

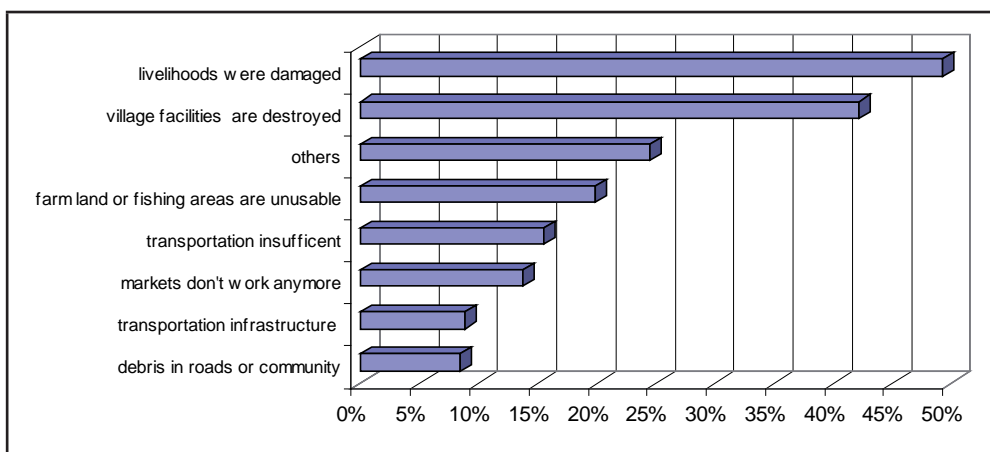
### RECOVERY NEEDS

Assistance for reconstruction and food aid has been constantly flowing into the delta. Necessity, however, is still larger than the stream of support. While Labutta, Bogale and Dedaye have greatly benefited from both types of assistance (green areas), there are still many villages that have not received either food or support to reconstruct their houses. The delta area is naturally the most affected one, for which assistance should be focused to that geographical area. Nevertheless, there are many other villages in both the Ayeyarwady and Yangon divisions which need further backing.

There is a need for immediate recovery plans that will support affected people to return to their occupation. People who are presently in need of food assistance have lost everything do not have the means to recover themselves. Half of the VTA respondents perceive the recovery of their livelihoods to be their most difficult challenge (Figure 2 below). They also indicated the need for clearing up flooded and contaminated farmland and fishing areas as well as transportation and infrastructure needing revival. Durable shelter is indicated as critical for households to support them to restart their normal activities. These same individuals will need to find an income opportunity to escape from the dependence on relief assistance. In terms of livelihood recovery, the following immediate and medium-term needs have been identified.



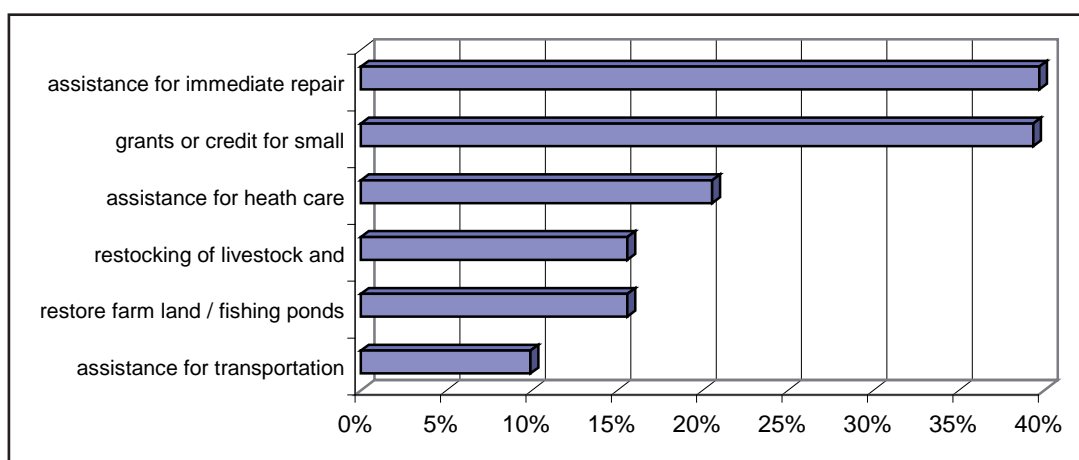
Figure 2: Most important challenges as reported by households living in the Delta



Source: VTA survey

*Immediate income recovery opportunities need to be created.* To compensate for the job loss 26.3 million working days would need to be created in the first year after Nargis. Labour-intensive schemes should be created for immediate community infrastructure recovery and public works. This injection of cash through wages will help stimulate local demand and contribute to kick-starting the local economy. Cash for work schemes need to be complemented by short-cycle skills training for community members, local contractors, and local labourers. (see Figure 3 below)

Figure 3: What do households think their communities need support for?



Source: VTA Survey.

In order to help the local population to quickly recover from the losses of jobs in the agriculture sector, an estimated 13.2 million working days would need to be created. Due to the time needed for the recovery of destroyed plantations, it is assumed that an additional 2.5 million days would need to be created in each of the subsequent 2 years.<sup>17</sup> To compensate the job losses in the fisheries sector, 10.2 million working days need to be created, assuming that the off-shore and in-land fishing capacity will be progressively re-established in one year. An additional 2.9 million working days should be created in the first year to absorb labour lost mainly by micro-enterprises in the industry sector. The commerce sector should be able to recover its capacity and compensate the job losses within 3 to 6 months.

Table 2: Estimated Needs for Employment Creation (Million working days)

<sup>17</sup> Another estimated 6 million working days would be required for an additional 3 years until plantation capacity has fully recovered.

**(Million working days)**

| Sector       | 2008/09     | 2009/10    | 2010/2011  |
|--------------|-------------|------------|------------|
| Agriculture  | 13.2        | 2.6        | 2.3        |
| Rice         | 10.0        |            |            |
| Plantations  | 3.2         | 2.6        | 2.3        |
| Fisheries    | 10.2        | 1.5        |            |
| Industry     | 2.9         |            |            |
| Commerce     | 0           |            |            |
| <b>Total</b> | <b>26.3</b> | <b>4.1</b> | <b>2.3</b> |

Source: PONJA team estimates.

*There is an urgent need to establish an effective local labour supply and demand matching mechanism.* Experiences from various disaster affected countries demonstrates that difficulties in matching demand and supply of skilled and unskilled labour for relief and recovery work result in an inflation of the cost of labour and in an influx of external workers from outside the affected area. A simple mechanism that facilitates the exchange and dissemination of information on employment opportunities needs to be put in place.

*Poor and vulnerable households who depend on relief schemes and do not have any other income source need immediate livelihood support through:*

- livelihood stabilization cash-grants. Many vulnerable households in the coastal and agricultural zones will be unable to meet their immediate needs and revive their livelihoods. They also need cash to cover immediate health care and education expenses. A sound mechanism is required to provide cash grants such that they support existing household coping strategies, rather than create dependence on relief aid distribution.
- micro-credit for livelihood activities. Prior to Nargis a number of development agencies have supported community based savings and credit operations. Microfinance programmes are confronted by both the demand by members for the withdrawal of their savings and the fact that members with outstanding loans are unable to repay them because their asset base has been destroyed or damaged. The micro-credit schemes, thus, require immediate funds for asset replenishment to enable them to re-start credit operations.

*Fragile micro enterprises need to be enabled to invest in the recovery of their productive assets.* Affected micro and small entrepreneurs often do not have the financial capacity to face the investment needed to restore their production capacity. Formal credit is scarce and most of these entrepreneurs already have outstanding loans to repay. Their inability to operate is obviously affecting the workers that used to have jobs with those entrepreneurs. Support schemes need to be provided focusing on wage support. Furthermore, micro enterprises routinely face difficulties from the scarcity and cost of working space, and from the lack of any adapted business advice on economies of scale, quality improvement and market linkages. There is a need to progressively support those micro enterprises through expanding the provision of micro-credit.

*Local youth do not have access to public or private vocational training.* Vocational training opportunities in the area are limited or non-existent. Young people who want to acquire specific skills would normally have to migrate to towns, incurring costs that are not affordable for the poor. Availability of skilled labour can be achieved by providing accessible vocational training, addressing female and male youth. The training should respond to the following needs: (i) increased demand for skilled labour generated by recovery works; (ii) the demand of the entrepreneurs willing to (re-) start a micro-business; and (iii) the demand of the unemployed in search of employment or self-employment.

## **STRATEGY**

The assessment team proposes a comprehensive strategy with two objectives: (i) to help the affected population cope with the effects of Nargis; and (ii) to help the population at-risk build resilience for future disasters. Such an approach should be based on two sets of intertwined actions: immediate measures (coping measures) to address the impact of cyclone Nargis in the first year; and longer-term measures that aim to reduce the probability that livelihood risks materialise (prevention measures) as well as at decreasing the potential impact of future shocks (mitigation measures). If designed and implemented in an integrated manner, these measures will contribute to orient the overall recovery effort in a way that it not only achieves the reconstruction of the physical capital lost

in the cyclone but also creates a virtuous cycle of job creation, income generation and stimulation of local markets.

*Immediate labour-intensive works for social protection and income recovery.* A minimum of 15 million working days of employment ought to be created in the first year to support the recovery process. Depending on the speed of local economic revival, the duration of cash for work schemes should vary between 3-6 months.

*Supporting labour market mechanism.* Simple employment information services should be set up to facilitate the matching of supply and demand in the labour market and gather information on the characteristics and skills of job seekers including micro-entrepreneurs, in order to design and plan tailored demand-driven training programmes.

*Community-driven livelihood support.* At the village level, the following activities could be envisaged, with extensive participation of villagers throughout the project cycle: (i) community level labour intensive works schemes to rebuild or rehabilitate community infrastructure, including the rehabilitation of tertiary roads, ponds, jetties and pontoons and other community infrastructure.; (ii) cash grants for a period of 3-6 months to the most vulnerable household assets.

*Micro-credit.* Micro-credit and revolving funds mechanisms are an excellent way to provide resources directly to affected households to help them recover livelihoods, and in addition strengthen social cohesion and the recovery of local markets. Recommended micro-credit activities could include: (i) capital grants to self reliance groups to help them re-establish their common funds; (ii) support to microfinance groups to help them reschedule or write off outstanding loans; (iii) extension of micro-finance activities to communities where these are not yet in operation.

*Improving the access of local youth to vocational training.*<sup>18</sup> Training programs should be implemented to provide local youth with opportunities to acquire skills and/or management capacity. This will enhance their employability by preparing them either for entry into the labour market or to establish themselves in self-employment. Training activities should be complemented by the provision of grants and tool-kits, assistance for the start-up process, facilitation for access to micro-credit, and technical support and coaching for a limited period of time, until the new activity will be able to take-off. Efforts should also be made to expand the capacity of trainers. In addition, non-formal vocational training opportunities through on-the-job training and internships with existing businesses and enterprises should be explored.

*Developing micro-business services.* The establishment of business services (such as one-stop-shop schemes) would, among others, help small-scale entrepreneurs identify and access opportunities arising from recovery efforts and market revival, strengthen their relations with the suppliers and buyers on input and output markets, and facilitate the registration of the new businesses. The (phased) establishment of local business services centres in townships as well as their first year of operation should be supported during the longer-term recovery phase.

*Implementation arrangements for livelihood programs.* The majority of programs in the livelihood area (with the exception of vocational training and micro-business services) would be community-based. While the use of community-driven approaches is not as large-scale in Myanmar as it is in other countries, there are successful experiences in delivering assistance in the Delta through these approaches. The two pre-requisites for the successful use of community-driven approaches are: (i) the ability to support village groups who can genuinely solicit and reflect the priorities of the community and avoid elite capture; (ii) the ability to establish and operate basic financial management processes.

Several programs already operating in the Delta, which were evaluated by the assessment team, possess a satisfactory track record of performance against these aspects: village leaders appointed are from a variety of backgrounds, including women and youth groups; they interact freely with the community; satisfactory simple financial management and record-keeping systems are used; and good practice anti-corruption measures, such as the posting of all recipients and expenditure publicly in the community, are followed. Care should however be taken not to scale up these activities too fast, and to combine them with strong capacity-building for community groups in planning, prioritisation and simple financial management.

<sup>18</sup> Some activities should start during the immediate recovery phase.

**ESTIMATED COSTS**

The total costs for the first year (immediate recovery) amount to K43.9 billion, the cost of the subsequent longer-term measures is estimated at K58.6 billion. Total needs for recovery of employment and livelihoods are estimated at K102.5 billion.

**Table 3: Estimated Costs for Recovery**

(Kyat Billion)

| Needs  | Year 1       | Year 2 and 3 |
|--|--------------|--------------|
| - Cash for work programs, livelihood programs, and grants for poorest households | 29.1         | 13.3         |
| -Community driven recovery programs  | 5.0          | 19.8         |
| -Micro-credit  | 7.6          | 22.8         |
| -Vocational training   | TBD          | TBD          |
| -Developing micro-business services  | 2.2          | 2.7          |
| Total  | 43.9         | 58.6         |
| <b>TOTAL NEEDS</b>   | <b>102.5</b> |              |

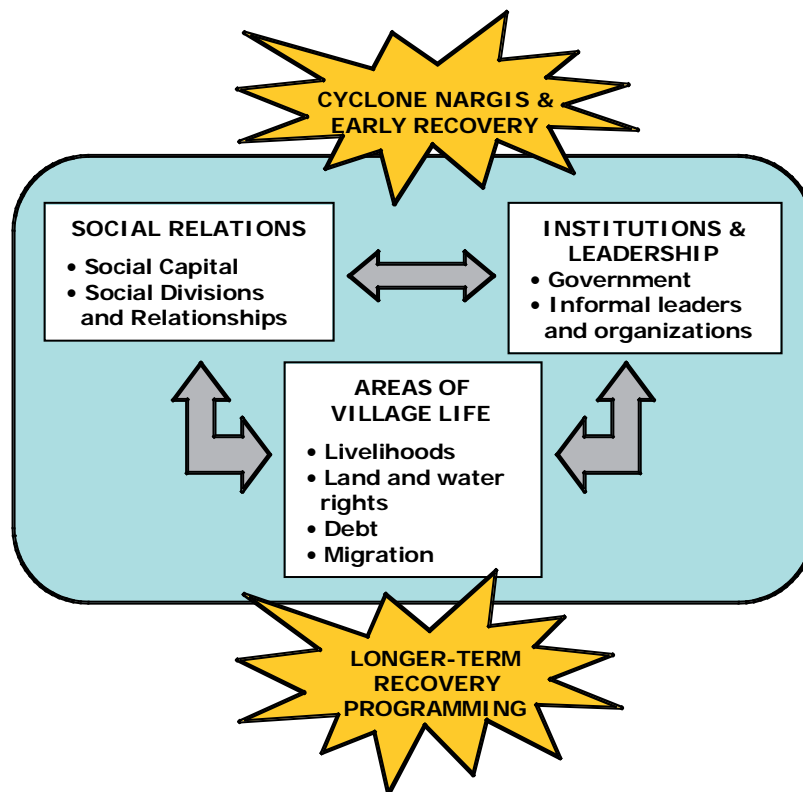
1/ Including costs for demand-driven skills training.  
Source: PONJA team estimates.

## ANNEX 15: SOCIAL IMPACT OF CYCLONE NARGIS

In addition to their humanitarian and economic consequences, disasters impact the social fabric of affected communities. Analyzing how Cyclone Nargis has affected local patterns of life, social structures and institutions is important in order to holistically understand its impacts. Such understanding is vital for developing plans for effectively delivering post-disaster assistance. The success of the early- and longer-term recovery effort will depend on the extent to which programs fit with the needs and institutions that exist in affected areas. "Doing no harm" must be a minimum standard of the aid effort. Well designed programs that draw on local capacities and that are built on an understanding of local realities can not only address key needs but also strengthen local institutions and practices in ways that enhance development and social cohesion.

This analysis examines the social impacts of Nargis at the community level<sup>1</sup> in two areas: the direct social impacts of the cyclone, of early relief efforts, and of how communities responded to the disaster; and the longer-run social impact that external longer-term recovery responses to the cyclone may have. It does so by comparing village life in the Delta before and after Nargis. This section first outlines key areas of life in rural Delta villages and their social structures and informal institutions. It then shows how Nargis, and the immediate response, is affecting social relations and cohesion. It concludes by looking forward to see how longer-term recovery responses may further impact on social life in villages in the Delta, and draws out some potential lessons. Figure 1 shows the section's analytical framework.

Figure 1: Impacts of Nargis and Responses on Village Life



The analysis is necessarily preliminary and tentative at this point.<sup>2</sup> Furthermore, the social impacts of Nargis and the recovery effort will be dynamic, changing in response to a range of factors including levels, types and sources of aid provided, government policies and actions, and the choices of affected communities and individuals. As such, in order to ensure recovery programs are effective, and to avoid negative impacts, it will be necessary to track social impacts over time.

1 Undoubtedly Nargis (and the response to it) will also shape social dynamics at the national level, but such analysis is not the focus of this section.

2 The analysis draws primarily on fieldwork conducted in ten villages in five townships in Ayeyarwady Division and two peri-urban areas of Yangon Division. Further, interviews were conducted with key stakeholders (government, NGOs, international agencies, and local leaders) at the township and national levels, and pre-existing survey evidence and insights from the literature were utilized.

