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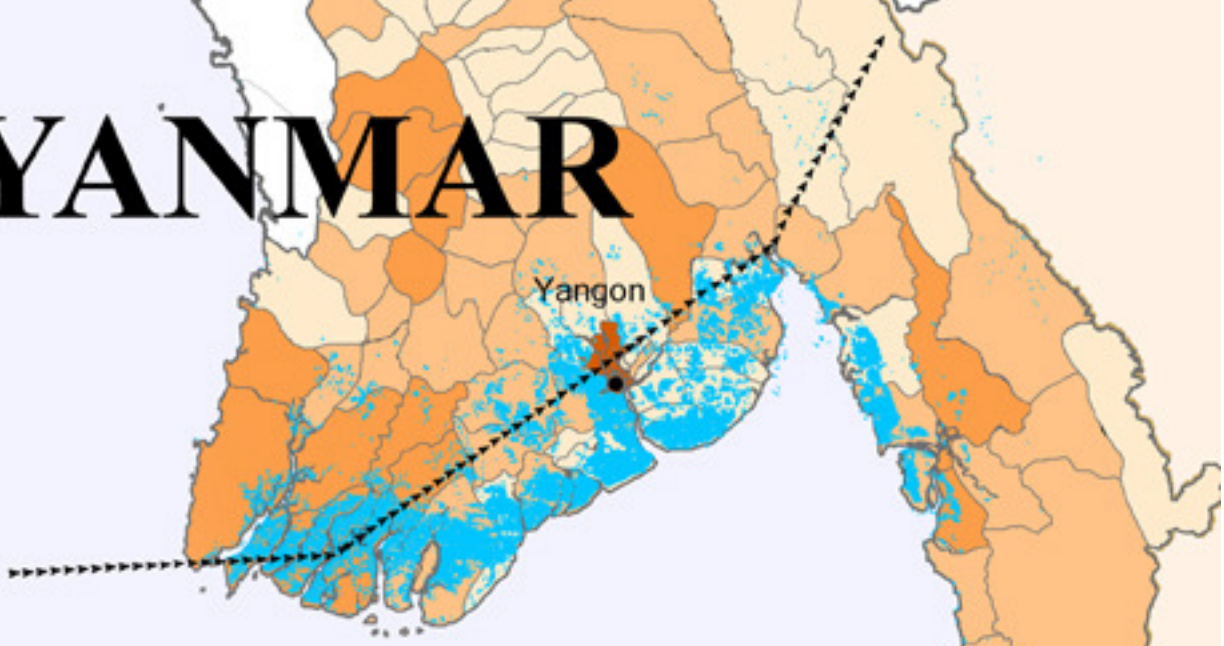

Emergency & Rehabilitation Programme

Needs Assessment for the Cyclone Nargis Affected Areas

Agriculture

(crops, livestock, fisheries, forestry)

13 June 2008

Food and Agriculture Organization of the United Nations

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Abbreviations and Acronyms

ACF	Action Contre La Faim
ASEAN	Association of South East Asian Nations
CERF	Central Emergency Response Fund
DOF	Department of Fisheries
FAO	Food and Agriculture Organization of the United Nations
HYV	High Yielding Variety
IASC	Inter-agency Standing Committee
ICRC	Internal Committee of the Red Cross
IDE	International Development Enterprise
IFRC	International Federation of Red Cross & Red Crescent Societies
ILO	International Labour Organization
INGOs	International Non Governmental Organizations
IOM	International Organization for Migration
JICA	Japanese International Cooperation Agency
LBVD	Livestock Breeding and Veterinary Department
MAS	Myanmar Agricultural Services
MLF	Myanmar Livestock Federation
MFF	Myanmar Fishers Federation
MOAI	Ministry of Agriculture and Irrigation
MOF	Ministry of Forestry
MOLF	Ministry of Livestock and Fisheries
MRCS	Myanmar Red Cross Society
MT	Metric Ton
NA	Needs Assessment
NGOS	Non Governmental Organizations
OIE	World Organization for Animal Health
UN	United Nations
UNCT	United Nations Country Team
UNDP	United Nations Development Programme
UNDAC	United Nations Disaster Assessment and Coordination
UNICEF	United Nations Children Fund
WFP	World Food Programme
WHO	World Health Organization

Emergency Context

The Cyclone Nargis struck Myanmar on 2 and 3 May 2008, making landfall in Ayeyarwady Division crossing through the Irrawaddy delta from southwest to northeast, and directly hitting the country's largest city, Yangon. Major damage was reported in the affected areas, particularly in the low-lying agricultural delta region where the Cyclone's impact was compounded by a storm surge. Buildings, infrastructure and communications have been severely damaged, and flooding was widespread. Given the devastation of homes and infrastructure, loss of agricultural land and loss of access to fishing grounds due to persistent flooding and the shifting of sands, many people have been displaced and are currently staying either in government-run settlements of informal temporary shelters such as monasteries, schools and other public building. Access to many disaster affected areas remains severely restricted, as certain parts of the delta can be reached only by boat. The estimated number of people affected is as high as 2.4 million. The official death toll stands currently (1 June 2008) at 77,738 with 55,917 missing. Unofficial estimates are considerably higher.

National and International Response

The Government of the Union of Myanmar declared a 'State of Emergency' for those parts of the country most affected by Cyclone Nargis, and welcomed international humanitarian assistance. The Myanmar army deployed helicopters, boats and trucks for the delivery of essential items to the affected people. In addition to the government response, other national and international humanitarian partners started to provide assistance. International relief efforts began almost immediately after the storm hit. To date, international agencies have provided some degree of assistance (mostly relief packages of food, water, shelter, non-food items, etc.) in all of the most severely affected townships. As of 4 June, preliminary estimates indicate that 1.3 million beneficiaries, out of the estimated 2.4 million people affected, have been reached through the combined efforts of the government, Myanmar Red Cross Society (MRCS), UN, INGOs, and local NGOs. Much of this assistance has been a one-off effort to supply a small amount to the largest number of needy people. While the operating environment has remained constrained for international organizations, the government, MRCS and civil society groups and the MRCS have provided significant relief to affected populations. There are over 95 civil society groups operational in the affected townships. While the overall total of beneficiaries reached appears high, a great part of this assistance has been to Yangon populations, most likely due to limitations on movements and ability to properly assess the situation and then respond rapidly. In the severely affected areas where over 2 million people are in need of some degree of assistance, only about 670,000 have been reached. Tens of thousands of people have not been reached as yet by humanitarian organisations. Access to the more remote areas of the Ayeyarwady delta has been hindered by different factors. However, information on the status of those populations is crucial at this point in order to avoid further vulnerabilities and for adequate planning of relief operations.

Coordination

The Government took the lead in coordinating national efforts through an Emergency Committee, headed by the Prime Minister, and has put into operation a national disaster management plan. The Ministry of Social Welfare, Relief and Resettlement is spearheading the relief response. United Nations Disaster Assessment and Coordination (UNDAC) team members have been deployed. To support the national response, the UN Resident/Humanitarian Coordinator is organizing international support through the Humanitarian Country Team, comprised of UN agencies, international NGOs, national NGO consortia and IOM, with IFRC and ICRC as observers. In order to provide clear counterparts to relevant national authorities the Humanitarian Country Team is structuring its response around sectoral priorities. Groups of organisations work together in clusters, coordinated by a designated lead. Cluster Leads are responsible for fulfilling their Terms of Reference which include working with national counterparts to coordinate needs assessments, plan the response, monitor needs and implementation of programmes and manage information to ensure effective humanitarian action. Cluster Leads work in full partnerships with all relevant actors operating within their respective sector. In this capacity Cluster Leads report to the Resident/Humanitarian Coordinator and are supported by

Global Cluster Leads. Through such mechanism the Humanitarian Country Team facilitates the coordination of partners for the joint prioritization of resources and common planning. Such system aims to ensure there are no gaps or duplication in the response. This provides a framework for the expected enhanced relief operation and identifies clear interlocutors for the Government of Myanmar.

FAO is leading the Agriculture Cluster (crops, livestock, fisheries, forestry) and co-chairs the Early Recovery Cluster at the country level. In coordination with the United Nations Country Team (UNCT), the United Nations issued a Flash Appeal (9th May) to meet the immediate needs of the affected population. This appeal seeks to help international partners support the Government of Myanmar's objective to address the needs of the communities affected by the cyclone for a period of six months. The appeal initially sought US$187 million to enable international partners to support the Government of Myanmar in addressing the needs of those people most affected by the cyclone. Currently the appeal requests US$ 201 million. FAO proposed US$10 million within the Appeal to meet immediate needs in the agriculture, livestock and fisheries sectors. The UN will revise the 9 May Flash appeal by end June/early July based on more complete information and jointly conducted assessments.

	Cluster/Sector	**Lead Organization**
	Agriculture	FAO
	Child Protection	UNICEF
	Early Recovery	UNDP
	Emergency Education	UNICEF
	Emergency Shelter	IFRC
	Emergency Telecommunications	WFP
	Food Assistance	WFP
	Health	WHO
	Logistics	WFP
	Nutrition	UNICEF
	Water/Sanitation	UNICEF

Regionally, the Secretary-General of the Association of South East Asian Nations (ASEAN) has called on member states to provide urgent relief assistance. ASEAN focal points have been told to be on high alert and the Secretariat has proposed activation of the ASEAN Standby Arrangement and Standard Operating Procedures (SASOP) disaster response mechanism. ASEAN deployed an Emergency Rapid Assessment Team (ERAT) with representatives from Brunei Darussalam, Malaysia, Philippines, Singapore and the ASEAN Secretariat. The team worked in collaboration with the UN to gather and analyse assessment findings, undertake field assessments and through consultations with senior government officials, provide recommendations on the way forward in addressing the support for the Government of Myanmar.

The ASEAN-UN Pledging Conference took place on 25th May. The overall tone of the conference was encouraging. Tens of millions of dollars were pledged by the Member States to help scaling up the relief effort. The conference was also an important exercise towards building greater mutual trust, confidence and cooperation between the Government of Myanmar and the international community. The tripartite partnership between the Government, ASEAN and the UN will prove useful for increasing assistance to cyclone survivors, opening up access to those in urgent need, and ensuring a more coordinated, effective relief operation. The ASEAN-led coordination mechanism will be led by the Secretary-General of ASEAN and include a core group chaired by the Government, with three representatives each from the Government, ASEAN and the UN. A joint assessment of damage/loss and early recovery needs prepared by the Government, ASEAN and the UN is expected to be ready by early July.

As of 4 June 2008, a total of US$ 153.6 million has been committed to relief operations in Myanmar, with a further US$ 108.9 million pledged. Out of these total contributions, US$ 82.4 million has been committed to projects and activities outlined in the UN Flash Appeal), with US$ 2 million allocated for Agriculture (FAO). An additional US$50.9 million has been pledged. The UN Flash Appeal for Myanmar currently requests US$201 million and is covered at 41%. More than 20 UN Agencies and NGOs have requested funding through the Appeal.

FAO Response to the Crisis

FAO responded immediately to the crisis by sending a formal offer of assistance to three key line ministries, the Ministry of Agriculture & Irrigation, the Ministry of Livestock & Fisheries and Ministry of Forestry. Within days, the Ministry of Livestock and Fisheries and the Ministry of Agriculture officially requested FAO assistance. FAO's Emergency Operations and Rehabilitation Division (TCE) at Headquarters is since coordinating the response closely with FAO's Regional Office for Asia and the Pacific (RAP) in Bangkok and the FAO Representation in Myanmar. FAO is participating in the Inter-agency Standing Committee (IASC) and Regional Cluster Meetings on Myanmar. This has been effective to ensure close coordination with all international and UN Organizations in the formulation of the Organization's response. With funding from its own Special Fund for Emergency and Rehabilitation Activities (SFERA) and Technical Cooperation Programme funding (TCP), FAO mobilized immediate human resources to build up the Organization's response capacity in Myanmar. FAO's Regional Emergency and Rehabilitation Coordinator and a Senior staff from FAO Bangkok travelled to Myanmar the week of 11 May to support the FAO Office in Myanmar in Agriculture Cluster Coordination as well as in launching FAO's immediate response. As stated above, FAO estimated the initial requirements at US$10 million to address the time critical needs in agriculture, livestock and fisheries sectors in the UN Flash Appeal launched on 9 May 2008. This requirement will only allow meeting a small part of the immediate requirement, as the damage and losses (including income foregone) for the agriculture sector – including crops, livestock and fisheries - is estimated by the Government at around US$300 million. Based on this initial appeal for agriculture, US$ 3.0 million have already been approved to-date by the donor community and another US$ 15 million are hard pipeline commitments.

The FAO international Team Leader for the comprehensive needs assessment arrived in country on 18 May. Due to the initial restrictions of international staff to be fielded into the delta, national technical experts – mostly from the line Ministries – were mobilized the day after and sent to the affected areas for a first rough analysis of the situation, before the remaining international experts arrived in the country on 26 May to complement the Needs Assessment Team. For this, FAO was also drawing upon its technical staff from Headquarters, Regional Office, and Country office for all four sub-sectors (crop, fisheries, livestock and forestry) to be covered by the needs assessment. With approved funds from Italy, CERF, FAO-TCP and SFERA, FAO has already started to provide immediate assistance to Cyclone Nargis affected farmers and fishers with the procurement of rice seed, fertilizers, draft animals, and powertillers. Other priority inputs such as agricultural tools, animal feed, veterinary supplies and fishing equipment are also being sourced.

An Emergency and Rehabilitation Coordination Unit staffed with a Senior Coordinator, international and national experts, is in the process to be established with the assistance of an experienced Hqs staff acting as Interim Coordinator during the first two months before a longer term senior coordinator is recruited for managing the FAO response programme for Cyclone Nargis.