### KEY AREAS OF LIFE IN RURAL DELTA VILLAGES<sup>3</sup>

*Livelihoods.* The people of the Delta area are primarily farmers, fishermen and labourers, with a smaller proportion engaged in service industries and as traders. Approximately 50-60 percent of families in the Delta are engaged in agriculture. Fishing is generally done by landless households as well as farmers in the off-season. Estimates from some affected townships show between one-half and almost three-quarters of the population as being landless.<sup>4</sup> While the Delta was not one of the poorer parts of the country (29 percent of the population was poor in 2004-05, compared with 32 percent nationally)<sup>5</sup> development was relatively limited, and life could be harsh, in particular when crops failed. However, there were many opportunities for making at least a subsistence living.

*Land rights.* Even for those with land, the right to use it is insecure. While land is owned by the state, farmers are given user rights through application to the Ministry of Agriculture. Farmers must apply on a yearly basis for such a right. The primary criterion for user rights being renewed is past history of productive use of land, although a certain yield is not specified. If land is judged to have not been used productively, it can be taken and reallocated by the Peace and Development Councils (PDCs). Where land is not in use, people can apply for permission to farm it. It appears, however, that common areas, for instance, for cattle grazing, are being enclosed progressively, limiting the space available for villagers.

*Water rights.* Each year fishing concessions must be obtained from the Department of Fisheries. Large-scale operators obtain licenses and lease fishing rights to local fishermen who in turn are obliged to sell the catch to the concessionaires, reportedly at below-market prices. Lakes in the area provide fishing grounds during the monsoon season and provide planting ground or a source of water for irrigation during the dry season. The Department of Fisheries and customary rules govern the use of fishing grounds that cover net size, fishing prohibition during spawning time, and showing the sign of net location to prevent damage from passing boats. Fishing for own consumption is reportedly not formally allowed.

*Debt.* Indebtedness is a big problem for many villagers in the Delta. Farmers borrow for agricultural inputs and home consumption. Fishing households borrow boats and fishing supplies from traders. The landless poor often sell their labour in advance, at roughly half the going wage rate, in order to meet consumption requirements during the "hungry season" of June-October. In the 2005 rainy season, 43 percent of households in the Delta were in debt, compared to a national average of 33 percent.

*Migration.* Opportunities to make a good living, and strong demand for labor, resulted in an inflow of people after the Delta was opened for development in the mid-nineteenth century. More recently, the opening of the wetlands of the upper parts of the Delta created opportunities for casual labourers in these areas, and some have moved from the lowland Delta for work. There are few opportunities for high school graduates in their villages and they must look for employment elsewhere in the country and beyond. Within Myanmar, however, the Delta is not considered a major labour sending area.

### THE SOCIAL STRUCTURE OF DELTA VILLAGES

Despite, or perhaps because of, the many challenges of Delta life, communities are relatively socially cohesive and have strong capacities for collective problem solving and decision-making. Limited interaction with the state at higher levels has led to the development of indigenous systems for solving problems and managing village life. While the usual inter-group cleavages exist (including between those of different ethnicity and religion, between genders, between the young and old, and between different income and livelihoods type groups), village activities tend to cut across such boundaries. Traditions of marriage within villages have strengthened kinship relations. While there is relatively little trade between villages, forms of social interaction (weddings, the initiation of boys into monkhood, and other ceremonies) lead to close relations.

3 Sources: Mya Than (2001). Changing Faces of the Ayeyarwaddy (Irrawaddy) Delta (1850-2000). Singapore: Institute of Southeast Asian Studies, Singapore; UNDP, Ministry of National Planning and Economic Development, and UNOPS (2007). Integrated Household Living Conditions Survey in Myanmar, Poverty Profile. Unpublished; key informant interviews.

4 UNDP et al., op. cit.

5 The 2004-05 household survey established the poverty line at c. 450 Kyat per day (November 2004). It is based on minimum food expenditures to satisfy caloric requirements plus reasonable non-food expenditures to meet basic needs. UNDP et al., op. cit.

## SOCIAL DIVISIONS AND RELATIONSHIPS

*Ethnic and religious relations.* Unsurprising for such a diverse country, the Delta region is home to people of a number of different ethnicities.<sup>6</sup> There are three primary ethnic groups: the Bamar make up the majority of the population with smaller numbers of ethnic Karen<sup>7</sup> and Rakhaing. The latter live on the largely unaffected west coast. There are two major Karen groupings, the Pwo and the Segaw, speaking distinct dialects. In addition to the Karen, there are small numbers of Mon and Indians. The Bamar and Karen are distributed throughout the Delta. Villages can be classified into those segregated by ethnicity, and those with an ethnic mix depending on settlement history.

Generally, Delta villages handle ethnic and religious differences with tolerance. Religious buildings play an important role as places for social gatherings in the village. The main religion is Buddhism practiced by most Bamar, some Karen, and Indians; the Karen are mainly Christian Baptist, and Indians may be Buddhist, Hindu or Muslim. Inter-marriage between Indians and Burmese ethnic groups is common and inter-marriage between Bamar and Karen also occurs.

*Gender relations.* There are distinct roles for men and women in the village; these roles tend to define the scope and nature of relations between genders. Typically, while the husband is expected to play the major role in income generation and the wife is expected to be the household manager, the wife assists in her husband's activities, and often has her own productive activities, too. Decision-making in the household is divided by sphere. Joint decisions are made about children's schooling, off-farm work and borrowing. Often, women will have control over household finance while men have control over farm expenditures.<sup>8</sup>

*Inter-generational relations.* Age is an important marker of status in villages. The elderly are respected and protected, and village elders play an important role in the community. Accession to eldership is determined primarily by wisdom, but wisdom is seen as a by-product of lived experience. Elders tend to be male; it is difficult, but not impossible, for women to join the elders group. Nonetheless, avenues of power, such as becoming Village Head, are very much open to younger people. (By law, Village Heads are to be less than 45 years old.) This social order is reinforced by the occupational system, where most youngsters upon leaving school work with (or for) their parents.

*Class.* Class appears to be defined largely by either occupation (those with land versus those without) or political power. There does not appear to be a strong hereditary entitlement to membership of a certain class, although generational access to resources clearly enhances opportunities for wealth-making for some. That said, life in villages does not seem to have created a rigid class system. Large landholders and businessmen often live outside of villages in the township or district capital or even in Yangon. This creates a certain degree of solidarity amongst those in the villages.

*Inter-village relations.* In general, relations between villages seem strong. Relationships between villages are strengthened by the cross-village kinship system, built through inter-marriage, but interaction is limited by the Delta's watery geography. Due to the relative difficulty of accessing township capitals, villagers often get expertise (skilled workers such as carpenters and mechanics), and buy products not available within the village, from neighbouring villages rather than urban centres. Inter-village cooperation is needed to prevent conflict over the use of communally managed resources such as water ponds and the distribution of irrigation water in the dry season when water for all purposes can be scarce.

## SOCIAL CAPITAL AND MANAGING DIVERSITY

Social capital in the Delta is strong. The ability to manage problems stemming from the cleavages discussed above is strengthened by a wide-ranging sense of social cohesion and common purpose within villages, and by traditions of reciprocity and collective action.

Myanmar's political, economic and social culture is usually characterized as being very hierarchical. Yet at the village level such power differentials are less pronounced. While Village Heads

<sup>6</sup> There are 170 ethno-linguistic groups in Myanmar.

<sup>7</sup> The 1984 population census (latest) records 69 percent of the total Myanmar population as Bamar, and 6.8 percent as Karen. No breakdown by division or state is given. As the low-land or Delta Karen are the second largest Karen population outside of Karen state, they are likely to comprise a larger proportion of the Delta population.

<sup>8</sup> See Annex 17 (Gender) for a more detailed discussion of gender relations.



have obvious power as representatives of the state, their control over village life is checked by a number of sources of informal authority, including that of the monks and village elders. This makes for a relatively “flat” social order. While community input into higher-level decision-making is rather small, problem solving and village level decision-making is done collectively amongst a number of different local elites.

There are a number of reasons for the strength of such social capital. First, development resources from higher levels are scarce. This accentuates the importance of pooling resources and carefully prioritizing expenditures for public goods. Strong social norms on the duty to contribute to the community prevent shirking. Second, in the absence of state or employer supported social security, families are the primary safety net, with children taking care of their parents in old age. In the same vein, community members support each other in times of need, something particularly evident in their response to Nargis. Traditions of reciprocity, evident across Myanmar as in many other Southeast Asian cultures, encourage acquiescence from those providing help. Third, as discussed above, kinship ties are strong and are reinforced through marriage within the villages. In the words of one community member, “We are all family here.”

In addition to sharing resources for common projects and helping each other in time of need, community cohesiveness also helps in the management of problems and local conflicts. It does so by providing strong social controls and accepted norms that discourage individuals from partaking in behaviour deemed inappropriate by the community. Moreover, because legitimacy to manage different areas of life is largely uncontested (there appear to be a relatively clear realms of authority for which leaders should address which types of problems) disputes are more easily managed when they do occur.

### **COMMUNITY INSTITUTIONS AND INFORMAL LEADERSHIP**

Village life in the Delta is governed by a range of formal and informal institutions. Informal institutions that play an important role in control, decision-making (including over resource allocation), and problem solving include village elders, religious networks, and local customs and traditions. In most villages, a standing committee, usually of village elders, is consulted for key decisions. Village elders tend to play a larger role in problem solving and local conflict resolution than in resource allocation.

Monks play a very important role too, in particular in solving problems and conflicts that the village elders find difficult to manage. Where they issue advice, others tend to listen and follow. Monks are also networked vertically through monasteries at the village tract, township level, and above. There exist other village committees in the affected areas, sometimes utilized on an ad-hoc basis, in particular when there is an externally-funded development project in the village. These include self-reliant groups, a range of user groups as well as Village Forums and other ad-hoc or permanent mechanisms for participatory planning and management of community-based development. Many of these groups are created to support women in income generating activities.

### **THE SOCIAL IMPACTS OF NARGIS AND INITIAL RELIEF**

That Nargis will have massive impacts on local ways of life is clear. The specific impacts are at this point less certain. This section presents a range of hypotheses on how Nargis, and early relief efforts, might change social and economic life within villages. These are necessarily speculative. The short period of time between the cyclone and this writing means that significant social changes have still to play out; besides, it is the duration of such changes that will be key in understanding whether the impacts of Nargis will be short-term or enduring. Such dynamics will need to be monitored over time. However, early analysis of phenomena in the field, combined with an understanding of the past ways that social life in Delta villages has evolved, and the impacts of other disasters such as the 2004 Indian Ocean tsunami, do point to potential social impacts.



## IMPACTS ON AREAS OF VILLAGE LIFE

### *Livelihoods*

Hypothesis 1: Nargis will have regressive impacts with those in supporting occupations suffering more than those with land. Likely in the short-term, possibly balanced by increasing labour demand once recovery gets underway.

Those in supporting occupations (casual labourers, those doing odd jobs, those in local micro-industries) will likely suffer the most from Nargis, at least in the short-term. First, their employment is dependant on the wealth and decisions of those they work for such as landed farmers. For the current crop season, landholders are likely to employ fewer casual labourers because of a lack of seeds and implements. In areas where land has been more heavily affected (for example, where it was extensively flooded with salt water) or where farmers lost their lives, the impacts on employment opportunities for farm hands will be even greater.

The immediate response to Nargis appears to be missing those in supporting roles. Whereas efforts are being made to replace draught cattle, provide agricultural inputs, and give new boats to fishermen, there has been much less assistance given to replace the basic household assets that casual labourers and those in micro-industries (food sellers, seamstresses, etc.) need. Few are providing cash or in-kind assistance to these groups. Village economies have been almost completely decapitalized, and access to credit on non-extortive terms is limited. Without a basic asset base or cash, opportunities to make money are few. One implication is that Cyclone Nargis may have regressive impacts at least in the short run, with the relatively richer (those holding land) benefiting more, or losing less, than poorer households.

In the medium-term, casual workers stand to gain from a resumption of agricultural activity once farmers and fishermen have acquired the necessary implements. In the same vein, support to small and medium enterprises, especially those with a local supply chain such as the fishing industry, would help not only to revitalize the economy but also to create jobs.

### *Land*

*Hypothesis 2: There will be a redistribution of land away from small-scale farmers to those with larger holdings. A risk, but probably on a small scale.*

Farmers (and their families) are worried about losing their right to use land in the aftermath of Nargis. Renewal of land user rights is contingent on productive use of land in the past year. This, along with a desperate need to ensure food security, appears to be a central reason why farmers were disproportionately likely to return to their villages soon after Nargis, even to the most affected areas close to the coast.

Where farmers died, their families believe that they will still enjoy the right to farm land for at least the current crop season. However, it is less clear whether such rights will be renewed once they are reviewed after the current planting and harvesting cycle. The loss of documentation recording land use history is also problematic, especially for those kept at the village level (see Annex 16, Vulnerable Groups).

Interviews in Yangon and the townships suggest that some potential does exist for smaller-scale redistribution of land to elites or other small-scale farmers who produce more, in particular where previous land users have died. Some have worried that there is also potential for some to use the disaster as a means to consolidate land in the hands of larger landholding companies. The government's focus on ensuring agricultural self-sustainability (particularly in an era of sharply rising global food prices) has led to some efforts to provide land to larger businesses and entrepreneurs.

In order to avoid regressive impacts of the cyclone, changes to settlement and land use patterns should, therefore, be minimized, avoiding the transfer of land away from smaller farmers. It will particularly be important to ensure that due process is established to protect the access of survivors to their families' land and to settle any land claim issues transparently and expeditiously.

*Other assets and debt*

*Hypothesis 3: The relief response further indebts affected villagers, increasing poverty in the medium to long run. A real risk.*

Besides providing relief, the government response to Nargis has focused on asset replacement, in particular for farmers. Draught cattle, power tillers, seeds and fertilizer are being provided to affected communities in an effort to ensure that the current monsoon planting season, which runs through July, can proceed. The above inputs are being provided in the form of loans: loans for seeds have to be repaid after the harvest with minimal interest, for power tillers after three years without interest.

Such a strategy has its pluses. It works against the aid dependency, and escalation of entitlement claims, that has become a feature of so many post-disaster situations. If agricultural production is able to resume smoothly, farmers should be able to pay off their loans. While loan repayments may decrease consumption in the short term, over time communities can recover as they build up their asset base and receive income from selling their products. The introduction of newer technologies such as power tillers could increase productivity and incomes.

Yet such a scenario assumes a relatively smooth return to land cultivation. There are a number of factors working against this. First, harvests may be less bountiful than in the past due, for example, to the increased salinity of the soil (at least for the current planting season) or land having been washed away. Second, there may be insufficient local labour to cultivate land to its maximum potential. Third, farmers who used draught animals may not know how to operate power tillers. Fourth, trauma and/or physical injury may reduce productivity rates. Further, the fact that many of the inputs provided are not useable (for example, tillers with wrong wheels, or without fuel, or inappropriate seeds) increases the risk that agricultural production will not be speedily resumed.

If this scenario played out, the policy of provision of loans rather than grants may lock community members into a cycle of poverty and debt that could be hard to break. Already, community members are highly indebted, perhaps unsustainably so given the fragile, disaster prone, economy of the Delta region.

## **IMPACTS ON SOCIAL COHESION AND RELATIONSHIPS**

### *Inter-group relations*

Nargis will likely alter the relationships between different groups in the village. Some shifts are already apparent. The degree to which such changes persist is dependant on a range of factors, including government policies, the nature of aid programs, and the resilience of local cultural and social systems forged over centuries to external shocks. It is difficult at this point to forecast exactly how the cyclone will change relationships between groups.<sup>9</sup>

*Hypothesis 4: Inter-village relations – Relationships between villages will improve after Nargis. Likely in the short-term, but there will be different impacts in different places over time.*

Village economies in the Delta were already linked before the cyclone. Nargis appears to have provided some opportunities for a strengthening of ties between villages. Less affected villages provided shelter to the displaced in the immediate aftermath of the disaster and shared their meagre resources. A spontaneous outpouring of care occurred throughout the country. Such altruism is likely to strengthen relationships between villages.

In the medium-term, inter-village ties could strengthen further or weaken. As discussed earlier, many skilled workers died, and villagers may now need to source materials and expertise from other villages which they previously had "in-house". As long as relationships between villages are not extortive (for instance, boat-makers keeping the prices they charge at reasonable levels), increased trade will likely strengthen the social relationships between villagers.

On the other hand, relationships between neighbouring villages may worsen due to competition over common natural resources, such as use of water ponds as many have been contaminated and damaged, fuel wood, and grazing lands as most cattle fodder was washed away. These tensions may

<sup>9</sup> See Annex 17 (Gender) for a discussion of possible impacts on gender relations.

be exacerbated by perceived differences in access to relief and recovery support. As such, it is of vital importance that aid is better harmonized, coordinated and monitored

*Hypothesis 5: Religion and ethnicity – Relationships between ethnic and religious groups will worsen due to inequities in aid provision.* Potentially, but depends on the nature of the relief and recovery effort.