Scope and Objective of the Needs Assessment Report

The overall intention of this Needs Assessment (NA) is to elaborate a pragmatic Emergency and Rehabilitation Programme for the geographical area most affected by Cyclone Nargis. Based on the understanding of the pre-cyclone situation, the impact of the natural disaster is assessed in terms of its physical destruction and impact on people's livelihoods. In order to quickly recover from the hardship caused, an emergency programme for immediate assistance (0-6 months) as well as a medium-term rehabilitation programme (0-24 months) is proposed *in support of the most vulnerable farmers and*

fishers communities in order to help protect and rebuild better livelihoods in the eleven priority townships most severely affected by the cyclone - Bogale, Dedaye, Kyaikiat, Labutta, Mawlamyinegyun, Ngapudaw and Pyapone of Ayeyarwady Division and Khawhmu, Kungyangong, Kyauktan and Twantay Townships of Yangon Division - the government and the UN defined these township as the cyclone affected area to be tackled within the overall recovery operations. The assessment covers the crop production, livestock, fisheries and forestry sectors to formulate a response plan in the most rapid and sustainable manner possible. The proposed programme will help reduce the need for protracted and potentially high-cost life saving activities, which may also undermine social capital with far reaching consequences and bolster resilience to the next shock. As the *assessment focuses on needs directly related to the impact of the cyclone*, it does therefore intentionally not reach into long-term development.

The conclusions and recommendations of the report will be used to inform and complement other assessment efforts made by the Government and international and national partners, including the on-going UN-led interagency assessment for early recovery – of which the ‚emergency' package would have to become part of it. The programme document has been consulted with all partners concerned with agriculture, fisheries, and forestry sectors through the Agriculture Cluster mechanism, established in Myanmar. It is intended to be used as a reference guide for the formulation of immediate and medium-term interventions/projects based on donors request, as well as to provide technical advice to relief and development partners.

Data Availability

The needs assessment for the *crop sub-sector* relies heavily on surveys/appraisals made by Township Managers of the Myanmar Agricultural Services (MAS) following reports from their Village Tract and Village Extension Managers based on visual estimations. This information has subsequently been verified and collated by the MAS Divisional and District Managers and the Department of Agricultural Planning of MOAI. The FAO Needs Assessment Team subsequently visited all eleven of the most affected townships to further verify this information. In addition, the mission has been able to crosscheck the levels of damage and the needs required in selected areas, through other assessments undertaken by national and international non-government organisations such as Action Contre La Faim (ACF)[1] and International Development Enterprise Myanmar (IDE)[2]. The findings of ACF were based on a limited number of questionnaire surveys and focus group discussions in six villages of Bogale Township. IDE were able to make an assessment of 14 of the worst affected townships in Ayeyarwady and Yangon Divisions through field observations, consultations with MAS managers and interviews with affected families. While access to rural areas remains difficult and the time required to plant paddy rice for the 2008 monsoon cropping season is limited, it is unrealistic to undertake any detailed baseline surveys for the six-month emergency period. The mission therefore relied on the data presently available to make its forecasts for the procurement and delivery of inputs over the initial months of the emergency. However, projects prepared for the recovery of the agricultural sector and rehabilitation of rural livelihoods over the medium-term will include detailed baseline surveys to determine more precise needs of the rural population and its service providers.

For the *livestock* sector the assessment relied to a great extent on data provided by the government. A thorough ground proofing on a larger scale was not possible as field visits were only allowed towards the end of the mission. However, the field work roughly confirmed information provided by the government. Damage data for poultry in the Yangon area could be verified and were corrected downwards from the initial data collection. The data on the losses sustained by the *fisheries* and aquaculture in the Ayeyarwaddy and Yangon Divisions were obtained in close collaboration with Department of Fisheries (DOF) and are valid as of the third week of May 2008. It is emphasised here that these data are partial and preliminary and mostly based on secondary sources, and are subject to review and possible rectification at a later stage. In early June 2008, additional figures on damage to

[1] Action Contra La Faim; Food Security and Water and Sanitation Rapid Assessment of Bogale Township, Ayeyarwady Division; May 2008

[2] International Development Enterprise Myanmar;Farm Recovery in the Ayeyarwady Delta – Rebuilding Smallholder Families; May 2008

fisheries assets were received from a UNDP field survey in five of the most affected townships indicating that on average an additional 1,000 small boats were lost in each township. Most of the critical data on status of *forestry* after the cyclone damage was provided by the Ministry of Forestry, to a great extent based on field reports from returning officers and analysis of satellite images. Pre-cyclone information came mainly from UNDP and JICA projects that were implemented in the 1990s partially by FAO. The data on physical parameters appear quite sound, and were derived using the most scientific tools then available. The forestry related socio-economic data do not appear to have the same level of rigour though. Hence, they should be treated in a relative sense. However, the averages, approximations and trends are on the predictable side.

Operations and Acknowledgements

The mission team leader started his work in Yangon on 18 May 2006, with the international consultants/staff finally arriving in the capital a week later on 26 May. While the national counterparts from the three line Ministries - Ministry of Agriculture and Irrigation, Ministry of Livestock and Fisheries, Ministry of Forestry - travelled to the affected areas right at the beginning of the mission, travel approval was granted for the international staff on 31 May. After an intense series of field visits to the affected areas, including interviews with field officers, farmers, fishers and other key informants, a substantial number of documents and reports were reviewed and working sessions and meetings were held with government entities, UN agencies, bilateral cooperation and donor agencies, NGOs, civil society representatives and organizations and the private sector. Thereafter, the needs assessment report was prepared on 8 June and, after a thorough review by the technical services of FAO Headquarters and the Regional Representation in Bangkok, the final report was cleared by FAO Headquarters and RAP on 11 June. The mission concluded its work in a wrap-up meeting with the government on 13 June. Finally, national and international development partners were de-briefed on 16 June in Yangon, and on 18 June in Bangkok.

During the assignment, the mission maintained continuous contact with the senior counterpart officials forming a joint-team of FAO and Government of Myanmar. Furthermore, the mission cooperated with other government entities concerned with recovery, the UN Resident Representative, WFP, UNDP, UNHCR, ILO and other UN agencies, and with the FAO Resident Office. The mission would like to express its deep gratitude and appreciation to all those from various institutions and agencies who provided fruitful inputs and insights. The mission would like to thank the Government and its line Ministries - Ministry of Agriculture, Ministry of Livestock and Fisheries, Ministry of Forestry - for their dedicated and continuous support. In particular, the mission would like to thank Mr. Leon Gouws (FAO Representative a.i.) and Mr. Saw Ler Wah (Deputy Representative) for their extraordinary assistance. Furthermore, the mission would like to thank the entire staff of the FAO Myanmar Representation for the continuous and very efficient operational support throughout the duration of the assignment. Finally, the mission would like to express its gratitude to the emergency operations officers of FAO Hqs led by Ms Hilde Niggemann for its commitment and effective management.

FAO Needs Assessment Mission (core) Team:

Albert T. Lieberg	*Team-Leader*
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Simmathiri Appanah	*Forestry*

Executive Summary

Myanmar's hardship caused by Cyclone Nargis is unprecedented - never before in the country's recent history has there been a natural disaster of this magnitude. The cyclone cut a huge swath of destruction about 100 miles wide across 200 miles in the populous Irrawaddy Delta, killing an estimated more than 130,000 people and ten thousands of livestock, while destroying homes, crops, property and entire livelihoods. Given the devastation of homes and infrastructure, destruction of agricultural land and loss of access to fishing grounds due to persistent flooding and the shifting of sands, many people have been displaced and are currently staying either in government-run settlements of informal temporary shelters such as monasteries, schools and other public building. Access to many disaster affected areas remains severely restricted, as certain parts of the delta can be reached only by boat. The estimated number of people affected is as high as 2.4 million.

The cyclone hit against a backdrop of growing and entrenched vulnerability and food insecurity among hundreds of thousands of rural families in Myanmar. The livelihood activities of the severely affected people include crop production, livestock rearing, fishing, salt making and petty trade. However, growing population, decreasing farm size, diminishing soil fertility, declining yields, and high costs of imports such as fertilizer have meant farm families had little cushion before the cyclone. While for many families life was already very harsh and insecure before the storm, those most vulnerable communities have now even less resilience or resources for recovery. Most families lost their food/seed stocks, livestock, fishing equipment and physical access to food markets has been disrupted in the worst-affected areas. The loss of assets and destruction of communication networks have resulted in the non- functioning of a majority of rural markets and limited supply of basic goods and services, leading to increasingly high prices of food commodities. The damage to croplands, livestock, fishing ponds, and tree nurseries has increased unemployment for the extreme poor who depend on wage labour for their livelihood. The coping mechanisms of the severely-affected people include migration to other areas in search of employment opportunities, distress sale of remaining assets, reduction in food consumption, sharing of shelter, loans and borrowings.

Against this background, the overall intention of the Needs Assessment is to elaborate a pragmatic Emergency and Rehabilitation Programme for the geographical area most affected by Cyclone Nargis. Based on the understanding of the pre-cyclone situation, the impact of the natural disaster is assessed in terms of its physical destruction and impact on people's livelihoods. In order to quickly recover from the hardship caused, an emergency programme for immediate assistance (0-6 months) as well as a medium-term rehabilitation programme (0-24 months) is proposed *in support of the most vulnerable farmers and fishers communities* in order to help protect and rebuild better livelihoods in the eleven priority townships most severely affected by the cyclone. The assessment covers the crop production, livestock, fisheries and forestry sectors by formulating a response plan in the most rapid and sustainable manner possible. The proposed programme will help reduce the need for protracted and potentially high-cost life saving activities, which may also undermine social capital with far reaching consequences and bolster resilience to the next shock to come. The conclusions and recommendations of the report will be used to inform and complement other assessment efforts made by the Government and international and national partners. The programme document has been consulted with all partners concerned with agriculture, fisheries, and forestry sectors through the UN Agriculture Cluster mechanism, established in Myanmar. It is intended to be used as a reference guide for the formulation of immediate and medium-term interventions/projects based on donors request, as well as to provide technical advice to relief and development partners.

Crop Production

Overall, it is estimated that some 783,220 ha of paddy fields were submerged by the cyclone, i.e. 63% of paddy land in a total of 19 townships of the two main affected Divisions, plus Bago East and Mon State. By the end of May 2008, most of the affected areas had drained with only a few pockets of inundation remaining. However, it is still estimated that some 130,000 ha of paddy fields need to be rehabilitated before farmers can return to their fields and cultivate a crop. It is estimated that between 75 and 85% of seed stocks from the cyclone-affected area were destroyed by flooding or subsequent

wetting from rain because traditional bamboo seed stores were severely damaged by the cyclone. Due to the destruction caused by the cyclone *the overriding factor preventing farmers returning to rice production is a serious shortage of draught animals and power tillers to cultivate the paddy* fields and, where farmers have access to power tillers, they have no cash to pay for fuel and lubricants. As a general rule, farmers sell their surplus grain in May and June to pay for, *inter alia*, fuel and lubricants – but with most of this seed/grain destroyed by the cyclone the *farmers lack essential working capital*.

It is estimated that some 122,505 draught animals were lost in the eleven cyclone-affected priority townships. Moreover, it is estimated that some 2,996 power tillers, 121,373 harrows, ploughs and rotary cultivators, 19,655 carts and 132,085 other farm implements were lost during the cyclone. The loss of draught animals and power tillers means that an estimated 52,121 farmers will not be able to plant monsoon rice between June and August 2008. This translates into a loss of production on some 183,425 ha of paddy land (i.e. 32% of the most severely cyclone-affected area in Ayeyarwady and Yangon Divisions). At present yield rates, this could mean a loss of 550,000 metric tonnes of paddy rice. In addition, some 29,500 ha of summer paddy crop that was planted late in the season were destroyed by the cyclone with a loss of 133,051 metric tonnes. Furthermore, around 37% of orchard crops were severely damaged or destroyed. It should be noted that *these figures do not account for the estimated 100,000 to 120,000 landless farmers who also lost tree crops and especially vegetables from their kitchen gardens*.

Livestock

Based on primary data, the estimated numbers of livestock killed in the eleven townships are: 227,268 large ruminants *of which 122,524 mature draught animals;* 66,000 pigs; 1,134,000 poultry; 498,000 ducks; 6,999 goats. Most seriously affected were the townships of Bogale where 51% and Labutta where over 70 % of the large ruminants were killed. In Labutta 85% of the pigs were lost, while in Dadeye, Kyaiklet and Labutta with over 75% mortality practically all poultry and ducks were wiped out. High winds and the storm surge also destroyed *cattle sheds* and *pig* and *poultry houses*. *Feed reserves* such as rice straw, brans and cakes were either washed away or made unusable due to salt water intrusion.

As mentioned above draught animal are an important asset to prepare the paddy fields for the imminent monsoon planting season. The loss of 122,524 draught animals or 61,000 pairs of bullocks means that, if not replaced soonest, an average of 122,000 hectares of paddy cannot be planted or only planted in insufficiently prepared seed beds resulting in lower yields. The inability to plant the 2008 monsoon season would put many of the farming families under great economic threat as loans cannot be paid back and other financial obligations won't be met. The resulting lack of rice would have a negative impact on the food security particularly also in view of the recent soaring food prices. Furthermore, the break down of the general infrastructure and the damage to the veterinary stations impede the routine delivery of veterinary services. Seasonal vaccination cannot take place. Dead animals cannot be properly disposed off - they decompose in ditches and fields, contaminate water and are a source of disease. 434,581 cattle and buffaloes, 262,000 pigs, over 5.5 million chicken and 0.9 million ducks have survived. These surviving animals are stressed and weakened, they have limited access to feed and clean water and are therefore more susceptible to diseases. Seasonal outbreaks of livestock diseases which commonly occur under such circumstances cannot be controlled and are a further threat. Around 30-55% of the rural household in the Ayeyarwady delta are considered landless families who keep backyard livestock and are amongst the most vulnerable communities, including widows and women-headed families. They are most seriously affected as they depend totally on the few livestock and on casual employment opportunities.