No visible inter-group tensions have so far arisen. However, aid could potentially strengthen or worsen relationships between different ethnic and religious groups. There has no indication of a bias between ethnic groups in the provision of relief aid. However, there is a risk of assistance being channelled, or being perceived to be channelled, disproportionately to particular ethnic groups. Equity, and transparency in distribution, therefore, needs to be an overarching principle for the provision of aid.

The prominence of religious institutions (monasteries, churches and mosques) in providing early aid does create a risk that religious differences will be accentuated. Monasteries have sometimes channelled aid to Buddhists, and churches to Christians. However, religious leaders have emphasized the non-sectarian nature of their assistance, and monks, priests and imams are aware of the potential negative effects of excluding some from aid.

Conversely, there is the potential for Nargis, and the response to it, to improve relationships between religious and ethnic groups. The cyclone did not discriminate by religion or ethnicity: people from all groups were equally affected. The outpouring of assistance from all faiths to all faiths may be a unifying force, along with the shared experience of the disaster, and a shared goal to rebuild their lives.

#### *Social capital and managing diversity*

*Hypothesis 6: Nargis will weaken social capital, making it more difficult for communities to recover.* Unlikely. Potential for social capital to be strengthened.

Early community responses to Nargis seem to show that social capital has been enhanced by the disaster. The rebuilding effort has necessitated collective action. Few villagers have the resources or skills to rebuild their houses by themselves, access external aid, or restart their livelihoods. As such, they are relying on their neighbours' help. Because many villagers are equally affected, and because their situation is so severe, community members are pooling labour and resources. The speed at which shelters have been constructed is testament to the power of such collective action.

In the longer-run, there will likely be challenges to such social cohesion. As more aid arrives, including possibly larger resources for rebuilding houses and infrastructure, risks of capture by certain groups or individuals increase. Resentment over (perceived) inequities in assistance could lead to problems (see also above). Further, it is likely that the economic situations of households will diverge over time, with some able to recover to their previous position, or even increase wealth, while others are left behind (see earlier hypotheses). Again, this may lead to social tensions, especially if those who are "getting ahead" start to limit the amount of support those still in need receive. There does not seem to be evidence of this yet, but experiences from elsewhere indicate that such problems could arise and would need to be managed.

### **LESSONS FOR POST-NARGIS PROGRAMMING**

Cyclone Nargis exerted a massive shock on the social fabric of life in the Delta. The recovery effort, if it is sizeable, will constitute another great shock. Villages in affected regions received relatively little aid from outside before Nargis. Interaction with the state and civil bodies at higher levels was limited. With some exceptions, local cultures and practices changed relatively slowly in response to outside influences and pressures.

The response to Nargis is likely to alter this. While it has the potential to change life in Delta villages for the better, there exists also a risk of negative consequences. If a recovery program proceeded, with resources significantly beyond past amounts of assistance, resources flowing to villages would increase sharply. Existing forms of social capital and problem solving may be strengthened or weakened, depending on the ways in which assistance is given. The role of the different institutions that collectively govern village life and manage problems could change.

This section builds on the previous analysis by identifying a number of factors related to the content of a possible longer-term recovery program that will help determine whether it will have positive social impacts. If longer-run, mostly externally funded, recovery support was more limited, scarcity of domestic resources would likely accentuate negative social impacts.

## **POLICY DIMENSIONS**

Many of the critical areas identified, which require attention if recovery is to be sustainable, cannot be addressed through projects alone. Policy decisions, including reforms, will be necessary. Key issues where policy attention might be needed include livelihoods, land use, and resettlement.

Lack of access to land is correlated strongly with poverty. There is a risk that Nargis could lead to a loss of land for the families of some victims. Establishing due process to protect the access of survivors to their families' land and to settle any land claim issues, as well as minimizing the transfer of land away from smaller farmers, would go a long way toward avoiding a regressive impact on the poor. Developing a policy framework to protect existing land rights, and to expand land use rights where possible, for instance, to allow land to be used as collateral, would do much to speed recovery.

Lastly, those who cannot, or do not want to, return to their villages need to be resettled in a manner that promotes their economic independence and is socially and environmentally sustainable.<sup>10</sup> An open consultative process should be put in place to establish the wishes of affected families and communities with regard to return and resettlement, with a view to providing families with appropriate assistance depending on their aspirations.

## **STRENGTHENING SOCIAL COHESION AND SOCIAL CAPITAL**

### **BUILDING TIES THROUGH PROJECT FORMATION AND IMPLEMENTATION**

The processes by which recovery programs are implemented create opportunities to strengthen inter-group and inter-village ties. If people from different groups within villages work together in selecting, formulating and implementing projects, inter-group social relations can be enhanced. Experience from elsewhere shows that where such arrangements exist, new positive social ties can be created, improving inter-group perceptions and the ability of different groups to work collectively.<sup>11</sup> These processes also operate at the inter-village level. Programs that involve different villages working together (for example, on rehabilitating a shared pond between villages, or a school to be attended by children from multiple villages) can lead to stronger inter-village bonds.

### **USING INDIGENOUS INSTITUTIONS**

As noted above, a range of informal institutions help govern village life. There are a number of reasons why recovery efforts should work with such local institutions. First, if they do not, their programs are likely to be less effective. Local leaders, as representatives of their communities, know more about local needs and cultural norms than any outsider. The analysis suggests that, in most villages, mechanisms of social control restrain local leaders from exploiting their powers and position. This reduces the intrinsic risk of "elite capture" of recovery resources.

Second, failure to work with local informal leaders risks undermining their legitimacy, which may have a number of unplanned impacts. Informal leaders play a vital role in maintaining social cohesion, managing relationships between groups and solving problems in villages. Their legitimacy is, in part, a function of the resources they control, as well as the extent to which they perform their tasks well in the eyes of communities. Channeling recovery resources through other mechanisms, without associating them one way or another, may undermine the powers they have, and the roles they play. This could lead to a backlash, which may prevent the effective and efficient use of aid.

Third, using informal leaders can help ensure community contributions to the recovery effort. Those with strong local legitimacy, such as religious leaders and village elders, can mobilize people within the village in areas such as rehabilitating community assets and helping vulnerable households. Where community members make such contributions, the results of aid tend to be more

<sup>10</sup> See also Annex 8 (Housing).

<sup>11</sup> See, e.g., Barron, Patrick, Rachael Diprose and Michael Woolcock (2006). "Local Conflict and Community Development in Indonesia: Assessing the Impact of the Kecamatan Development Program." Indonesian Social Development Paper No. 10. Jakarta: World Bank.

sustainable.

Using local leaders to help implement recovery aid may also improve the ways they govern. Evidence suggests that strong pressures do exist from communities for aid to be used well. Carefully designed programs that strengthen community demand and the ability of local informal institutions to deliver can do much to enhance relations between those in leadership positions and those not.

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## ANNEX 16: VULNERABLE GROUPS

### SUMMARY

The social welfare system in Myanmar has limitations in the provision of services, due among others, to a shortage of trained social workers. In this context, community based mechanisms provide an important avenue for social welfare activities benefiting women, children, the elderly, disabled, and other vulnerable groups.

The majority of the population affected by Nargis has suffered gravely. As a result, most have become vulnerable, at least temporarily. For children, initial evidence suggests that they may have to drop out of school in some areas if their workloads within the household remain as they are post-Nargis. For women, the disproportionately high female death toll – the majority of those dead (61 percent) is female, with a significantly higher proportion in several severely affected villages – may create special vulnerabilities. Finally, an estimated 700,000 people were displaced by Nargis. While most of them have returned home, those who are still displaced require special attention.

The assessment team recommends a two-pronged recovery strategy addressing the needs of vulnerable groups. First, participatory processes that involve community members in decision-making throughout the project cycle should be expanded to include assistance to vulnerable groups. Second, a complementary system should be reinforced, with skilled social workers, community child protection and development workers, as well as functioning referral mechanisms. A priority intervention responding to both objectives would be to increase the number of professionally trained social workers and conduct further training for NGO social workers.

### PRE-DISASTER SITUATION

For the purposes of this report, vulnerable groups include children (separated, unaccompanied or orphaned), women (including women-headed households), the elderly, chronically sick and disabled, and the displaced.<sup>1</sup> Those who lost documentation may also be in need of special assistance.

*Social welfare mechanisms.* The social welfare system in Myanmar has limitations in the provision of services, due among others, to a shortage of trained social workers. The Ministry of Social Welfare, Relief and Resettlement includes the Department of Social Welfare (DSW) which is mandated to carry out various programmes and services for children, young people, women, disabled people, ex-drug addicts, and older people who are socially and economically disadvantaged. There are DSW representatives at the national and state/divisional levels but not at the district, township or village level, due to a lack of resources. In this context, community based mechanisms provide an important avenue for social welfare activities benefiting women, children, the elderly and disabled.

*Children's rights.* The Child Law mandates the creation of the National Committee on the Rights of the Child (NCRC) to effectively implement the provisions of the law and the Convention on the Rights of the Child.<sup>2</sup> It also provides for the establishment of local Committees on the Rights of the Child at the state or division, district and township levels to provide services for the benefit of children. The work of these Committees is constrained, in part due to a lack of resources.

*The situation of women.* Prior to the cyclone, female headed households in rural areas (including those affected by Cyclone Nargis) comprised nearly 17 percent of the total.<sup>3</sup> The government's report submitted under the Convention on the Elimination of All Forms of Discrimination against Women in 1999 asserts that in Myanmar, women and men are seen to enjoy equal rights.<sup>4</sup> The report lays out the responsibilities and duties that women are expected to perform, stating "in Myanmar society, traditions and customs expect a woman to control the purse, to prepare food, make clothing and look after the children".<sup>5</sup> Such centrally recognized norms and belief systems are important to take into consideration when assessing the impact of Nargis on women in Myanmar society.

1 The situation of the landless and those indebted is reviewed in Annex 15 (Social Impacts).

2 See Government of Myanmar. The Child Law of 1993.

3 UNDP (2006). Household Poverty Assessment.

4 Considerations of reports submitted by States parties under article 18 of the Convention on the Elimination of All Forms of Discrimination against Women, Initial report of States parties, Myanmar, 25 June 1999.

5 Ibid, p.9.



## IMPACT

The majority of the population affected by Nargis has suffered gravely, especially in rural areas. As a result, many have become vulnerable. For some households, this will be a transient state as they re-establish their livelihoods in farming or fishing or as casual labourers over time. Other households have a heightened vulnerability and require targeted, possibly longer-term assistance to overcome the cyclone's impacts.

Many cyclone survivors are in a fragile psychosocial state. Results from the Village Tract Assessment (VTA) survey indicate that approximately 23 percent of those surveyed report having experienced and/or observed psychological problems as a result of the cyclone, 10 percent report having lost at least one family member, and only 8 percent report having access to structures and mechanisms supporting a capacity to cope with the distress associated with Cyclone Nargis. Factors such as these demonstrate the need for holistic and culturally relevant relief and recovery approaches targeting vulnerable groups.

## CHILDREN

Post Nargis, as with many post-disaster situations, the vulnerability of children increases, as does the risk of abuse, violence, exploitation and neglect. Children may have to help contribute to financially supporting the family. With insufficient funds to pay for the costs associated with schooling, they may have to withdraw from schools due to financial constraints and to care for younger siblings while their parents try to earn a living. In a recent survey, 30 percent of children in Dallah are predicting that they will soon have to drop out of school if their workloads within the household remain as they are post-Nargis.<sup>6</sup>

Unaccompanied or separated children<sup>7</sup> are particularly vulnerable groups. Secondary separation is starting to emerge as an issue as caregivers and parents who are struggling to provide for children post-Nargis, are sending their children to the Department of Social Welfare and faith-based institutions for education and shelter.<sup>8</sup> In Dallah, there are cases of parents migrating after the cyclone, leaving children as heads of households and thus increasingly vulnerable.<sup>9</sup>

Children also become vulnerable to exploitative or dangerous forms of labour including becoming live-in child domestic servants, working in the fishing industry, or in some cases being trafficked for labour and sexual exploitation.

## WOMEN<sup>10</sup>

The VTA survey found that the majority of the dead are female. According to assessment data, 61 percent of those dead are female. In some severely affected villages, twice as many women aged 18-60 died as men. It is not yet possible to gauge how this mortality pattern will impact on the vulnerability of women and children in the cyclone-affected areas. If mothers have passed away there will be an additional burden on fathers to care for the emotional needs of the children, and the boys and girls in the household will likely take on increased care responsibilities of their siblings.

Women's vulnerabilities can potentially be exacerbated by several trends we see post-Nargis. The traditional burden of reproductive labour is maintained by women, while they fill the newer "productive" labour gaps left by those men and women who were killed. The burden of care may lead fewer women than men to migrate to find alternate sources of employment, which could lead to a slower economic recovery.

As a predominant group in performing certain tasks (such as transplanting paddy) in the agricultural and non-formal income sectors, women are particularly affected by much reduced job opportunities in the short run, especially in farming and fishing. Desperation for income can lead women to make risky employment decisions, including commercial sex work.

6 Save the Children (2008). Child Protection in Emergency Report, 3 May – 28 June 2008.

7 A separated child is one who is separated from both parents or from his or her previous legal or customary caregiver but not necessarily from other relatives, and may be accompanied by another adult family member. An unaccompanied child is separated from both parents and other relatives and is not being cared for by an adult who, by law or custom, is responsible for him or her.

8 Save the Children (2008), op. cit.

9 ibid

10 See Annex 17 (Gender) for a more thorough analysis of the impacts of Nargis on women.

## THE ELDERLY, CHRONICALLY SICK AND DISABLED

Vulnerabilities of the elderly stem from the fact that they have often spent their lives working and accumulating assets and savings to a point where they can live without working once their physical capacity to do so has diminished. If they have to use their savings to replace housing and other assets, they will have less money for food and other necessary items.

Many families in the most-affected areas lost all their belongings, and any money they may have kept in the house. This loss of savings has a proportionally bigger impact on the prospects for the personal recovery of the elderly. Furthermore, they, as well as the chronically sick and disabled, have greater difficulty accessing aid that is being distributed, and carrying relief items that have been distributed, even if they can access them.

In the absence of a state or employer supported social security, families have been the primary safety net, with children commonly taking care of their parents in old age. The assessment team observed that the social fabric remains strong after Nargis, and the elderly continue to play an important role in village life, much as they have in the past.<sup>11</sup> At the same time, they need to take on the additional responsibility of caring for their grandchildren if they have been orphaned, or if the children's parents move to take up work in another area.

The source of vulnerability for the chronically sick or disabled is similar to the pre-cyclone scenario; they lack the ability, or have only a reduced ability, to contribute to family finances. In the stressed economic situation many families are now experiencing, the sick and disabled become an additional burden. Furthermore, the elderly, chronically sick and disabled have special nutritional and or medical needs that often go unrecognized in an post-crisis emergency context.

## THE DISPLACED

The devastation caused by cyclone Nargis displaced hundreds of thousands of people from their communities and forced them to seek shelter and security elsewhere. During the third week of May, it was estimated that at least 260,000 people were living in camps and informal settlements in schools, monasteries and churches throughout Ayeyarwady and Yangon Divisions. In addition, many people sought shelter with extended family or friends in neighbouring villages or towns, bringing the total number of the displaced at its height to an estimated 700,000 (equivalent to c. 30 percent of the estimated 2.4 million people affected by Nargis).<sup>12</sup>

While most people affected by the cyclone require some kind of assistance, those displaced are among the most vulnerable. Finding themselves in new locations and separated from the social support they are accustomed to in their communities, they may experience such problems as unequal access to assistance, discrimination in aid provision, increased sexual and gender-based violence, loss of documentation and difficulty in replacing it, and issues related to property rights in the rebuilding of their homes.

There are three broad categories of vulnerable persons displaced by the cyclone: (i) people whose displacement is ongoing because they are still in camps or temporary settlements or who are no longer in camps or settlements but cannot return to their communities of origin; (ii) people who cannot return to their communities of origin and have already been relocated; and (iii) people who have successfully returned to their communities of origin.

As of the first week of June, many camps and settlements had been dismantled and people started to return to their communities of origin on a large scale. In Labutta township the camp population had declined from 40,000 to 10,000; in Bogale township all camps were closed. Throughout the township, four transit sites had been established by the government from which people were being encouraged to return to their communities of origin. In Myaung Mya, two sites officially recognized by the government were down from 13,000 to 3,700 people. An estimated 800 people remained in informal settlements. All camps in Pathein township were closed. About 3,000 people had returned to their communities of origin in other townships (mostly Labutta) as Pathein

<sup>11</sup> See Annex 15 (Social Impacts) for a more detailed discussion.