Fisheries

The destruction caused to the fisheries sector was brought about in two main ways: (a.) damage from high winds and debris and related impact caused by the storm surge, (b.) flooding and intrusion of salt water. Common also is the damage to post-harvest capabilities, i.e. the loss of fish processing, marketing and transport infrastructure and equipment. This resulted in food insecurity and the loss of

employment opportunities, in particular for women. The off-shore fisheries were struck hard, partly because there is no early-warning system in place, and many fishing boats were overcome by the cyclone while fishing far out of the coast. Many of the boats were lost at sea with their entire crew and all their equipment. Vessels that happened to be moored or anchored at the time of the cyclone were damaged or sank at their mooring sites, leaving a number of them in a salvageable state. The in-shore fisheries suffered from the same damage as the off-shore fleet, albeit that a number of the vessels and their crews were able to return to shore. Fish processing installations were damaged or destroyed. The inland fisheries suffered damage in the form of loss of or damage to fishing and transport boats, fishing gear and equipment, processing installations and equipment, including ice factories and cooling facilities. Many skilled fishers and processors died in the flooding and the storm - over 27,000 fisheries workers are missing or dead.

The assessment indicates that over 2000 off/in-shore boats/vessels have been lost, and on average more than 1,000 small boats of other categories have been destroyed in each township. Furthermore, a total of 55 cold storages were damaged. The damage to aquaculture includes loss of stock when ponds were flooded and damage to ponds, cages and infrastructure - the estimated impact on private sector aquaculture reveals that over 15,000 ha of ponds have been damaged. The total production loss of fish as a result of the cyclone (both from capture fisheries and aquaculture) is believed to be 150,000 tonnes of fish.

Forestry

Based on the information gathering network of the Ministry of Forestry and the analysis of satellite imagery, the cyclone affected both the natural forests and plantation stands especially of the Ayeyarwady Division. About 14,000 ha out of 275,000 ha of mangroves were clearly lost. In addition, out of the 63,000 ha of tree plantations in the area, about a third (21,000 ha) was damaged by the cyclone. Besides damage to forestry production and timber stands, infrastructure belonging to the Forestry Department was also destroyed - mainly office and housing buildings. However, a more urgent concern is how the loss of forestry production chain would have on the rural people heavily or partially dependent on forestry for their livelihood. The mangrove forests have been aptly described as the poor man's overcoat in that a large number of artisanal fisherman, landless poor, and marginal farmers especially women are dependent on them for their direct and indirect incomes (charcoal production, casual labour in forestry operations, minor forest produce collection and processing, etc.). villagers also obtain 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.

Emergency & Rehabilitation Programme

The overall objective of the emergency and rehabilitation programme is to restore farmers/fishers to pre-cyclone conditions and rebuild the food security, rehabilitate livelihoods and improve the resilience of the worst-affected communities to future disasters. This would be achieved through grants to replace assets lost or damaged by the cyclone and safeguard assets that survived the cyclone and the adoption of improved production, processing and marketing technologies, as well as safeguarding and promoting environmental protection. The emergency and recovery projects presented below have been prepared to cover urgent needs. These project proposals, however, do not aim at covering the huge financial losses of the agricultural sector but represent the technical judgment of the mission for a first pragmatic and operationally feasible set of priority initiatives for urgent implementation within the coming months - especially for the recovery of the most vulnerable farming/fishing communities. The scale and scope of the recovery programme recommended has been based, inter alia, on the following considerations: (i.) immediate needs for some of the most vulnerable and resource-poor farmers/fishers, those who depend exclusively on agriculture/fishing and have no other resources to recover from the imposed hardship by their own means; (ii.) a realistic dimension of achievable project objectives (especially regarding the number of beneficiaries), given the very restricted timeframe at disposal, of 6/24 months; and (iii.) the currently limited local implementation capacity for the execution of massive agricultural recovery projects.

Overall, when it comes to the formulation of recovery needs within a very restricted timeframe and with low levels of local implementation capacity, it is of paramount importance to focus on a realistic perception of the given circumstances listed above. The mission's approach was to design well justified, technically sound, quick-impact projects, with a high probability to attract the needed donor funding and achieve set objectives within the given timeframe set for project implementation. However, these proposals should only be seen as a first stepping stone to launch and kick-start a process that will hopefully culminate in the elaboration of further recovery and development projects needed for the rehabilitation of the sector, and will contribute to a comprehensive reconstruction and development programme aimed at restoring the country's sustainable development pattern on which it had embarked prior to the cyclone's impact. At the same time, reconstruction in other sectors (inter alia, food supply, housing, schools, feeder roads, power supply) will simultaneously assist families to resume farming in cyclone-affected areas. This is why the elaborated programme entails focused beneficiaries and geographical targeting in order to complement the programme of other UN agencies (e.g. WFP for food, UNHCR for shelter, UNDP for cash for work) and actors.

The emergency and rehabilitation programme is composed of eight project/programme proposals targeted for urgent/immediate execution and nine for medium-term implementation. Ideally, and provided donor funding is made available, both packages are to be implemented in parallel - in order to achieve the needed sustainability in the overall recovery effort:

Projects/programmes for '**emergency and immediate**' implementation (0-6/12 months): **32.21 US$ Mio.**

1. Emergency Coordination Unit	0.48 US$ Mio.
2. Annual Food Crop Production for Marginal Farmers	15.57 US$ Mio.
3. Horticulture Production for Landless Households, Schools/Orphanages	3.27 US$ Mio.
4. Emergency Provision of Draught Animals	3.56 US$ Mio.
5. Emergency Vaccination, Treatment and Feeding of Surviving Animals	1.65 US$ Mio.
6. Chicken and Ducks Production for Landless Households	1.86 US$ Mio.
7. Emergency Supply of Fishing Gear, Boat Repair and Processing Implements	4.90 US$ Mio.
8. Mangrove Verification Assessment and Programme Formulation	0.92 US$ Mio.

Projects/programmes for '**recovery and rehabilitation**' implementation (0-24 months): **51.22 US$ Mio.**

1. Rehabilitation of Annual Food Crop Production	12.20 US$ Mio.
2. Rehabilitation of Horticulture Production	2.66 US$ Mio.
3. Rehabilitation of Household Agro-Processing and Storage	7.89 US$ Mio.
4. Rehabilitation of Embankments/Polder Lands and Ponds	7.93 US$ Mio.
5. Rehabilitation of Draught Animals Production	5.66 US$ Mio.
6. Promotion of Pig Production for Landless Households	1.90 US$ Mio.
7. Rehabilitation of Fishing Fleet and Basic Sector Services	9.65 US$ Mio.
8. Small-scale Aquaculture Rehabilitation	1.75 US$ Mio.
9. Mangrove-Forestry Sector Rehabilitation	1.58 US$ Mio.

Overall Emergency & Rehabilitation Programme for Agriculture (corps, livestock, fisheries, forestry):

Emergency/Immediate Needs:	32.21 US$ Mio.
Recovery/Rehabilitation Needs:	51.22 US$ Mio.
Total Programme:	**83.43 US$ Mio.**

I. PRE-CYCLONE SITUATION

With over ten million people, the Ayeyarwaddy Delta has the highest population density of Myanmar. The extended area is located at the southern end of the central plains with Rakhine State to the north-west, Bago Division to the north, and the Bay of Bengal and the Andaman Sea in the south and east. It is a region with a large number of rivers such as the Ayeyarwaddy River (2,710km), the most important river in Myanmar. The climate is tropical with three distinct seasons: dry and hot from March to May; rainy season from June to October and dry and cold from November to February. The annual rainfall varies with the coastal region receiving between 3,500 and 4,000 mm and the northern region between 2,500 and 3,000 mm. As a result of its geographic location and its landscape, the Ayeyarwaddy delta has a great economic potential and is considered as the rice granary of Myanmar. Other primary crops are maize, sesame, groundnut, sunflower and beans. In addition to arable land, the delta has 1.8 million acres of protected forest and approximately 5 million acres of forest surrounding them. The proximity of the sea and the abundancy of rivers make this area a centre for fish and prawn breeding.

However, due to its very nature, the delta region is flood-prone and is frequently affected by severe floods and storms. As a result, paddies are flooded, houses destroyed and people made homeless. Storms can be caused by local heat meeting cooler air from the Bay of Bengal and the Andaman Sea. These tropical storms usually occur between May and November with high intensity rainfall. Flooding frequently occurs due to the heavy rainfall during the monsoon season between May and September. According to data from the Department of Relief and Resettlement, during the Tsunami 2004, the Ayeyarwaddy delta was one of the areas of Myanmar most affected with 61 officially recognized deaths, 42 injured and 2,562 victims.

Livelihoods are characterized by the ownership of land, livestock (oxen and cows in particular as they contribute to farming), and capacity to hire labour and invest in agriculture. All wealth determinants are one way or another related to agricultural production. Land ownership is the primary dividing line between wealth groups, while plough animals, agricultural machinery, such as tractor, combiner and water pump are resulting factors. However, land owners are very important within the economy because they employ others and therefore provide livelihoods for the less wealthy labourers and typically rent out assets for agricultural production e.g. water pumps and cows for ploughing to 'poor' households. They employ people for agricultural activities that are labour intensive such as land preparation, transferring paddy rice to the main field from nurseries and harvesting. Typically, households within this group do not undertake casual labour for other households but rely on their own production. Typical 'poor' households represent 10 to 25% of the population (or about 40% of landholder) and own only around 1 - 5 acres of land. Ownership of livestock is limited to chickens and ducks and sometimes a pair of bullock. Land is often cultivated with rented plough. To compensate for their limited production of rice and to provide income for non-food necessities, they regularly labour in the fields of the middle and better off farmers. These households may lose proportions of their limited land acreage at times of crises if they default on debts when their land is used as collateral. Floods that reduce harvest or cause crop failure for example can reduce their ability to keep their land. They have small land sizes and subsequent low production. In addition, the land they hold is often situated in areas that make agricultural production more difficult e.g. lower productivity soils or difficult access to water. This makes them more vulnerable and less able to cope with shocks than their better off and middle counterparts.

About 45 to 55% of rural households fall into the very poor landless labourers category. Livestock ownership for this group is limited to a few chickens and/or some ducks. They typically keep at least one pig a year which will be shared with the pig owner; these households earn both their food and cash income from agricultural labour and salt making from sea water. In the absence of local labouring opportunities migratory labour to near by locations is another option. Typically this will include agricultural labour, fishing in the coastal zone, casual labour or trading in beach tourist areas to the Western parts of the country. The landless labourers are most vulnerable to any change or shock that reduces the market price of labour. Declining demand for labour services, increased supply of casual labourers, and market control mechanisms are examples of these. The high proportion of landless

households is indicative of an area with high pressure on land. As the population continues to increase, the number of landless households is expected to rise. In the absence of alternative income opportunities to agriculture, an overall impoverishment can be expected for the poorest landless labour in the medium to long term unless changes occur.

A. Crop Production

The soils of the Ayeyarwady Delta are predominantly *gleysols, fluvic gleysols and humic gleysols*, i.e. gley and gley swampy soils in western parts and meadow and meadow alluvial soils in eastern parts. In southern coastal areas, the soils are predominantly dune forest and beach sands (*arenosols*) and saline swampy meadow gley soils (*gley-gleysols*). Soils tend to be moderately fertile with medium nitrogen, low phosphate, and high potash nutrient status. The land can sustain two crops per year with adequate supplies and proper management of water and chemical and organic fertilisers. The saline soils are low in fertility and require high levels of amelioration.

Between *33% and 51% of the rural population in the cyclone-affected area are landless*, compared to a quarter for the country as a whole[3]. The landless households generate incomes from farm labour, sales of produce from backyard gardens, small livestock, and off-farm activities such as salt making, fishing, etc. The average size of agricultural land holding in the cyclone-affected area is 3.50 ha, compared to 2.57 ha for the country. In the cyclone-affected areas, 14% of landholdings are below 0.04 ha, 28% between 0.4 and 2 ha, 26% between 2 and 4 ha; and 32% over 4 ha. The cropping intensity varies from 58% on land holdings of less than 0.2 ha, to 123% on holdings of 2 ha, and 130% on holdings of 4 ha. Crops are the mainstay of the farming systems in the cyclone-affected area with paddy rice the predominant crop. The prominent cropping pattern is paddy rice followed by pulses such as black gram, green gram and cowpea with sunflower, sesame and corn. Those farmers living close to rivers and lakes, with access to irrigation water, grow a second crop of paddy ("summer rice"). The Ministry of Agriculture estimates that 1.24 million hectares of rice are grown in the affected area (eleven priority townships plus three more in the Yangon division and five in Bago East and Mon State) per year. Rural household livelihoods are supported by small-scale backyard gardens with fruit trees such as banana, mango, jack fruit, guava, cashew nut and vegetables and small-scale livestock such as pigs, ducks and chickens.

There are four *rice-based cropping systems* in the cyclone-affected area:
(i.) Coastal areas with occasional sea water intrusion – planted with long-duration saline tolerant varieties such as *Annawar Bo*, *Let Yone Gyi, Yakhaing Gyi* and *Nga Sein Gyi* which are broadcast in April/May and harvested January/February; (ii.) Flooded areas not usually intruded by sea water – planted with local varieties such as *Nhan Gar* and high quality varieties such as *Manawthukha*, *Paw San* and *Nga Kywe* which are sown between June and early August, transplanted about one month later, and harvested in November and December; (iii.) "Monsoon" rice growing areas, where water management systems allow short-season varieties such as *Thee Dat Yin* to be grown; these are raised in nurseries in July and August, transplanted one month later and harvested in November and December; and (iv.) "Summer" rice growing areas next to rivers and creeks where water management systems allow short-season varieties such as *Thee Dat Yin* to be grown; these are raised in nurseries in November, December and January, transplanted one month later and harvested in March and April.

With respect to *seed multiplication*, there are four levels of seed flows namely breeder seed, foundation seed, registered seed and certified seed. The breeder seed is managed by the Department of Agricultural Research, whereas the others are handled by the Myanmar Agriculture Service (MAS) on its own farms or in cooperation with contract farmers for seed multiplication. The distribution of improved seed to farmers is done by the various levels of field extension workers from MAS. Since almost all of the improved rice varieties are self-pollinated, farmers generally save their own seeds once they have identified the right variety for them - every five years, extension workers encourage the farmers to regenerate their seed stock by adopting certified rice seed from MAS.