<sup>12</sup> Myanmar Information Management Unit (2008). One of the main challenges in assisting this population group following cyclone Nargis, has been that detailed information about the extent of the displacement, the location of the populations and disaggregated data providing information on gender, age, morbidity profile, ethnic composition and needs of persons displaced by the cyclone are not available.



was not affected by the cyclone. In Mawlamyinegyun township all camps had been closed. In Pyapon township, 37 camps hosting about 17,000 people were being closed. As of the end of June, few camps remain.<sup>13</sup>

The assessment team noted a number of reasons why people left the monasteries, schools and camps to return home. First, the government encouraged such return (see below). Second, villagers appeared to want to return to their homes to restart their livelihoods. This seemed particularly true for farmers, who wanted to be able to restart planting in order to ensure a harvest, and hence food security, in the near future. The insecurity of land use rights, where land can be taken if it is not used productively, also appeared to be a strong driving force behind this. Third, those who remained in villages made tremendous efforts to rebuild houses, meaning that those returning may have somewhere to stay.<sup>14</sup>

For people displaced by the cyclone whose displacement is still ongoing, potential loss of user rights may be a concern and may become an obstacle to recovery (see also above). In some cases the destruction is so severe, or the environment so fragile, that returning to the place of habitual residence may no longer be possible. In these instances, other solutions need to be identified before the return process begins.<sup>15</sup>

### LOSS OF DOCUMENTATION

The loss of documentation during a natural disaster is common and can create considerable problems for individuals and families who depend on support. The loss of birth, marriage and death certificates, personal identification, and education and health certificates which are often necessary to access basic social and health service and for children to attend school, can make it very difficult for people to receive the assistance they are entitled to and need.

Large amounts of documents, often stored in the private residence of the head of the village or village tract Peace and Development Committee (PDC), have been lost during the cyclone. This will affect many villages for a prolonged period of time, until records have been re-established. There is a possibility that the formal fees charged for issuing documents and providing administrative services will increase in order to finance local expenditures related to the post-disaster recovery. There is also a risk that informal fees in cash or in kind may be levied on, for instance, those requiring the urgent re-issuing of documents. Such fees may become a burden on residents and, in particular, make it more difficult for the poor and vulnerable to maintain their rights and access services.

Land and land use registration are especially important for village life. The main responsibility for land allocation and use lies with the village PDC. Where PDC members lost their life and records were destroyed, village elders and oral testimonies can play a vital role in identifying and endorsing claims. Women too can contribute to this process, as in many cases it is they who are the memory banks of a community, as well as important transmitters of cultural values to the next generation.

### RECOVERY EFFORTS TO DATE

A range of activities is being carried out by the government, UN agencies, and non-governmental organizations. In the aftermath of Cyclone Nargis the Department of Social Welfare (DSW) developed a National Plan of Action for Child Protection in Emergencies with technical support from child protection agencies; it is currently being finalized. The DSW has also expressed an interest in developing a similar plan focused specifically on the protection of women.

VTA survey data indicate that approximately 8 percent of the population sampled reported the presence of "special programs," identified by the respondents as schools, day care facilities, and orphanages. As of early July, DSW and the humanitarian community have established 132 child friendly spaces in Ayeyarwady and Yangon Divisions; over 200 more child friendly spaces are planned over the next month and a half. Thirty thousand dignity kits, which comprise under-garments and feminine hygiene products, have been distributed. Community support mechanisms, which focus on psycho-social support, among others, have been developed and are being expanded in the affected

13 Information and statistics collected by the Temporary Settlements Group based on field data submitted by UN agencies and NGOs, May-June 2008; and Myanmar Cyclone Nargis Information Center (2008). "Rapid Assessment of Cyclone Affected Areas in Myanmar". Myanmar Survey Research, 15 May 2008.

14 See Annex 15 (Social Impacts) for an analysis of the impact on land and land use rights.

15 See Annex 8 (Housing) for a discussion of guiding principles for resettlement based on experience with natural disasters and from development projects elsewhere.

areas. Initial feedback from those providing cash benefits to vulnerable groups indicates that such assistance is tremendously useful; the cash is used largely for food, livelihoods, and other immediate needs. These activities have helped encourage a return to normalcy.

The government has provided incentives to those who choose to return to their villages, including free transportation, basic supplies, and promises of future rations. Field work by the assessment team indicates, however, that government aid policies in some areas may be restricting the ability of affected villagers to move to new communities, since they would not receive such assistance if they wanted to settle in another village.

### **RECOVERY NEEDS AND STRATEGY**

*Needs.* Patterns and degrees of vulnerability will change continuously during the recovery period; some families will re-establish their livelihoods while others will relapse into crisis. At the same time, formal social services and safety nets are too weak to cater to the still enormous needs of the vulnerable population groups identified above. Continued support to these groups is, therefore, essential for an extended period of time.

*Strategy.* The assessment team recommends a two-pronged recovery strategy addressing the needs of vulnerable groups.<sup>16</sup> First, experience in Myanmar, as in other post-crisis situations, demonstrates that community based mechanisms provide tremendous support at the local level. Participatory processes that involve community members in decision-making throughout the project cycle should be expanded to include assistance to vulnerable groups. Second, a complementary system should be reinforced, with skilled social workers, community child protection and development workers, as well as functioning referral mechanisms.<sup>17</sup>

A priority intervention responding to both objectives would be to increase the number of professionally trained social workers and conduct further training for NGO social workers, to ensure meaningful community participation, capacity building and awareness raising activities at a community level of social services. This could be achieved through an expansion of the recently opened University Post-Graduate Diploma in Social Work that DSW and Yangon University (Psychology and Law Departments) have developed with UNICEF support.

*Next steps.* There is a need to improve the knowledge base about vulnerable groups. Two activities are particularly urgent: an analysis on the feasibility of scaling up existing small-scale cash grant schemes for vulnerable groups; and the design of a data collection instrument to capture the evolution of vulnerability during the recovery period, to allow for better program design and targeting. Furthermore, there is a need to strengthen technical standards and implementation guidelines for social work.

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<sup>16</sup> See Annex 14 (Livelihoods) and Section 4 (The Way Forward) for a more detailed discussion on options for community-driven recovery.

<sup>17</sup> In a third step, strategic approaches to the social welfare sector should focus on policy development, management and oversight capacity, the quality and quantity of human resources, and better monitoring and information systems.

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## ANNEX 17: GENDER

### SUMMARY

Distinct gender roles for men and women exist at village level, which tend to define the scope and nature of relations between genders. Communal life is also divided by gender, with formal and informal leadership primarily a domain of men. The patterns of distinct gender roles are constant across villages. However, gender roles are dynamic rather than static, and can evolve in response to need and ability.

According to data from the Village Tract Assessment survey, 61 percent of those dead are female, with significantly higher figures in individual villages. This type of demographic change will have significant impacts on the roles of, and relationships between, different genders in many villages and is also likely to have an effect on migration patterns.

Women and men, girls and boys experienced the impacts of Cyclone Nargis differently. As such, the relief and recovery strategy requires recognition that the starting points for women's and men's recovery are not the same, and that specific strategies to enable women's meaningful participation in activities and benefits must be incorporated. The major strategic thrust is to incorporate women's protection issues into all sectors. Women must not be viewed simply as "passive" victims, but rather as a specific group with its own needs, interests, vulnerabilities, capacities, and coping strategies.

### TRADITIONAL GENDER ROLES IN AFFECTED AREAS<sup>1</sup>

Distinct gender roles for men and women exist at village level, which tend to define the scope and nature of relations between genders. The husband is expected to play the major role in income generation and the wife is expected to be the household manager. Even so, women assist in their husband's activities, and often have their own income generating activities, too, while men will take on tasks generally considered as the responsibility of females, but only for a limited time if women are sick or heavily pregnant. Male and female children have equal access to education, although men tend to be better educated. Boys and girls who stay on the farm inherit land user rights equally.

In farming and fishing households, men and women work together by carrying out distinct yet complementary tasks. For instance, men repair boats and nets and cast out and haul in nets while women sort, weigh and dry the fish and sell the catch on the market. Women travel independently by boat around the delta area to sell and trade local produce in other villages and towns. Men and boys are typically responsible for looking after livestock. At the same time, it is common for women to manage production of poultry including ducks, geese and chickens, as well as tend home vegetable gardens which produce much of the family's staple food.

Decision-making in the household is divided by sphere. Joint decisions are made about children's schooling, off-farm work and borrowing. Men make most decisions about farming and fishing activities, while women are responsible for marketing. Women generally control household finances while men control farm expenditures.

Communal life is also divided by gender. Farm-based community activities such as repair and maintenance of irrigation canals and construction of small dams are dominated by men with women participating in fishing-related community activities such as community fish harvesting, seeding fingerlings, and clearing waterweeds from ponds. Men and women share maintenance of village infrastructure such as pagodas, monasteries, and schools. Women handle social activities during religious festivals such as pagoda beautification and cleaning and cooking communal meals.

Formal and informal leadership is primarily a domain of men. The Peace and Development Councils, the primary government body at the township, village tract and village levels, are generally composed of males. It is difficult, but not impossible, for women to join the elders group.

Village Tract Assessment data indicate the presence of self reliance groups in almost half of the sampled villages. These groups have commonly been established for externally-funded development projects. A gender impact study<sup>2</sup> showed that self reliance groups have enabled

1 Baseline data disaggregated along gender lines were limited. Much of the analysis presented here is therefore based on secondary information taken from agency reports, and on field work by the assessment team.

2 Smith, R. (2006). A Hen is Crowning, United Nations Development Programme.

village women to network and share their skills and experiences, play a greater part in household decision making, better understand how to reduce household conflict surrounding the provision of income by establishing their own income earning activities, and build self esteem, self confidence and increased status both in their families and their communities. The worth of these groups has also been increasingly accepted by men, since they see the benefits of good management of these groups in positive economic outcomes and village-oriented projects.

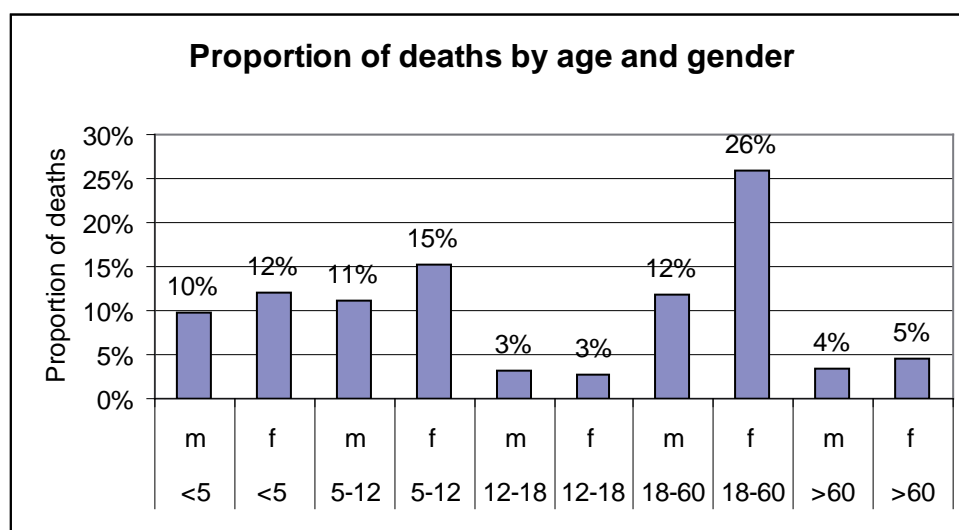
While the patterns of distinct gender roles described above are constant across villages, the experience of, for example, self reliance groups shows that gender roles are dynamic rather than static, and can evolve in response to need and ability. Cyclone response efforts, therefore, would be able to challenge gender norms in order to foster equal participation of women and men, girls and boys.

### NARGIS' IMPACT ON GENDER RELATIONS<sup>3</sup>

According to data from the Village Tract Assessment (VTA), 61 percent of those dead are female. However, this figure can be significantly higher in individual villages.

Figure 1 in the report shows mortality figures among the households in a sample of 10 severely affected villages and illustrates the gender balance of mortality. In the key productive and reproductive age group of 18-60 years old, more than twice as many women died as men in those ten severely affected villages.

Figure 1: Proportion of deaths by age and gender in 10 severely affected villages



Source: Village Tract Assessment

This type of demographic change will have significant impacts on the roles of, and relationships between, different genders in many villages and is also likely to have an effect on migration patterns.

First, men will need to take over some of the roles previously played by women. Second, those women who survived may take on additional tasks. Third, the loss of many women may lead to a spate of remarriages, or early marriages, although this will likely be delayed until villages have recovered enough to be able to expend scarce resources on such celebrations. There may be a need for men to go to other villages or towns to find a wife, which could increase out-migration from severely affected areas or lead to more inter-village marriages. Poor and uncertain conditions make it less likely that men will bring in new wives from outside the Delta region. This will likely affect the social fabric of villages and kinship systems.

<sup>3</sup> See Annex 16 (Vulnerable Groups) for additional information.

Experience from elsewhere indicates that violence, including violence against women, accompanies natural disasters. Prevailing social norms emphasizing control of anger, fairness, and acceptance, will help mitigate this but may not be sufficient. During the VTA survey 23 percent of respondents reported having experienced and/or observed psychological and problems as a result of the cyclone. Psychological distress brings depression and anger. Consequently, psychological support and protection systems for both women and children will be essential components of the relief and recovery effort.

After the disaster, what were previously the main sources of income – agriculture, fishing and small businesses – have been damaged and have left many people without a stable job. There are reported cases of trafficking and recruitment for work in Yangon.<sup>4</sup>

## RECOVERY NEEDS AND INTERVENTIONS

*Needs.* Women and men, girls and boys experienced the impacts of Cyclone Nargis differently. This is a result both of social norms and cultural values which restrict the choices, behaviour and opportunities of women and girls, and limited self-rescue or rehabilitation abilities due to differences in learned skills. As such, the relief and recovery strategy requires recognition that the starting points for women's and men's recovery are not the same, and that specific strategies to enable women's meaningful participation in activities and benefits must be incorporated. A rapid gender analysis of the Nargis assessment data highlights the following gendered impacts and implications for recovery strategies (see Attachment).

*Strategy.* The major strategic thrust is to incorporate women's protection issues into all sectors. Women must not be viewed simply as "passive" victims, but rather as a specific group with its own needs, interests, vulnerabilities, capacities, and coping strategies.<sup>5</sup> The Nargis response should continue to foster an environment promoting non-discriminatory humanitarian assistance, through comprehensive and representative consultation with the affected population. Not only is this good humanitarian practice, it allows for a cathartic, systemic approach to ensuring the community takes ownership of its healing and recovery process.<sup>6</sup>

*Interventions.* In the short-term, the distribution of dignity kits, which contain, among other things, women's sarongs, T-shirts, underwear, soaps, sanitary cloths and multivitamins, should be continued. In the medium-term, a situation analysis of the vulnerability of women and girls should be conducted. Furthermore, it will important to provide psychosocial counselling and socio-economic programmes for vulnerable women and girls and to conduct training for service providers and community-based workers on psychosocial counselling. Possible longer-term options include improving coordination of protection programmes for women by different agencies and continuing to support and create community-based mechanisms for referral to social services.

4 Save the Children, Child Protection in Emergency Report, 3 May – 28 June 2008.

5 "Integrating Gender into Emergency Responses," Bridge Briefings 4.

6 "Protecting Persons Affected by Natural Disasters," IASC Operational Guidelines on Human Rights and Natural Disasters, June 2006.