[3] 32.3% for Ayeyarwady Division; 51.2% for Yangon Division; and 45.6% for Bago East Division – IDEA International Institute, Quebec City Canada; Integrated Household Living Conditions Survey in Myanmar; 2007

With respect to *soil preparation facilities*, nearly two-thirds of farm families owned animal drawn equipment with a further 16% owning motorised or mechanical agricultural equipment such as power tillers before the cyclone[4]. Because of the higher flood water levels in Ayeyarwady Division and Kungyangong Township of Yangon Division, animal drawn equipment tends to predominate in those areas while power tillers predominate in the remainder of Yangon Division. The main *constraints* encountered by farmers before the cyclone were: (i) access and transportation due to the many creeks and rivers and few access roads; (ii) lack of chemical fertilisers; and (iii) high price of agricultural inputs. In the years prior to the cyclone, farmers were tending to move away from the use of chemical fertilisers.

Institutions and Policies

The Extension Division of the Myanmar Agriculture Service (MAS) of the Ministry of Agriculture and Irrigation (MoAI) is responsible for overseeing agricultural development throughout the country. MAS is represented by Divisional and District Managers and Assistant Managers at divisional and state levels and Township Agricultural Managers and Village Tract and Village Extension Managers at township, village tract and village levels. The Seed Division of MAS is multiplying certified seeds at Thayaungchaung near Patheim for distribution by the Extension Division. The MoAI Department of Agricultural Research is located at Yezin, near Naypyidaw in central Myanmar and its field station at Myaungmya in Ayeyarwady Division carry out research on crop varieties and crop production and crop protection technologies for dissemination through MAS. Agricultural inputs are supplied and paddy rice is marketed by the private sector, all co-ordinated by the Rice Growers Association and Rice Millers Association of the Union of Myanmar Federation of Chamber of Commerce and Industries. Since 1992, the Government of Myanmar's annual Economic Development Plans have prioritised integrated agricultural development through, "freedom of choice in agricultural production, expansion of agricultural land while safeguarding the rights of farmers, and encouragement to the participation of the private sector in commercial production and distribution of farm machinery and agricultural inputs". The Ministry of Agriculture and Irrigation's Fourth Five-Year Short-Term Plan has five key strategies for agricultural development: (i) development of new agriculture land; (ii) provision of sufficient irrigation water; (iii) support to agricultural mechanisation; (iv) application of modern agro-technologies; and (v) development and utilisation of modern varieties.

B. **Livestock**

Large ruminants

The livestock population before the cyclone in the most affected 11 townships of the Ayeyarwady and Yangon division[5] consisted of 661,849 total large ruminants (396,354 cattle and 265,495 buffaloes, out of which 55% or 363,357 are considered adult draught animals). In the two affected divisions each livestock holder owns on average about 3.5 cattle (60,965 holders) or 3.5 buffaloes (63,331 holders) or a combination thereof. In Yangon each holding consists of in average 3.5 buffaloes (11 602 holders) or 6 cattle (29 226 holders) or a combination of both. The rather high number of cattle in Yangon can be explained with the existence of a number of dairy farms. In the Ayeyarwady Divison there is no dairy or beef cattle production cattle and buffaloes are exclusively used for draught. Draught animals are of the local breed and very extensively managed. Main sources of roughage are straw, communal grazing grounds or grazing or cut and carry from the road side. Limited supplementation takes place during the ploughing period, mainly with rice bran and oil seed cakes. According to Myanmar law only incapacitated and cattle over 16 years can be slaughtered.

In the affected area a total of 122,782 ha of land (99,202 hectares in Ayeyarwady; 23,580 ha in Yangon), i.e 15% of paddy land are considered under the deep water rice production system. Paddy fields due to the very high water level during the monsoon season are difficult to prepare with mechanized implements and farmers have to rely almost exclusively on draught animals preferably buffaloes. Buffaloes and draught cattle are also appreciated as they provide manure as fertilizer and

[4] IDEA International Institute, Quebec City Canada; Integrated Household Living Conditions Survey in Myanmar; 2007

[5] When reference is made to the Ayeyarwady and Yangon divisions, it refers to the 7+4 most affected townships.

serve for transport and threshing. Locally one assumes that one pair of buffaloes or cattle can work 2 hectares per season or 4 hectares per year (monsoon and summer paddy).

Pigs, poultry and ducks
Backyard livestock farming is a major source of income for the landless, poor and female headed households. Raising backyard chickens and ducks is wide-spread and Yangon city depends heavily on the surplus produced in Ayeyarwady Division which is picked up by middleman and transported to the markets of Yangon. The livestock population before the cyclone is estimated at 348,000 pigs, 6.786 million poultry and 1.38 million ducks. In the Ayeyarwady Division the average number of chickens and ducks per holding are 21.5 (114,607 holders) and 16.5 respectively (57,704 holders). In Yangon 70,414 holders own an average of 62 poultry and 20,368 owners keep an average of 22.4 ducks. The average pig holding was 5.9 and 5.6 respectively for Ayeyarwady and Yangon with 40,322 holders in Ayeyarwady and 21,320 holders in Yangon.

Animal feed
There are only two feed mills in the Yangon area. One is run by the CP-Myanmar Group (a Thai food and agriculture products conglomerate) producing feed rations for dairy cattle, fish, pig and poultry. The capacity for production of large ruminant feed is 60 tons per day. The Livestock Feed Stuff and Milk Product Enterprise (LFME) a Government owned enterprise produces pig, poultry and fish compound feed. Cattle feed is only produced for the own farms.

Institutional setting
The Livestock Breeding and Veterinary Department (LBVD) of the Ministry of Livestock and Fisheries (MOLF) provides policy guidance and technical services for animal health and production. LBVD is supported by the Myanmar Livestock Federation (MLF) a private sector NGO in promotion and expansion of livestock activities. The organizational structure comprises: the LBVD headquarters in Yangon, Divisional Offices, District Offices, Township and sub Township offices from which the field service is delivered to the farmers. Supporting institutions for the livestock sector are the Central Disease Diagnostic Laboratory and three regional Disease Diagnostic Laboratories as wells as 2 vaccine production units. The following vaccines are locally produced: Hemorrhagic Septicemia (HS), Black Quarter (BQ), Anthrax, ND and Foot and Mouth Disease (FMD) monovalent Type O. With the exception of FMD, the national requirement for vaccine can be met by own resources. However laboratories and vaccine production units face frequently problems of interrupted supply of reagents and raw materials. For all veterinary drugs LBVD depends on imports and supply interruptions are frequent. Veterinarians due to long isolation lack exposure to the latest developments and technologies in veterinary service delivery.

Sector Policies
The government of the Union of Myanmar has a long term national strategy and policies for livestock sub-sector development under which MOLF has allocated land for livestock zones in State & Divisions. The policy objectives are: To increase the livestock production for domestic consumption and share the surplus with other countries; To undertake the conservation and effective utilization of livestock resources; To promote investments related to livestock sector development; To take harmonious effort with livestock development and sustainability; To uplift the socio economic status of livestock communities. Furthermore, MOLF along with other international organizations such as Food and Agriculture Organizations of the United Nations (FAO), the World Animal Health Organizations (OIE) and through the bilateral and multilateral sources are promoting livestock breeding and veterinary services in the country.