**Attachment**  
**Gender Analysis of Cyclone Impacts**  
**and Implications for Recovery Strategies**

| Gender Impacts of Nargis  | Possible Social Outcomes   | Implications for Recovery Strategies  |
|---|--|---|
| Women and girls number more amongst the dead and missing  | <ul style="list-style-type: none"> <li>• Men lose their domestic support system to care for children, perform household work.</li> <li>• Decrease in available marriage partners, possible increase in incidence of child-marriage or surviving girls being required to take on responsibility for household duties.</li> </ul>  | <ul style="list-style-type: none"> <li>• Participation mechanisms to assist with child care to enable single parent families to take up recovery work and re-establish their livelihoods</li> <li>• Protection systems for women and older girls to prevent possible abuse</li> <li>• Incorporating coping strategies into capacity building for community groups.</li> <li>• Addressing the causes of the imbalance of deaths in disaster risk recovery programmes.</li> </ul> |
| Increased food prices and decrease in casual labour opportunities<br><br>Increase in power differential between men and women | <ul style="list-style-type: none"> <li>• Increased risk of domestic violence</li> <li>• Increased competition for the paid work that is available</li> <li>• Women and men pushed into increasingly risky occupations including unsafe migration, child labour and sex work.</li> </ul>  | <ul style="list-style-type: none"> <li>• Participation mechanisms to ensure women and men have equal access to paid work</li> <li>• Protection, support and advocacy about gender-based violence, anti-trafficking, other forms of exploitation or abuse of those in extreme poverty.</li> </ul>  |
| Loss of adequate shelter and basic household equipment for cooking, need to go further away for acquire basic food items      | <ul style="list-style-type: none"> <li>• Basic household tasks take longer, involve harder work.</li> <li>• Households are physically less secure in order to protect their few remaining possessions.</li> </ul>  | <ul style="list-style-type: none"> <li>• Rehabilitation of local markets; the supply of goods and basic household equipment will positively impact on time of women and men available for other recovery initiatives, as will return to 'normalcy' in living conditions.</li> <li>• Vigilance in maintaining law and order during this phase.</li> </ul>  |
| The titled users of land have perished in the cyclone   | <ul style="list-style-type: none"> <li>• Land redistribution; possibility of losing land use rights if land is not cultivated.</li> </ul>  | <ul style="list-style-type: none"> <li>• Protection of the interests and user-rights of dependents (wives and widows, children).</li> </ul>   |
| Contaminated water supplies, inadequate or broken sanitation systems  | <ul style="list-style-type: none"> <li>• Possible outbreak of disease, leading to reduced working capacity of adults.</li> <li>• Increased burden of care for the sick; need to travel further away to get clean water has time and energy implications.</li> </ul>  | <ul style="list-style-type: none"> <li>• Rehabilitation of the basic waster supply systems will positively impact on the time availability, particularly women but also men, for recovery and income earning initiatives.</li> </ul>  |
| Loss of a large proportion of the population in some villages   | <ul style="list-style-type: none"> <li>• Previous leaders may have died. Possible opportunity for women to become more actively involved and challenge male-dominated structures.</li> <li>• Local skills base (small artisans, teachers, traders, etc.) severely depleted; opportunity for training survivors in locally required skills, including challenging prevailing gender roles.</li> </ul> | <ul style="list-style-type: none"> <li>• Donors can encourage capacity building activities for women and focus on working with gender balanced community organizations so that recovery reflects the needs and experiences of both men and women.</li> <li>• Provision of skills training should consider trades and crafts for women and men.</li> <li>• Equal pay for men and women.</li> </ul>   |

| Gender Impacts of Nargis                                  | Possible Social Outcomes   | Implications for Recovery Strategies   |
|---|--|--|
| Food is scarce or unaffordable                            | <ul style="list-style-type: none"> <li>• Experience elsewhere indicates that it is most often the women who go without food in order to ensure other members of the family, particularly children, meet their nutritional needs.</li> <li>• When forced to choose families may prioritize nutritional (and educational) needs of boys over girls.</li> </ul>   | <ul style="list-style-type: none"> <li>• Continue with food aid (in cash or in kind) to the poorest of the poor to enable rehabilitation of livelihoods.</li> <li>• Ensure those distributing food, cash and services are female and male.</li> <li>• Vigilance for signs of female malnutrition which will impact on reproductive health but also further limit women's ability to recover through poor health.</li> </ul>  |
| Health infrastructure is damaged and services are limited | <ul style="list-style-type: none"> <li>• Those with a need for ongoing medical care such as the chronically ill, but also women taking contraception and those requiring antenatal care are at risk of rapid deterioration in health, unplanned pregnancy and birth complications, respectively.</li> <li>• Increased risk of maternal and neonatal mortality in the absence of emergency obstetric care.</li> </ul>                                       | <ul style="list-style-type: none"> <li>• Post-crisis health responses to include service packages such as Minimum Initial Services Packages (MISP) designed to prevent excess maternal and neonatal morbidity and mortality, to prevent and manage the consequences of sexual violence, reduce HIV transmission and plan for comprehensive reproductive health services.</li> </ul>  |
| Changes to patterns of settlement and migration           | <ul style="list-style-type: none"> <li>• Reorganisation of families to access care and support; potential for women and orphans to have their rights abused out of need for shelter or financial support.</li> <li>• Movement of men and single women to cities to access income generating work; vulnerability to trafficking, increase in risky occupations.</li> <li>• Newly constructed or reconstructed villages or temporary settlements.</li> </ul> | <ul style="list-style-type: none"> <li>• Ensure support and protection services for members of re-formed households.</li> <li>• Vigilance and advocacy regarding trafficking, risky occupations, and reduced vulnerability to HIV and AIDS or other sexually transmitted diseases; training and support for safe migration/mobility.</li> <li>• In villages/settlements, minimise areas where women or children may be unsafe, i.e. dark or secluded areas.</li> <li>• Ensure safe access to shared resources i.e. latrines, water, fuel and food; private and safe bathing spaces for women and girls.</li> </ul> |



## **ANNEX 18: EARLY RECOVERY**

### **EARLY RECOVERY STRATEGIC FRAMEWORK**

#### **CONTEXT**

This document represents one part of a larger early recovery strategic planning process, which is at this point in time a work in progress. Together with the early recovery strategies of other clusters, this paper will form a comprehensive Early Recovery Strategic Framework. This document describes a common objective and approach to early recovery relevant for all clusters in Myanmar and includes a section called Early Recovery Outputs and Indicators which is specific to the work of the Early Recovery Cluster and Early Recovery section of the revised Humanitarian Appeal. Based on the relevant findings of the PONJA assessment, the early recovery response includes the strategies and priorities developed by other clusters. These priorities are discussed at some length in earlier sections of the PONJA report and are summarized in the matrix provided below.

#### **WHAT IS EARLY RECOVERY?**

Early Recovery is intended to create greater linkage between humanitarian interventions and longer term development in order to provide mutual advantages between relief and development by augmenting humanitarian efforts and addressing the gaps in coverage between humanitarian relief and long-term recovery to enable a smoother transition to long-term development. It aims at addressing needs, gaps and the delivery of relief and recovery assistance to mitigate the loss of lives and livelihoods and to revitalize the capacity of communities to recover from natural disasters such as one like cyclone Nargis. It is multi-dimensional, multi-sectoral and community-based.

Early recovery begins concurrently with the delivery of direct relief assistance focusing on helping people re-establish their lives and to begin 'building back better'. It presents an opportunity to introduce disaster risk reduction in all aspects of recovery, diversifying livelihoods, strengthening community-based organizations and rehabilitating eco-systems.

Early recovery efforts support ongoing spontaneous community initiatives, strengthening the capacity of communities to cope early on in the relief stage and harnesses opportunities to reducing disaster risks. Key objectives that underpin this strategy include:

- i. Moving beyond and foreshortening dependencies on direct relief assistance;
- ii. Providing support to self-help;
- iii. Re-establishing the foundation for longer-term recovery and development;
- iv. Building back better.

#### **COMPONENTS OF EARLY RECOVERY**

Following a common approach, each of the clusters in Myanmar is in the process of developing their own early recovery strategy as it relates to their particular sector or thematic area e.g. Health, Education, Shelter, etc. In so doing, early recovery coordination mechanisms seek to ensure that early recovery interventions are coherent, strive towards common goals, avoid gaps and minimize overlap. Within this process, the Early Recovery Cluster focuses on the areas of early recovery not covered by other clusters, and considered a priority for the collective success of the early recovery effort. This is discussed under the Early Recovery Strategy section below.

#### **EARLY RECOVERY RESPONSE PLAN**

In many parts of the cyclone affected areas in the delta region, humanitarian relief and response efforts are underway. This is likely to remain a priority throughout the monsoon season. At the same time, affected communities are looking for ways to rebuild their lives. Farming communities have begun to resume their agricultural activities during this planting season and those engaged in small and micro enterprises have garnered their resources to restart businesses. Many families have already begun to put together temporary shelters using tarpaulin sheets and local materials. With the assistance of private companies, new houses are being reconstructed. Support from the Government, local civil society organizations, the private sector and international organizations such

as the United Nations and international NGOs have also begun to reach the affected areas and are already having an impact. However, the needs of many have yet to be met.

Within the context of the humanitarian phase, it is intended that early recovery activities will focus on delivering assistance, training and developing risk reduction strategies to generate self-sustaining, locally and nationally owned strategies for recovery over a 12 month period. In response to the findings of the PONJA, priorities in early recovery have been developed across sectoral and thematic clusters to address the needs of communities. These priorities have been discussed in earlier sections of the PONJA Report and are summarized in the table below. They cross-cut and complement the priorities set by the Early Recovery Cluster.

#### SUMMARY OF POST-NARGIS EARLY RECOVERY CROSS SECTORAL PRIORITIES

| CLUSTERS & THEMATIC GROUPS                  | PROPOSED EARLY RECOVERY PRIORITIES   |
|---|--|
| <b>Food Security &amp; Agriculture</b>      | Targeting vulnerable groups: <ul style="list-style-type: none"> <li>• Food security and food self-reliance, re-establishment of household livelihoods' economic security for small-scale farming and fishing communities and landless households;</li> <li>• Resumption of rice cultivation, plantation crops, vegetable cropping and alternative crops such as root crops, pulses, peanuts and other oil crops;</li> <li>• Provision of small ruminant, pigs and poultry rearing as income generation activities, particularly for poor, landless and disadvantaged families (including women- and single-parent household's);</li> <li>• Resumption of fishing and other non-agricultural livelihood activities;</li> <li>• Improved coordination and monitoring.</li> </ul>   |
| <b>Livelihoods</b>                          | As part of a sustainable and integrated livelihoods approach: <ul style="list-style-type: none"> <li>• Restoration of livelihoods through cash, grants and cash for work;</li> <li>• Improved/safer community social infrastructure and housing;</li> <li>• Provision of micro-credit;</li> <li>• Small/medium enterprise development introduced;</li> <li>• Provision of skills training.</li> </ul>  |
| <b>Shelter/Housing</b>                      | <ul style="list-style-type: none"> <li>• Equity in distribution of available resources;</li> <li>• Safer structural improvements and weather protection;</li> <li>• Temporary shelter solutions for vulnerable families who lack skills or resources to rebuild homes;</li> <li>• Shelter support packages to include: construction tools kits; essential building materials at community sites; hands on technical assistance; grants/vouchers for procurement of materials and/or construction activities;</li> <li>• Building back solutions and practices to be developed;</li> <li>• Artisans and builders to be trained in safer construction techniques, including assessment of damages and house location;</li> <li>• Preparedness training for recurring disasters and risk reduction plans at local/national levels (i.e. voluntary shifting of villages from low-lying to elevated/safer areas; constructing safer/more permanent housing; providing safe havens/escape hills, high multipurpose building such as schools, temples, etc);</li> <li>• Provision of flood protection walls and concrete canal lining to water bodies.</li> </ul> |
| <b>Water, Sanitation and Hygiene (WASH)</b> | <b>Water Supply:</b> <ul style="list-style-type: none"> <li>- Treatment and distribution of clean water;</li> <li>- Distribution of water storage containers';</li> <li>- Distribution of chlorine and household treatment chemicals;</li> <li>- Rehabilitation of existing water supply systems;</li> </ul> <b>Sanitation:</b> <ul style="list-style-type: none"> <li>- Gender segregated shared temporary sanitation;</li> <li>- Gender segregated latrines in schools, health and religious institutions;</li> <li>- Awareness raising on safe disposal of human waste;</li> <li>- Rehabilitation of damaged toilets, sewage systems and other sanitation systems.</li> </ul> <b>Hygiene Promotion:</b> <ul style="list-style-type: none"> <li>- Posting key hygiene message in public places;</li> <li>- Training and mobilizing hygiene promoters;</li> <li>- Running cleaning campaigns;</li> <li>- Preparing community action plans;</li> <li>- Monitoring hygiene behaviours.</li> </ul>   |

|                          |  |
|--------------------------|--|
| <b>Vulnerable Groups</b> | <p>Focusing on women, children, the elderly, single-headed and landless household's, the injured and disabled:</p> <ul style="list-style-type: none"> <li>• Decreased family income has meant women often go without food. Meeting the nutritional needs of women is a priority;</li> <li>• Ensuring protection of women and young girls separated from their families leaving them vulnerable to exploitation;</li> <li>• Protecting women from domestic abuse and other forms of violence;</li> <li>• Protecting vulnerable groups, particularly women from taking on risky employment, exposing them to trafficking, and exposure to STI/HIV-AIDS;</li> <li>• Protecting the savings/interests of the elderly who may have lost control over resources or have difficulty in accessing services.</li> </ul>   |
| <b>Health</b>            | <ul style="list-style-type: none"> <li>• Adopting appropriate measures to prevent the outbreak and spread of diseases;</li> <li>• Basic disease surveillance system to be put into place (MoH/WHO);</li> <li>• Provision/restoration of basic health-care services;</li> <li>• Organize mobile teams to provide medical care and support to public health services.</li> </ul>   |
| <b>Environment</b>       | <ul style="list-style-type: none"> <li>• Expand and substantiate preliminary findings on mangrove damage and supplement them with more detailed reviews of surface and groundwater pollution, salinization and waste generation;</li> <li>• Promoting reforestation to replace and rehabilitate the damaged mangroves and ensure that future productivity is not lost, including following components: (i) reforestation cum regeneration of accessible mangrove reserves in the delta, (ii) improve the capacity of all relevant stakeholders in reforestation of mangroves based on scientifically proven approaches, (iii) emphasis on active participation of forest-dependent communities in the reforestation work;</li> <li>• Assistance to the Forest Department to recover basic facilities for it to continue its operations in the cyclone-affected area;</li> <li>• Construction setbacks and mangrove buffer zones ranging from 200 m landward from the mean low tide mark along exposed coasts to 100 m along major river embankments;</li> <li>• Allocation of land (preferably) on higher ground for construction of safe houses/havens from storms;</li> <li>• Early warning system that would give people enough time to evacuate or seek shelter in safe houses.</li> </ul> |

## EARLY RECOVERY STRATEGY

In the aftermath of Cyclone Nargis, the IASC Country Team adopted the cluster approach in order to strengthen its coordinated humanitarian response to the emergency. Eleven clusters were established, including an early recovery coordination mechanism, led by UNDP. Early recovery is coordinated by an Early Recovery Cluster consisting of working groups for thematic areas not covered by other clusters, and at the same time an Early Recovery Network was set up to ensure inter-cluster coordination of early recovery.

While it is vital to provide humanitarian relief to those affected by the cyclone, it is also imperative to sustain the lives that are being saved. Early recovery efforts aim to help people to re-establish their lives and build towards a better future.

Following are the key elements of the Early Recovery Strategy:

- Integrated delivery of assistance at the community level;
- Differentiated package of support for the most vulnerable;
- Combining quick impact activities and long-term sustainable livelihood activities;
- Reducing future disaster risks.

All the humanitarian clusters are planning early recovery activities and at the same time the early recovery cluster is programming for activities not covered by other clusters. It is imperative that various packages of support come together at the community level. For example, training of artisans for the construction of safer houses should address not only risk reduction concerns, but also generate jobs in the construction industry and revitalize micro-enterprises that produce building materials. At the same, this could help improve health and hygiene conditions at the community level.

The impact of the cyclone has been felt differently across various socio-economic groups. Consequently, the capacity to recover is also uneven. Therefore, it is important that recovery

programming at the community level takes into account differential vulnerabilities and capacities. Some of the vulnerable groups (female headed households, orphaned children, single male parent headed households, permanently disabled, the elderly) will require additional assistance not only in the short term, but also community based social safety nets in the longer run. The early recovery assistance at the community level must focus on fostering such social safety nets.

One of the main objectives of early recovery efforts in the Delta region should be revitalizing the village economy through quick impact projects that create jobs and at the same time restore critical community infrastructure and community capacities to create a foundation for longer term development. This is also an opportunity to diversify livelihoods at the local level leading to more resilient local economies.

The Delta region is a high disaster risk region characterized by frequent small and medium-scale natural hazard events. Reducing disaster risk is a cornerstone of the early recovery strategy. This includes not only reducing the risk of mortality or loss of capital assets (shelter and infrastructure), but also minimizing the risk of losses in productive activities at the community level.

### **A COORDINATED APPROACH TO EARLY RECOVERY**

The delivery and coordination capacity of assistance providers and implementing agencies is key to the success of delivering early recovery support. Agencies must be able to demonstrate their presence in the affected areas, and their capacity to deliver against agreed objectives. Delivery capacity will continue to be heavily dependent on access to the affected areas and communities.

Early recovery activities should be closely coordinated within and between agencies and clusters, to maximize their effectiveness, avoid gaps, minimize overlap, and reduce any burden that agency presence may place on communities. Ideally, early recovery initiatives should work to foster cooperation among local authorities and civil society groups, in order to increase the effectiveness and sustainability of local programmes and to increase local participation in the recovery effort. A pragmatic approach must be adopted, however, depending on the operational context.

### **EARLY RECOVERY CLUSTER OUTPUTS AND INDICATORS**

As a multi-dimensional process (as opposed to a sector), early recovery needs to be organized differently from other sector-based groupings. As a common concern it cannot be limited to the work of one cluster. The timeline adopted for the early recovery is in keeping with the Humanitarian Appeal over the period of the next 12 months. The Early Recovery Cluster focuses on the areas of early recovery not covered by other clusters (the Early Recovery Network), and considered a priority for the collective success of the early recovery effort. In Myanmar, those key areas are as follows:

#### **1. NON-AGRICULTURAL LIVELIHOODS**

45 to 55% of rural households are engaged in the agriculture sector; with 90% of those in farming and the remaining 10% in fishing and livestock rearing/raising. Most rural households have homestead gardens, and a substantial number of households are also engaged in trading of agricultural produce. More than 80% of rural households have lost livelihood assets. Restoring their lives requires urgent support through the provision of agricultural inputs, farm tools and implements, poultry stock with feed and vaccination, and small fishing boats and nets. These assistance requirements are spelt out by the Agriculture Cluster.

Households engaged in non-agricultural activities and other off-farm activities - as well as those landless poor relying on wage labour on agricultural lands - require early access to cash income-generating opportunities. Immediate support needs to be provided for integrated livelihood projects to enhance the capacity of cyclone-affected communities to improve their economic status and stimulate local market and economies. Livelihoods support during the early recovery effort will focus on providing quick access to public work schemes and training. Special attention will be paid to vulnerable categories of the cyclone-affected population, such as single-headed households (either widows, widowers or those with absent men who are likely seeking work), those living with HIV, and the disabled.

Proposed interventions:

- Implementation of emergency public work schemes (debris clearance, rehabilitation of community infrastructure);
- Provision of capital funds to self-reliance and livelihood groups to meet the urgent need for cash of members who have lost savings.
- Delivery of community-based training programmes to help develop skills and create employment opportunities for the most socially and economically disadvantaged groups, in particular rural women, those living with HIV and people with disabilities;
- Revival and recapitalization of micro-finance schemes and self-reliance groups to support small-scale business opportunities;
- Support for new investment opportunities, by diversifying income, possibly through public-private partnerships (subject to feasibility assessments); or
- Rapid assessment of markets at township level to determine areas of support.

Proposed indicators:

- Livelihoods of x number of households in x number of villages restored and strengthened;
- X number of business management trainings conducted; or
- Cash for work activities implemented in x number of villages providing x person days of labour.

## 2. SOCIAL RECOVERY

Capacity building, targeting social recovery at the community level, is key to the achievement of recovery in this area. Social recovery will be promoted through working to revitalize and empower local communities by encouraging and supporting civil society organizations - including national NGOs, community-based organizations, women's groups and other self-help groups - and strengthening the links between these groups and local authorities. Recognizing that in many cases, existing community-based organizations have led the recovery effort so far, a concerted effort will be made to support these existing structures, and/or create a conducive environment for new community-based organizations to emerge as needed.

Community involvement in the restoration effort, through the repair or reconstruction of homes, schools, and other social structures, may help people to return to a sense of normalcy; as well as ensuring that the restored infrastructure meets their actual needs. Psycho-social support will be provided to help communities, particularly the most vulnerable groups, to recover from the loss of family members and the breakdown of social networks.

Proposed interventions:

- Assess the capacity and representativeness of existing community-based organizations and provide support for them as required;
- Where those organizations don't exist, or are inappropriate for external support, mobilize communities to develop their own self-help groups;
- Strengthen women's networks to encourage and facilitate their involvement in decision-making processes related to post-cyclone recovery, including project management guidance, sector-specific technical training, and advice and support on developing accountable structures;
- Organize village-level disaster recovery committees;
- Provide advice and support to households who will not be able to return to their places of origin, as well as to agencies working with those populations in target areas;
- Provide psycho-social support, within existing or new community-based organizations, for those distressed by the cyclone and its after-effects;
- Establish community feed-back mechanisms that allow communities to voice their concerns, and link them with those organizations responsible for responding to complaints.

Proposed indicators:

- Information and data available to x number of communities on forthcoming and ongoing early recovery interventions;
- Training of x number of civil society groups in preparedness and early warning; or
- Percentage or number of community-based organizations integrated into township or village-based recovery plans.

### 3. COMMUNITY INFRASTRUCTURE

Community infrastructure will be repaired in order to increase access for community mobility, facilitate the movement of goods and people to markets, and to allow for improved access for humanitarian and recovery partners to deliver assistance. Cash for work activities will provide immediate labour for urgent repairs and facilitate rapid income generation. Using small-scale contractors to work on minor roads and associated structures (bridges, culverts, drainage-channels, small link roads, and dirt tracks) is intended to generate a multiplier effect for the local community - linking employment-intensive techniques with local resources.

#### Proposed interventions:

- Clearance of debris;
- Rapid assessment of damage to community buildings and spaces;
- Repair of minor village infrastructure such as jetties and footpaths; or
- Repair of link roads through local contractors to restore inter-village access.

#### Proposed indicators:

- Community buildings restored and strengthened in x number of villages;
- Volunteers in x number of villages trained in maintaining village water supply systems; or
- Establish or re-establish safer social infrastructures, such as community resource centres, in x number of villages.

### 4. ENVIRONMENT

Environmental resources directly underpin the livelihoods of poor people in Myanmar. Pre-existing environmental damage has been exacerbated by the cyclone, while other challenges have appeared as a result of the disaster. A unified effort is needed to improve assist the environment to recover so as to become a sustainable basis for community livelihoods.

A comprehensive post-cyclone environmental assessment would be a valuable first step in determining the extent of environmental damage caused by the cyclone. Of particular interest is the damage to mangrove vegetation, salinity intrusion into freshwater resources, changes in delta hydrology caused by the flooding, and impact on soil quality due to salt water intrusion. It is also anticipated that community recovery efforts will have their own ecological impact on the region and beyond. For example, timber needed for reconstruction may come from the mangrove vegetation and/or from forestry inland, and may be harvested in an unsustainable manner. Immediate support is required to help communities and agencies minimize the environmental footprint of their early recovery actions.

#### Proposed interventions:

- Assist local communities in sustainable early recovery to minimize ecological damage;
- Create an 'environmental help-desk' for agencies implementing large-scale projects in the Delta which may have un-intended environmental consequences;
- Scientific assessment of the eco-system services provided by the mangroves, including disaster risk reduction, to provide an evidence base for future advocacy efforts; or
- Comprehensive post-disaster environmental assessment of cyclone Nargis.

#### Proposed indicators:

- Number of communities trained in sustainable early recovery interventions;
- Number of early recovery projects screened for their environmental impacts; or



- Number of communities provided with on the spot advice on disaster waste management.

## **5. DISASTER RISK REDUCTION (DRR)**

Disaster risk reduction (DRR) measures need to be incorporated into the work of all clusters/sectors. Specific DRR measures within the context of this strategy are also needed to strengthen the capacity of communities to withstand and deal with the after-effects of future natural disasters. A first step will involve identifying and targeting community groups and civil society organizations in at-risk communities in order to initiate community-level capacity-building activities. Measures will also be introduced to incorporate disaster risk reduction in early recovery efforts, promoting the notion of 'build back better' for the housing sector, settlement planning, infrastructure, health and education facilities, water and sanitation, and livelihoods.

### Proposed interventions:

- Establishment of village disaster preparedness committees;
- Identification of community resources for disaster response such as emergency shelters and equipment;
- Training of masons on hazard resistant constructions;
- Development and dissemination of guidelines for DRR across all sectors; or
- Training for school teachers to raise awareness of children about disaster risks and disaster preparedness;

### Proposed indicators:

- Number of communities representatives trained in disaster response and early-warning systems; or
- Community resources for disaster response identified in x number of villages.

## **EARLY RECOVERY PROCESSES**

### **CROSS-CUTTING ISSUES**

Key cross-cutting issues for early recovery include gender, HIV/AIDS, environment, disability and Disaster Risk Reduction (DRR). Early recovery presents a unique possibility to shape the agenda for longer-term recovery and development. Effectively addressing cross-cutting issues from the start thereby presents an opportunity to promote and strengthen equity and equality for all, avoiding marginalization of certain groups or creation of new sources of risk. It also provides an opportunity to forge links between programmes and agencies.

### **LINKAGES WITH OTHER CLUSTERS**

This strategy, together with the early recovery interventions of other clusters mentioned in earlier sections of the PONJA, is one part of an overall package of early recovery assistance for the cyclone-affected population. It represents part of an integrated and multi-sectoral approach to early recovery. As a next step, an Early Recovery Action Plan will be developed, which will map out the implementation of early recovery through a series of concrete, inter-linked programmes and activities. The Action Plan will be costed and prioritized, identifying the agency responsible for implementation, and providing targets and indicators for monitoring and follow-up.

## **MONITORING**

The Early Recovery Cluster and Network will put in place a system to monitor and evaluate performance against agreed early recovery objectives. The Monitoring and Evaluation (M&E) system will be community-based, involving inclusive local-level consultations, to allow communities to feed back on the support that is being provided and adjust priorities according to their actual needs.



**ANNEX 19: DATA ANNEX TO THE NATIONAL RESPONSE**

Data provided by the Myanmar Government in conjunction with section 5.1. 'The National Response'.

**TABLE SHOWING DEAD AND MISSING PERSONS  
BY DIVISION AND TOWNSHIP (ANNEX 1)**

| <b>Sr.No</b>               | <b>Township</b>   | <b>Dead</b>  | <b>Missing</b> |
|----------------------------|-------------------|--------------|----------------|
| <b>Ayeyarwady Division</b> |                   |              |                |
| 1                          | Napudaw           | 4178         | 10             |
| 2                          | Labutta           | 33344        | 48464          |
| 3                          | Mawgyun           | 5250         | 2127           |
| 4                          | Phyarpone         | 1258         | 10             |
| 5                          | Bogale            | 34744        | 3198           |
| 6                          | Kyeik Latt        | 12           | -              |
| 7                          | Dadeye`           | 4111         | 19             |
| <b>Sub-total</b>           |                   | <b>82897</b> | <b>53828</b>   |
| <b>Yangon Division</b>     |                   |              |                |
| 8                          | Thanlynn          | 3            | 7              |
| 9                          | Kyauktan          | 13           | -              |
| 10                         | Kayan             | 1            | -              |
| 11                         | Thone Kwa         | 6            | -              |
| 12                         | Twantay           | 25           | -              |
| 13                         | Kawhmu            | 130          | -              |
| 14                         | Kungyangon        | 1446         | -              |
| 15                         | Dala              | 14           | 1              |
| 16                         | Seikkyi Kanaungto | 2            | -              |
| <b>Sub-total</b>           |                   | <b>1640</b>  | <b>8</b>       |
| <b>Grand Total</b>         |                   | <b>84537</b> | <b>53836</b>   |

**ANNEX (2A) PROVISION OF INPUTS(CROP SUB-SECTOR) TO THE AFFECTED AREAS**

| Sr.No        | Particular      | Division               | Distributed Qty. | Cost (US\$ million) | % Distributed | Remark      |
|--------------|-----------------|------------------------|------------------|---------------------|---------------|-------------|
| 1            | Paddy seeds     | Ayeyarwady             | 23205 MT.        | 5.8                 | 71%           | 7 townships |
| 2            | Paddy seeds     | Yangon                 | 4024 MT.         | 1                   | 88%           | 6 townships |
| 3            | Vegetable seeds | Ayeyarwady             | 2094 kg          | 0.0008              | 100%          | -           |
| 4            | Vegetable seeds | Yangon                 | 306 kg           | 0.0001              | 100%          | -           |
| 5            | Power Tiller    | Ayeyarwady +<br>Yangon | 6708 nos.        | 2.08                | 67%           | -           |
| <b>Total</b> |                 |                        |                  | <b>8.8809</b>       |               |             |

**ANNEX (2B ) PROGRESS OF LAND PREPARATION IN THE AFFECTED AREAS**

| Sr.No        | Division   | Township         | Completed Area (ha.) |
|--------------|------------|------------------|----------------------|
| 1            | Ayeyarwady | Ngapudaw         | 24611                |
| 2            | Ayeyarwady | Labutta          | 30524                |
| 3            | Ayeyarwady | Mawlamyaing Kyun | 39952                |
| 4            | Ayeyarwady | Bogalay          | 32155                |
| 5            | Ayeyarwady | Phyarpone        | 20045                |
| 6            | Ayeyarwady | Kyaik Latt       | 30235                |
| 7            | Ayeyarwady | Dadeye`          | 41998                |
| 8            | Yangon     | Kungyangon       | 22016                |
| 9            | Yangon     | Kawhmu           | 19931                |
| 10           | Yangon     | Kyauktan         | 61227                |
| <b>Total</b> |            |                  | <b>322694</b>        |

Note : Land Prepration : Planned area 764675 ha. Completed Area 322694 ha. Completed Percentage 42.20%

**ANNEX (3A)****DAILY HEALTH CARE ACTIVITIES FOR THE VICTIMS OF CYCLONE NARGIS IN  
YANGON DIVISION BY MINISTRY OF HEALTH**

| Date                 | OPD Hosp | OPD Camp | OPD Total | Inpatient | Diarrhea | Referral |
|----------------------|----------|----------|-----------|-----------|----------|----------|
| 6-5-08 to<br>30-6-08 | 36,413   | 80,686   | 117,099   | 9,468     | 4,590    | 139      |

**Daily Health Care Activities for the victims of Cyclone Nargis in  
Ayeyawaddy Division by Ministry of Health**

| Date                 | OPD Hosp | OPD Camp | OPD Total | Inpatient | Diarrhea | Referral |
|----------------------|----------|----------|-----------|-----------|----------|----------|
| 6-5-08 to<br>30-6-08 | 56,448   | 143,920  | 201,467   | 35,431    | 6,284    | 231      |

**Number of persons treated by Traditional Medicine professionals**

| Date                  | Yangon Division | Ayeyawaddy Division |
|-----------------------|-----------------|---------------------|
| 20-5-08 to<br>30-6-08 | 85,163          | 40,684              |

**Floating hospitals for victims of cyclone Nargis living along the sea  
coast, streams and creeks in the Ayeyawaddy division**

| Date                  | OPD    | Diarrhoea | Referral |
|-----------------------|--------|-----------|----------|
| 20-5-08 to<br>30-6-08 | 44,988 | 767       | 45       |

**ANNEX (3B) MINISTRY OF HEALTH****(1) Financial Support for Transportation**

| Sr.No        | Responsible Section                             | Response Activities   | Date                            | Kyats in Million |
|--------------|---|---|---------------------------------|------------------|
| 1            | Administration section,<br>Department of Health | - Transportation cost for hiring motor vehicles for field trips of specialist teams | (3-5-2008)<br>to<br>(30-6-2008) | 23.6             |
|              |   | - Fuel cost for traveling local and outside Yangon                                  | "                               | 3.3              |
| 2            | Public Health Teams                             | - Fuel cost for Nargis emergency relief activities by public health teams           | "                               | 49.07            |
| 3            | Traditional Medicine                            | - Transportation cost for hiring motor vehicles and ship                            | "                               | 18.6             |
| 4            | Department of Medical Research(LM)              | - Hiring motor boats and fuel cost  | "                               | 1.8              |
| 5            | University of Public Health                     | - Hiring of car and fuel  | "                               | 0.81             |
| 6            | Central Medical Store Depot                     | - Transportation fees   | "                               | 3.1              |
| <b>Total</b> |   |   |                                 | <b>100.28</b>    |

**(2) Financial Support for Human Resource**

| Sr.No        | Responsible Section        | Response Activities   | Date                            | Kyats in Million |
|--------------|----------------------------|---|---------------------------------|------------------|
| 1            | Ministry of Health         | Per-diem for health personnel (1523) persons from medical teams and public health teams | (3-5-2008)<br>to<br>(30-6-2008) | 115.1            |
| 2            | CMSD                       | Labour charges/ over time fees  | "                               | 2.5              |
| 3            | Traditional Medicine       | Per-diem for 88 health personnel  | "                               | 11.9             |
| 4            | National Malaria Programme | Daily allowance for field officers  | "                               | 4                |
| 5            | DMR                        | Daily allowance for health professional   | "                               | 0.9              |
| 6            | UOPH                       | Daily allowance for health professional   | "                               | 1.02             |
| <b>Total</b> |                            |   |                                 | <b>135.42</b>    |

**ANNEX (4A) MINISTRY OF FORESTRY'S ITEMIZED CONTRIBUTION FOR THE RECONSTRUCTION  
ACTIVITIES OF CYCLONE DAMAGED AREAS**

| Sr. | Rehabilitation Activities   | Sawn Timber (Cu. Ton) | Price              |                    | Govt. Subsidization (Ks) |
|-----|---|-----------------------|--------------------|--------------------|--------------------------|
|     |   |                       | Actual Value (Ks)  | Offered Price (Ks) |                          |
| 1   | <b>Yangon Division</b><br>special sale of sawn timber for reconstruction of towns / villages    | 1318.7                | 292751400          | 52748000           | 240003400                |
| 2   | construction of Economy Housing   | 5708.7                | 1267176000         | 228320000          | 1038856000               |
| 3   | reconstruction of schools, hospitals and religious buildings                                    | 2784.5                | 618159000          | 111380000          | 506779000                |
| 4   | reconstruction of Govt. Buildings   | 3650.1                | 810322200          | 146004000          | 664318200                |
| 1   | <b>Ayeyawady Division</b><br>special sale of sawn timber for reconstruction of towns / villages | 3547.0                | 787434000          | 141880000          | 645554000                |
| 2   | construction of Economy Housing   | 83845.0               | 18613590000        | 3353800000         | 15259790000              |
| 3   | reconstruction of schools, hospitals and religious buildings                                    | 1050.0                | 233100000          | 42000000           | 191100000                |
|     | <b>Total</b>  | <b>101904.0</b>       | <b>22622532600</b> | <b>4076132000</b>  | <b>18546400600</b>       |

*Note. Actual production cost for 1 ton of sawn timber is 222,000 Ks., but Govt. of Myanmar sale in special price of 40,000 Ks.*

**ANNEX (4B) MINISTRY OF FORESTRY'S ITEMIZED CONTRIBUTION FOR THE RECONSTRUCTION  
ACTIVITIES OF CYCLONE DAMAGED AREAS  
(DISTRIBUTION OF LOGS)**

(Kyats)

| Sr. | State/Division | Reconstruction Activities             | Distribution (Cu. Ton) | Price/Cu. Ton | Amount            | Govt. Subsidization |
|-----|----------------|---------------------------------------|------------------------|---------------|-------------------|---------------------|
| 1   | Yangon         | School/Hospital/ Religious buildings  | 2500                   | 97000         | 242500000         | -                   |
| 2   | Ayeyawady      | School/ Hospital/ Religious Buildings | 6500                   | 97000         | 630500000         | -                   |
| 3   | Ayeyawady      | Fishing Boats                         | 8200                   | 97000         | 795400000         | -                   |
|     | <b>Total</b>   |                                       | <b>17200</b>           |               | <b>1668400000</b> |                     |

**ANNEX (5) DAMAGES IN EDUCATION SECTOR BY SCHOOL TYPE AND LOCATION**

|  | Number of<br>School | Damaged/<br>Destroyed |
|--|---------------------|-----------------------|
| <b>Public Education</b>                                  |                     |                       |
| Totally or partially damaged schools                     |                     | 39,214                |
| Roof damaged schools                                     |                     | 10,859                |
| Furniture, equipment and learning materials              |                     | 13,766                |
| <b>Monastic Education</b>                                |                     |                       |
| Partially damaged schools                                | 308                 | 1,331                 |
| Furniture and learning materials                         |                     | 345                   |
| <b>Early childhood, Youth and Adult Literacy Centers</b> |                     |                       |
| Partially or totally damaged public Institutions         | 310                 | 828                   |
| Furniture and learning materials                         |                     | 132                   |
| Partially or totally damaged private Institutions        |                     | 1,415                 |
| Furniture and learning materials                         |                     | 734                   |
| <b>Higher Education</b>                                  |                     |                       |
| Roof damaged universities/offices                        | 537                 | 4,431                 |
| Furniture, equipment and learning materials              |                     | 277                   |
| <b>Administrative Offices</b>                            | 31                  | 544                   |
| <b>Primary schools</b>                                   |                     |                       |
| Totally or partially damaged schools                     | 1778                | 33,663                |
| Roof damaged schools                                     | 1685                | 9,007                 |
| Furniture, equipment and learning materials              |                     | 11,216                |
| <b>Middle school</b>                                     |                     |                       |
| Totally or partially damaged schools                     | 166                 | 3,117                 |
| Roof damaged schools                                     | 167                 | 886                   |
| Furniture, equipment and learning materials              |                     | 1,332                 |
| <b>High schools</b>                                      |                     |                       |
| Totally or partially damaged schools                     | 129                 | 2,433                 |
| Roof damaged schools                                     | 181                 | 967                   |
| Furniture, equipment and learning materials              |                     | 1,218                 |
| <b>Grand Total</b>                                       |                     | <b>137,715</b>        |

**ANNEX 20: TRIPARTITE CORE GROUP****1ST PRESS RELEASE OF TRIPARTITE CORE GROUP****YANGON, MYANMAR, 24 JUNE 2008**

1. The Tripartite Core Group (TCG) was formed after the 19 May 2008 Special Association of Southeast Asian Nations (ASEAN) Foreign Ministerial Meeting in Singapore, and the 25 May 2008 ASEAN-United Nations International Pledging Conference in Yangon, Union of Myanmar. The aim of the TCG is to act as an ASEAN-led mechanism to facilitate trust, confidence and cooperation between Myanmar and the international community in the urgent humanitarian relief and recovery work after Cyclone Nargis hit Myanmar (2 to 3 May 2008).

2. The TCG comprises 3 members from the Myanmar Government: (Deputy Foreign Minister U Kyaw Thu who is the Chairman, Acting Director-General, Ministry of Social Welfare and Resettlement U Aung Tun Khaing, and Deputy Director-General, Ministry of Agriculture and Irrigation U Than Aye), 3 members from ASEAN (Singapore's Ambassador to Myanmar Mr Robert H K Chua, Dr Puji Pujiono, a senior UNDP officer seconded to the ASEAN Secretariat, and Ms Adelina Kamal, Assistant Director of the ASEAN Secretariat) and 3 from the UN (UN Humanitarian Coordinator Mr Daniel Baker, UN Resident Coordinator Mr Bishow Parajuli and a rotating UN agency Representative). The TCG started its work on 31 May 2008 and has been meeting at least once a week and sometimes more often, in a spirit of mutual understanding, trust and cooperation. It has been working closely with the National Disaster Preparedness Central Committee chaired by His Excellency Prime Minister General Thein Sein, Union of Myanmar. The TCG has successfully completed the following operational tasks:

- i. Fulfilling the commitment of His Excellency Senior General Than Shwe, Chairman of State Peace and Development Council to His Excellency Ban Ki-Moon, Secretary-General of the United Nations, that visas for UN and foreign aid workers would be given and their access to cyclone-affected areas would be allowed. Requests for visas, visa extensions and permits to travel are now channeled through the TCG for rapid facilitation.
- ii. Since 2 June 2008, the entry and deployment in Yangon and Ayeyarwady Divisions of the 10 commercial helicopters contracted by the World Food Programme. These helicopters played a key role in the deployment of the Post-Nargis Joint Assessment Teams in the Ayeyarwady Division (Delta) from 11 to 20 June 2008. They are now flying daily flights to provide humanitarian relief supplies in the cyclone-affected areas.
- iii. The successful completion of the Post-Nargis Joint Assessment (PONJA) Teams in Ayeyarwady Division (Delta) and Yangon Division from 11 June to 20 June 2008. 350 officials and volunteers from the Myanmar Government, ASEAN and UN supported by the World Bank, Asian Development Bank, and both local and international NGOs were trained from 2 to 3 June 2008 in the established data gathering templates of the Village Tract Assessment (VTA) used by the UN, and the Damage and Loss Assessment (DaLA) used by the World Bank and Asian Development Bank. 85 DaLA members, and 245 VTA members, supported by 20 members in the coordinating office in Yangon were subsequently deployed. Advance teams were sent to Labutta and Pyapon, two severely affected townships in the Ayeyarwady Division (Delta) to test the assessment questionnaires from 4 June to 7 June 2008. The data collected by the PONJA teams from 380 villages will lead to a credible and independent damage assessment report, as mandated by the 25 May 2008 ASEAN-United Nations International Pledging Conference in Yangon. This will allow donors to fulfill their pledge commitments to the cyclone victims and help in the recovery and reconstruction. The PONJA report will be published in Yangon and submitted to the ASEAN Foreign Ministerial Meeting (20-21 July 2008) in Singapore. It will also provide inputs to the UN's revised Humanitarian Flash Appeal in July 2008 in New York for post-Nargis emergency and early recovery efforts.

3. The TCG, representing the Myanmar Government, ASEAN and the UN, continues to work in a spirit of mutual understanding, trust and cooperation to address pressing issues such as the implementation of the new Guiding Principles on the work of the UN and INGOs, and the continuing work of post-Nargis relief, recovery and reconstruction.

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**2ND PRESS RELEASE OF THE TRIPARTITE CORE GROUP****"FURTHER INROAD TO RELIEF AND EARLY RECOVERY FOR VICTIMS OF CYCLONE NARGIS"****YANGON, 2 JULY 2008**

The Tripartite Core Group (TCG) of ASEAN, Government of the Union of Myanmar, and the United Nations has been meeting regularly to monitor, coordinate and facilitate the flow of international relief aid into the cyclone-hit areas.

On 25 June 2008 in Yangon, the TCG presented to the 3rd Meeting of the ASEAN Humanitarian Task Force the first stage of the Post-Nargis Joint Assessment (PONJA). "The PONJA was conducted jointly by TCG components and partners to assess comprehensively all sectors through unimpeded access to more than 300 villages throughout the Delta. Rigorous protocols and methodologies were implemented to ascertain that the assessment stands up to both scientific and international standards", explained Dr. Puji Pujiono in his report to the Task Force. More than 300 people from international aid agencies, government officials, Red Cross Movement, INGO and NGO members of the Inter-Agency Standing Committee, and volunteers took part in the exercise.

In his opening remarks, Dr. Surin Pitsuwan, Chairman of the Task Force and Secretary-General of ASEAN stated that the exercise will be the basis for further cooperation and collaboration. "We want to ensure that the conditions and reservations expressed by the representatives of 51 countries, the international institutions, international NGOs who attended the ASEAN-UN International Pledging Conference on 25 May 2008 in Yangon – issues related to transparency, accessibility and the issue of reaching the affected people – are addressed through this community-based assessment", Dr. Surin said.

UN Humanitarian Coordinator, Mr. Daniel Baker said, "The preliminary findings provide us with the impetus to intensify our ongoing relief and early recovery efforts. The findings will provide critical inputs to the Appeal Revision scheduled to be released both in the UN in New York and Geneva on 10 July". The full report is to be released by the ASEAN Foreign Ministers in Singapore on 20 – 21 July 2008.

In the past week, the TCG learnt that swift action taken by the Ministry of Health of Myanmar with the support of the United Nations, ASEAN, the Red Cross, and international/national NGOs has prevented mass outbreak of disease that was feared after the cyclone. Ten medical teams from ASEAN and other countries participated in a Medical Missions Feedback Workshop, held in Yangon on 23 June 2008, to provide feedback to the Myanmar Minister of Health, ASEAN and the WHO/Health Cluster.

Subsequently, in the ASEAN Roundtable, also held in Yangon on 24 June 2008, the TCG members noted experiences of ASEAN and neighbouring countries in post-disaster response and recovery as presented by experts. Heru Prasetyo of Tsunami Rehabilitation and Reconstruction for Aceh and Nias, Indonesia, was optimistic. "Judging the progress at the eighth week so far, the TCG efforts in managing response and preparing the recovery has placed Myanmar Nargis in much more advanced stage compared to Aceh Tsunami then. No doubt, the journey to recovery will be uphill and arduous", he said. Other experts from Thailand, Bangladesh and Pakistan also shared their experiences and lessons learnt. Views and ways forward for the relief and early recovery efforts and future programme were also discussed.

ASEAN Secretary-General Dr. Surin Pitsuwan and UN Under Secretary-General/ UNESCAP Executive Secretary Noelleen Heyzer, accompanied by the TCG Chairman and members from ASEAN and the UN, visited the Ayeyarwady (Irrawaddy) Delta on 26 June 2008 to witness the relief and early recovery efforts. For the first time, media community from ASEAN countries were invited to see for themselves the continuing relief work from the Government, private individuals, and the international community. Deputy Foreign Minister and TCG Chairman U Kyaw Thu explained to the media, "The Government is currently focusing on quickly providing low-cost housing and temporary school buildings for the cyclone-affected communities. Business community, religious institutions and private donors have been extending generous support to this effort".

From 9 to 30 June 2008, the TCG has authorised entry visas and extension of stay permits to 294 officials and individuals coming to Myanmar for extending assistance to Cyclone Nargis. With the

support of the TCG, the humanitarian community has been able to expand assistance to the victims of the cyclone. With the additional capacity that has been deployed to the Delta facilitated by the TCG, as well as the support provided for the transit of relief items into Myanmar and down into the Delta, assistance efforts have reached over 1.3 million people.

The TCG welcomed Singapore's donation of Ground Handling Equipment on 26 June 2008. "The equipment will enable the ground handling of larger planes and speed up the unloading and delivery of international relief supplies from the donor community at Yangon International Airport", said Singapore's Ambassador to Myanmar, Mr. Robert H K Chua.

**ISSUED IN YANGON, MYANMAR  
2 JULY 2008**

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## ANNEX 21: DISASTER RISK MANAGEMENT

### MYANMAR'S VULNERABILITY TO NATURAL HAZARDS AND CLIMATE CHANGE

#### HISTORICAL HAZARD RISK PROFILE

Myanmar is exposed to a range of frequently occurring hydro-meteorological and less frequent geophysical hazards. Its coastal regions are exposed to cyclones, tropical storms/storm surges, and tsunamis. Rainfall-induced flooding is a recurring phenomenon across the country. The whole country is at risk from earthquakes, droughts, and fires, while the country's hilly regions are also exposed to landslide risks. Less frequent events include tornadoes, thunderstorms and heat waves. Historical data indicates that between 1996 and 2005, urban fires constituted about 70% of disaster events, followed by floods (11%), storms (10%) and others (9%) including earthquakes, tsunami and landslides. In the 1910-2000 period, there were at least 14 major windstorms, 6 earthquakes, and 12 major floods.

#### HAZARD EXPOSURE IN THE DELTA REGION

**Cyclones:** There are two tropical storm seasons in the Bay of Bengal and the Andaman Sea that affect Myanmar – April to May and October to December. Tropical storms are often accompanied by storm surges. Although the Rakhine coast and the Ayeyarwady coasts are most threatened by storm surges, the coast of the Delta and of Mon State are also exposed. Over the last sixty years, 11 severe tropical cyclones have made landfall in Myanmar, of which only two have made landfall in the Delta region. Cyclone Nargis, rated as one of the deadliest cyclones of all time, was the first tropical cyclone to strike the country since Cyclone Mala made landfall in 2006.

**Floods:** The cyclone-affected region of Myanmar is also highly exposed to flooding. Most of the region receives more than 400 cm rainfall annually. Concentrated spells of rain during the monsoon season cause floods in the Chindwin, Ayeyarwady, Thanlwin and Sittaung river basins. In the Delta region, when high rainfall is accompanied by high tide in the seas, extended periods of flooding are experienced in many settlements.

**Fires:** Although not an entirely "natural" hazard, fire incidents very frequently occur in the region, attributable mainly to prevalent housing patterns (dry thatch roofed houses) and local practices of in-door cooking on wood fired stoves.

**Tsunamis:** There is a recorded history of 11 tsunami events affecting the northeastern shores of the Indian Ocean (Bay of Bengal and the Andaman Sea) over the last 250 years. The Indian Ocean tsunami of December 2004 left more than 60 people dead and more than 2,500 homeless in Myanmar's coastal areas.

#### PROJECTED IMPACTS OF CLIMATE CHANGE

Current literature on the impacts of climate change on Myanmar is quite limited. The country has not yet completed the preparation of its National Adaptation Plan of Action to respond to climate change threats. However, there appear to be some emerging climate change trends that were recently presented in the form of initial (unpublished) research findings by DMH at the recent ADPC-DMH Monsoon Forum. These include, firstly, a gradual warming, over the last 40 years, in the Bay of Bengal region close to Ayeyarwady delta. Secondly, over the last 40 years, the monsoon trough that forms around the onset of the monsoon in the Bay of Bengal has gradually moved southwards, from 20 degree N to 10 degree N near the Ayeyarwady Delta coast.

These oceanic and atmospheric processes need to be studied in a comprehensive manner to ascertain whether they represent a long-range cyclical process or a permanent shift in the climate system. Within the context of a broader analysis of climate related hazards outlined above, there is a need to undertake a scientific diagnostic of cyclone Nargis as well. Seen against the backdrop of historical cyclone tracks in the Bay of Bengal, this was an unusual event. The tropical depressions that formed in the Bay of Bengal in the last week of April 2008 appeared to be headed towards the Rakhine coast. However, two days before it made landfall, the system met with westerly disturbances and moved eastwards, making landfall in the Delta region. Further scientific investigation is needed to determine whether this represents a systemic shift in the nature of cyclones originating in the Bay

of Bengal or whether it was a rare event.

Such findings would have significant implications for disaster risk management and adaptation to climate change in Myanmar. In addition, it is important to highlight that delta regions all over the world face special vulnerabilities to the impacts of climate change. It is an opportune time for dialogue between Myanmar and other countries that are contending with possible impacts of climate change in their delta regions.

## **CURRENT INSTITUTIONAL ARRANGEMENTS, INITIATIVES AND CAPACITIES FOR DISASTER MANAGEMENT IN MYANMAR**

### **CENTRAL AND LOCAL INSTITUTIONAL ARRANGEMENTS**

The Government of Myanmar has established institutional arrangements for dealing with disasters and has systems and practices for disaster prevention and preparedness. While there are a number of ongoing public sector initiatives on disaster prevention, there currently is no specific long-term national strategy or plan for disaster risk reduction (DRR). At the national level, the national Natural Disaster Preparedness Central Committee (NDPCC) chaired by the Prime Minister is the apex body on disaster issues. At the lower administrative levels, the Chairmen of the State/Division/Township Peace and Development Councils head the Disaster Prevention and Preparedness Committees at various levels.

Emergency response functions are primarily assigned to the Fire Services department under the Ministry of Social Welfare. In addition, the Department for Meteorology and Hydrology (DMH) is responsible for disaster forecasting and early warning dissemination, and is currently leading a few new initiatives in the area of disaster risk identification, assessment and monitoring. Other major partners for disaster risk management include the Myanmar Red Cross Society, the Departments of Health, Irrigation and General Administration, as well as the police and armed forces.

### **CURRENT DISASTER PREVENTION AND PREPAREDNESS INITIATIVES**

The Government of Myanmar has indicated that it has undertaken a number of initiatives for disaster prevention and preparedness in recent years. These encompass a range of activities, including advanced River Forecasting and Flood warning systems; Empirical Storm Surge Modeling by the DMH; development of a long term prevention and preparedness for cyclone and storm surges; construction of risk mitigation infrastructure such as earthen embankments consisting of shelters and drinking water ponds in parts of the coastal zone; and reinforcement of flood protection infrastructure such as dykes and water barriers by the Irrigation Department.

The Government has further indicated that at the local/township level, the respective disaster relief and preparedness committees lead a range of preventive measures and post-disaster relief activities, including evacuation, emergency transportation and communications, shelter provision, and healthcare. Localized disaster preparedness and prevention measures mainly include disaster awareness raising and salt-water protection for infrastructure in the Delta region.

### **KEY LESSONS LEARNT FROM THE POST-NARGIS DISASTER RESPONSE**

Some of the key lessons learnt from the post-Nargis emergency response, in the context of disaster risk reduction and prevention, include the following:

*The national forecasting and early warning systems.* The post-Nargis joint assessment by DMH and ADPC concluded that the DMH's system for cyclone detection, prediction and forecasting functioned well. It was able to detect the cyclone at an early stage. The system was found well linked with other information sources, such as the Joint Typhoon Warning Center, the India Meteorological Department, the Thai Meteorological Department and the ADPC. However, lack of risk communication infrastructure beyond the township level resulted in a devastating impact on those communities who did not receive advance warning of the crisis.

*Community response.* Communities tended to underestimate the intensity of the impending cyclone, and were slow to react with most believing that staying indoors would offer enough protection from the winds, flooding and surge. This is understandable in a region which has not been frequented by cyclones of such magnitude.

*Lack of evacuation facilities and protocols.* In the absence of protective shelters and evacuation protocols and procedures, the communities had nowhere to take refuge or reach safety. The sheer scale of destruction also meant that local search and rescue equipment, and in some cases the physical means and transport infrastructure were short of what was urgently required.

*Lack of disaster resistant private and community infrastructure.* Most housing stock and community buildings in the coastal areas were not designed or constructed to disaster resistant standards. Even the religious buildings to which people flocked in some cases proved inadequate to withstand the severity of the cyclone.

*Lack of preparedness & poor coping mechanisms.* Although some of the communities had undertaken disaster preparedness planning in the context of other hazards (such as fires and floods), most communities were completely unprepared. There is a need for community based disaster preparedness, which builds on community initiative, and maximizes the use of community resources, capacities and local knowledge.

## **REGIONAL AGREEMENTS, PARTNERSHIPS AND INSTITUTIONS FOR DISASTER RISK MANAGEMENT**

The Government of Myanmar takes part in a number of regional and international collaborative activities on disaster risk management. It is committed towards achieving progress on the key priorities for action identified under the Hyogo Framework for Action (2005-15). At the regional level, the ASEAN Agreement on Disaster Management and Emergency Response (AADMER) and the ASEAN Regional Programme on Disaster Management (ARPD) provide opportunities for promoting regional cooperation. Myanmar can benefit from these existing regional frameworks and programmes for action. Myanmar has ongoing cooperation with the Asian Disaster Preparedness Centre (ADPC) on early warning issues that can be further strengthened. There has also been a broader dialogue with the WMO, UNESCO, IOC and ESCAP on strengthening early warning systems in the country.

## **MANAGING DISASTER RISK – A FRAMEWORK OF KEY ISSUES, NEEDS AND PRIORITIES FOR DRM**

Cyclone Nargis highlighted Myanmar's extreme vulnerability to high impact, low frequency natural hazards, and also the need for the country to undertake a range of actions for reducing disaster risks. There is strategic guidance available in the form of the Hyogo Framework for Action that can be contextualized to Myanmar.

Disaster risk reduction work in Myanmar is in its nascent phase. Therefore, a phased approach is recommended, which initially focuses on "quick wins" in terms of enhancing disaster preparedness in the affected areas. A gradual move can then be made towards a more comprehensive disaster risk reduction effort first in the affected areas and then extended to the other vulnerable parts of the country.

Based on discussions with a range of local and national stakeholders, this section suggests priorities for disaster risk management over the immediate, short, medium and long terms, building upon the DRR related initiatives incorporated in the UN's Early Recovery Strategy. The suggested activities could be aligned along five main pillars: (a) risk identification and assessment; (b) strengthening and enhancing emergency preparedness; (c) institutional capacity building; (d) risk mitigation investments, and; (e) risk financing and transfer mechanisms. These activities are in consonance with the priorities identified under Hyogo Framework for Action.

## **IMMEDIATE AND SHORT TERM NEEDS**

### *Community-based disaster preparedness and enhancing risk awareness*

A lot of the humanitarian and early recovery assistance is being delivered through community level organizations set up at the village level. There is an opportunity to use the same community-based organizations to enhance disaster preparedness. This could include following main elements: formation of village disaster preparedness committees; formation of specialized disaster management teams (search and rescue, first aid, early warning, evacuation, emergency food supplies etc.); community based risk assessments including mapping of past disaster impacts, and identification of priority interventions at the community level; provision of some basic disaster response resources;

and provision of community buildings that can be used as cyclone shelters. With relatively small amount of resources, these actions will enhance community preparedness to respond to disasters and thus minimize the loss of lives and livelihoods. Over time, as part of a comprehensive institutional system, the same community-based structures can be used for anticipatory (reducing future risks) risk management at the local level.

#### Strengthening local level elements of early warning systems

Cyclone Nargis exposed weaknesses in the local level elements of early warning systems in the country. Under the leadership of the government, and in cooperation with regional and international agencies, an end-to-end review of the early warning systems is currently underway. Efforts to generate improved forecasts and warning need to be matched with equal (if not greater) emphasis on effective communication systems, public awareness and social infrastructure at the community level. This includes improving the communication of official early warning to the vulnerable communities by using multiple channels of communication – radio (more frequent bulletins, more air time compared to existing 12 hours), local peace and development council communication systems and monastery loudspeakers. There is a need for developing locally appropriate protocols for communicating early warning that link with community based disaster preparedness efforts. For example, it is not enough to issue an early warning that states the expected wind speed, but it is important to state the expected severity (in categories) of an approaching cyclone, the damage it can cause and the actions that need to be undertaken to minimize losses.

#### Introducing disaster risk reduction in recovery efforts

The affected communities have begun to rebuild shelters using materials salvaged from the damaged houses and relief items provided to them. Rebuilding of permanent shelters is likely to begin only after the current monsoon season. This presents an opportunity to undertake preparatory work in the interim period to support the notion of “build back better” when full-scale long-term recovery begins. In this interim period, a range of locally appropriate construction technologies can be identified that can be introduced in the cyclone-affected areas. Over the coming months, manuals and guidelines on these construction technologies can be prepared and a critical mass of building artisans can be trained. There is a need to initiate the process of setting design and safety guidelines for housing, settlement planning, infrastructure, health and education facilities, water and sanitation, and livelihoods.

### **SHORT AND MEDIUM TERM NEEDS**

#### Comprehensive multi-hazard risk assessment

There is a need to undertake a scientific multi-hazard risk assessment of the affected area as a first step towards better defining the risk environment in the area. There is significant scientific and technical capacity within the country that can be brought together to undertake this exercise. Experiences from other countries can inform this process. A sound multi-hazard risk assessment can guide the recovery process as well as future investment in development processes. It is important, however, to highlight that disaster risk management decisions will have to be looked at within the context of other risks that the communities are exposed to. For example, siting of settlements at a distance of 500m or more from the high tide line would reduce risk from cyclones, storm surges and tsunamis. However, this may increase livelihood risk for fisher folk and therefore prove to be unsustainable (in other words people would return to their coastal locations over time). So, the management of disaster risk – based on an objective scientifically based assessment – will have to be weighed against other risks.

In the medium term, a more detailed, national level disaster risk assessment could be carried out that could: (a) take into account the characteristics of historical hazard events; (b) estimate the exposed asset base for each location/hazard and calculate the damage to different asset types, and; (c) calculate estimated monetary losses for each region. Such understanding of potential economic losses could help the country in reviewing the physical, human and financial exposures and determining levels of risks that might be acceptable and those that should be mitigated. This could also form a basis for updating emergency plans and procedures and undertaking training and capacity building programs.



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*Strengthening institutional and legislative arrangements for disaster risk management systems in the affected areas*

The recovery effort provides an opportunity to strengthen existing or establishing new institutional, legislative and financial arrangements for comprehensive disaster risk management. Disaster risk reduction has to be made part of the investment programs of various sectoral ministries and departments. This will require supporting and building the capacity of the various national and sub-national disaster prevention management committees to develop and implement disaster management plans at various levels, and mobilize adequate response resources.

*Mainstreaming disaster risk reduction and mitigation across sectors*

This will include advocacy for mainstreaming disaster risk reduction with the objective of ensuring that DRR will gradually become a formal institutional priority across sectors and in developmental programming across these sectors. This will include establishing measures to incorporate DRR in urban and land use planning, establishing mechanisms to increasing the resilience of the poor and the most vulnerable, and the stimulation of DRR activities in the production and service sectors.

*Fostering National-level Public-Private Partnership Forums*

In order to achieve sustainable disaster risk reduction, it is important to establish/ strengthen national level mechanisms that bring together a range of stakeholders including all development sectors, private sector, academia and the civil society. In line with the Hyogo Framework for Action, this will help ensure that disaster risk reduction becomes a national priority across the board and holistic approaches are adopted towards disaster risk reduction. Such a mechanism already exists in the form of Central Committee, which needs to be strengthened and made broad-based.

*Explore the development of micro-insurance mechanisms*

A number of national and international NGOs and UN agencies have been working on community-based micro-finance programmes in the affected area. Over a period of time, these programmes have contributed to human development gains in the affected area. The recent disaster has eroded some of these development gains. As these micro-finance programmes are refinanced, there is an opportunity to introduce – in selected communities on an experimental basis – micro-insurance programmes to guard against natural hazards. A series of insurance and derivative products could be developed to meet the needs of groups of small farmers and micro-enterprises. For some of the small enterprises – such as rice mills – insurance products are already available although the coverage is limited only to fires. Efforts to develop new products could build on this experience.

*Strengthen local level disaster preparedness and response systems*

In the affected areas, some basic disaster response capacities exist at the sub-township level in the form of Fire Services. The scope of responsibilities of the Fire Services can be expanded to include emergency response more broadly. There is a need for investment in improving the basic emergency infrastructure, response equipment, and skills of personnel. The post-Nargis recovery and reconstruction effort provides an opportunity to systematically assess the current capacities of emergency services, establish minimum standards based on local hazard risks, and upgrade accordingly. The village disaster preparedness committees, to be set up under community-based disaster preparedness initiatives, can receive training on different aspects of emergency response from the local emergency services. Such “peace time” interaction would ensure that in times of disasters, both community based organizations and local emergency services work in tandem and maximize the use of their combined capacities and resources.

*“End-to-End” Multi Hazard Early Warning and Dissemination Systems*

In the medium term, there is a need to undertake an end-to-end assessment of the existing early warning system in Myanmar. This would cover an analysis of existing forecasting and warning capabilities, mechanisms for translating forecasts into easily understandable and usable warning messages, and protocols for communicating the warnings and systems at the local level to act upon early warning. On the basis of such audits, “end-to-end” multi hazard early warning and

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dissemination systems could be designed and implemented for the country, along with standard operating procedures at different administrative levels.

#### Construction of Multi-Purpose Evacuation Shelters

There is great need for disaster shelters to be constructed along the coastal belt for protection against cyclones and tsunamis, and also possibly in frequently flooded areas, and for other natural calamities. In areas with high population density and high value economic assets the shelters should be designed to accommodate 1 in 100 year events. Where appropriate, shelters should be multipurpose buildings (e.g. education facilities), connected to livestock shelters, with adequate water supply, sanitation facilities and storage for food and supplies needed for survival immediately after the disasters. These shelters should be connected with the communication network for speedy evacuation and delivery of relief supplies during disasters. As a matter of policy, all public buildings constructed in the high risk zones should be multi-purpose and of shelter grade.

#### Integrating Disaster Risk Reduction in Education and Training Institutions:

There is a clear need for integrating disaster risk reduction concerns in development planning across all development sectors and across all administrative levels. An effective way of achieving this over the long run would be through integrating disaster risk reduction into the course curricula of relevant education and administrative training institutions.

### **MEDIUM AND LONG TERM NEEDS**

#### Physical Mitigation Investments

A range of physical risk mitigation options and projects could be undertaken over the medium to long term, following the initial disaster resistant reconstruction and rehabilitation of assets and infrastructure damaged by Cyclone Nargis. This could typically include both larger projects such as riverine and coastal embankments and embankment protection works, expansion and improvement of transport infrastructure, as well as bottom-up community-based risk mitigation investments at the micro level. The latter could be based on participatory community risk assessments (CRA).

#### Integrated coastal zone management

There is a need to harmonize various environmental management efforts in the coastal zone. This will help reduce disaster risk and also create opportunities for sustainable livelihoods for the affected communities.

#### Promoting mangroves replanting and ecosystem preservation

There is a longer term need for improving and rehabilitating the country's natural defences against floods and other hazards such as cyclones and tsunamis through ecosystem preservation and replanting of mangroves along the coastal belt.

#### Integrated climate risk management

The hazards associated with climate change are likely to pose new risks to the communities living in the cyclone affected areas. There is a need to research climate related risks in a comprehensive manner including 1) understanding the implications of **natural fluctuations** in the climate system from season to season, year to year or in some cases from decade to decade; 2) detecting and understanding the implications of **observable trends** in climate change; 3) analyzing the possible implications of **projected climate change** on a decadal time scale. Such an integrated approach will help devise practical strategies that will begin to address present-day concerns over weather and climate-related losses, while also preparing ground for longer-term risk management.

#### Catastrophe Risk Financing and Transfer

A well-designed risk financing program enables a disaster-prone country to avoid major economic disruptions following natural disasters by meeting its post-disaster funding needs without resorting to major budget reallocations, additional taxation, or external borrowing. This involves calculating this resource gap – the difference between probable maximum losses for a given disaster return period and ex-post resources available to the government – and then determining the most cost-effective way of funding it. To meet its post-disaster funding needs, the government can resort

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to a combination of ex post sources of funding and ex-ante funding arrangements. Ex-ante funding arrangements include reserve funds, contingent capital facilities, and risk transfer instruments (insurance and reinsurance). The possibility of buying risk coverage from the international capital markets, including re-insurers, could also be explored. This would inject liquidity immediately after the disaster and enhance coping as well as provide hazard contingent budget support. Depending on the peril, the insurance arrangements would follow parametric or index based triggers. In the case of Myanmar, the coverage could include weather related events such as floods and cyclones.

*Next steps.* A more detailed plan and costing of cross-cutting disaster prevention and preparedness activities should be completed following the assessment.

## CONSOLIDATED FRAMEWORK OF DRM NEEDS AND PRIORITIES

The matrix below provides a summary consolidated framework of the DRM needs and priorities identified above, grouped together along the lines of the 5 pillars described earlier.

**Table: Needs and Priorities for Disaster Risk Management**

|   | DRM Needs   | Immediate – Short Term | Short – Medium Term | Medium-Long Term |
|---|---|------------------------|---------------------|------------------|
| Risk identification and assessment (HFA Priority 2) <sup>1</sup>                | Community-based Risk Assessments  |                        |                     |                  |
|   | Comprehensive multi-hazard risk assessment at national level  |                        |                     |                  |
| Strengthening and enhancing emergency preparedness (HFA Priority 2, 3, 4 and 5) | Community-based disaster preparedness and enhancing risk awareness  |                        |                     |                  |
|   | Strengthening local level elements of early warning systems   |                        |                     |                  |
|   | Strengthen the local level disaster preparedness and response systems   |                        |                     |                  |
|   | “End-to-End” Multi Hazard Early Warning and Dissemination Systems   |                        |                     |                  |
| Institutional capacity building (HFA Priority 1 and 2)                          | Construction of Multi-Purpose Evacuation Shelters   |                        |                     |                  |
|   | Strengthening institutional and legislative arrangements for disaster risk management systems in the affected areas |                        |                     |                  |
|   | Mainstreaming disaster risk reduction and mitigation across sectors   |                        |                     |                  |
|   | Fostering National-level Public-Private Partnership Forums for DRR  |                        |                     |                  |
| Risk mitigation investments (HFA Priority 4)                                    | Integrated climate risk management  |                        |                     |                  |
|   | Introducing disaster risk reduction in reconstruction and recovery efforts  |                        |                     |                  |
|   | Physical Mitigation Infrastructure  |                        |                     |                  |
|   | Integrated coastal zone management  |                        |                     |                  |
| Risk financing and transfer mechanisms (HFA Priority 1 and 4)                   | Promoting mangroves replanting and ecosystem preservation   |                        |                     |                  |
|   | Explore the development of micro-insurance mechanisms   |                        |                     |                  |
|   | Catastrophe Risk Financing and Transfer   |                        |                     |                  |

<sup>1</sup> In 2005, over 168 governments including the government of Myanmar pledged to implement the Hyogo Framework for Action (HFA) for disaster reduction with three strategic goals: to integrate disaster risk reduction into sustainable development policies and planning; to develop and strengthen institutions, mechanisms and capacities to build resilience to hazards and to systematically incorporate risk reduction approaches into the implementation of emergency preparedness, response and recovery programmes. To achieve these goals, the HFA outlined five specific Priorities for Action: (1) Making disaster risk reduction a priority; (2) Improving risk information and early warning; (3) Building a culture of safety and resilience; (4) Reducing the risks in key sectors; and (5) Strengthening preparedness for response.

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