C. **Fisheries**

Fish is considered an essential part of the diet of the people of Myanmar, second only to rice. The country is endowed with rich and varied marine, coastal and inland fishery resources, and has a coastline of 2,832 km and a total *marine fishery* area of 486,000 km^2. Before the cyclone, 32,632 in-shore fishing vessels and 2,054 off-shore fishing vessels were operating in Myanmar waters. Medium size trawlers, purse seiners and long liners are important for the marine fishing. A large number of

traditional fishing gears operate in the open fisheries of coastal and inland areas. The permanent inland water bodies of Myanmar - lakes, reservoirs, rivers and ponds - cover about 13,000 km^2. This area varies throughout the year when floodplains and rice fields are flooded, providing a further 68,000 km^2 of rich seasonal fishing grounds. Throughout the country, there are 3,725 *floodplain fisheries concessions* ("leasable fisheries" or "inns"), nearly half of which (1,738) are located in Ayeyarwaddy Delta. They consist of productive fishing grounds of variable size usually located on a river branch; men are employed as fishing labourers and women for fish processing. To increase fish production, enrichment stocking is practiced in some inns. The so-called '*open fisheries*' are accessible to all to fish with licensed gear. In addition to these two categories of inland fishing, household subsistence fishing is widely practiced. In addition to the formal fisheries, aquatic organisms (fish, crab, molluscs, frogs etc.) widely provide essential livelihoods support, in particular to the landless and the poorest elements of the population. For 2006-2007, the total *capture fisheries* production from all waters is reported by the Department of Fisheries (DOF) to be 2.235 million MT, but this is likely to be considerably higher due to non and underreporting of catches. *Aquaculture* production in Myanmar was 604,660 tonnes in 2006-2007, or 21% of the total fishery production. Aquaculture contributes to food security and is one of the important industries of the country. In 2007, Myanmar had 85,924 ha of fish ponds and 90,927 ha of shrimp ponds. Pond culture of freshwater fish is well developed and caters to domestic demand as well as to export. Fourteen kinds of freshwater fish, mostly carps, are successfully cultured. Fingerlings and shrimp seed are produced by government-owned and private hatcheries.

Fisheries and aquaculture are practiced in labour-intensive ways, providing numerous *employment opportunities*. Inland fisheries support directly and indirectly the livelihoods of hundreds of thousands of households, contributing to food security at all levels and to the national economy. Post-harvest treatment of the catches includes freezing, drying, smoking, salting and the preparation of fermented fish products, and is mostly done by women. Livelihoods are directly and indirectly derived from fishery activities, and sustain households within the sector and in many related activities such as transport, marketing and processing. As in many other regions rich in fish resources, fishing is an important coping strategy for the poor and landless. In 2004, 797,738 persons were estimated to be directly employed in fishing and aquaculture, and an additional 2,562,230 persons were employed in providing services to the fishery activities[6]. Subsistence fishers have other occupations, usually farming. They fish in the flood plains and paddies using a very simple gear and fish on foot or in very small canoes which are also their main means of transport during the monsoon and in permanently inundated areas.

The *national policy* of the fishery sector focuses on increasing fish production for domestic consumption and exporting surplus production, expansion of aquaculture and improving the socio-economic conditions of fishing communities, while conserving the freshwater and marine resources and biodiversity. The Department of Fisheries of the Ministry of Livestock and Fisheries is the sole responsible institution and competent authority for the management and sustainable development of the country's fishery. Its responsibilities include distribution of quality seed of fish and shrimp; conservation of fisheries resources, the environment and biodiversity; research to develop fisheries technology; enhancement of fish production for domestic consumption and export; replenishment of fisheries resources by restocking; education and public awareness raising of fisheries resources conservation; dissemination of technology in fishing, aquaculture and fish processing; and capacity building of departmental personnel. The Department of Fisheries keeps records of motorized vessels operating in the inshore and offshore fisheries, however, a large number of small-scale, part time and subsistence fishers which use small un-mechanized vessels are un-registered. The State issues directives and regulations in accordance with the fisheries laws on conservation of fishery resources and sustainable fisheries management. The Myanmar Fishers Federation (MFF) represents the interests of fishers and aquaculture producers and facilitates the development of the sector.

The main constraints facing the fishery sector in Myanmar include inadequate seed supply and hatchery technologies in the marine finfish aquaculture while inadequate knowledge of the actual

[6] Source: *FAO Fishery and Aquaculture Country Profile Myanmar*

status of the marine resources limits the potential for good management. Lack of technical skills and capacity to add value to small and medium scale fishery products leaves a considerable part of the potential of the catches untapped. The strong *decline of the mangrove areas* along the entire coastline of Myanmar and in particular in the Ayeyarwaddy delta limits the productivity of the capture fisheries and reduces their resilience to recover from over-fishing or other calamities.

The cyclone-affected areas are among the most diverse fishery regions in the world. In many places, a whole range of fishing and aquaculture practices is found in one location, while in most other places these are geographically distinct. Coastal fishing villages in the Ayeyarwaddy delta for example may be home to marine and inland fishers, as well as the location of commercial and household aquaculture undertakings. In 2006-2007, 32,628 marine fishing vessels were registered in Myanmar, of which 2,055 engaged in off-shore fisheries and 30,573 smaller in-shore boats[7]. No data are available on the number of inland fishing boats but most of the inland fishing methods require the use of a boat.

D. **Forestry**

About half of the territory of Myanmar is covered with forests – about 20 million hectares. Currently, the annual export earning from forests exceeds $340 million, which accounts for nearly 22 % of its total exports. The heavy dependence on forestry has taken its toll on them – current annual deforestation is considerable, at about 1.4%, and this trend is rising. The area of concern, the Ayeyarwady delta, is a large flood plain with an extensive coastline. The worst affected townships are the Ayeyarwady and Yangon Divisions. The area used to be covered extensively with mangroves, but currently only 496,000 ha are classified as such. Of that mangrove/forest area only about 285,000 ha are still believed to be forested. The rest has become degraded and may even be barren. Such a dramatic reduction in mangrove forest cover started in the early 1920s with conversion of the area for paddy cultivation. Records, both departmental records and satellite images point to such dramatic change in mangrove forest cover. For example, the township of Bogalay (Ayeyarwady Division) had about 139,000 ha of mangrove forests in the early 1920s. Only about 24,000 ha of that can be found in the mid-1990s. The situation is critical - not only has the forest cover declined drastically, the remaining areas are heavily degraded or destroyed.

Despite such huge loss of the mangroves in the delta, the remaining forests still provide valuable economic and ecological benefits. Their ecological benefits are almost unending: mangroves are important in stabilization of the shorelines, protect inland areas from wind damage and wave surges, limit saline intrusion into agricultural areas, are crucial as the nurseries for fisheries, and they also harbour a high level of biodiversity. The economic benefits are equally valuable. The mangroves are an important source of fuelwood, charcoal production, construction material such as poles and thatch, medicines, tannins, food, etc. The value of this resource is heightened owing to the fact that poorer people depend considerably for their livelihood on this ecosystem. For example, in 2007 alone, the cyclone affected townships of Myaung Mya, Pyapon, Pathein and Yangon (West and North) produced 7,000 ton[3] of firewood, 32,000 ton[3] of charcoal, 26 million stems of bamboo, 66 million nypa roof thatches and 285,000 *Phoenix* construction poles.

However, with the decline in the mangrove resource, many of the villagers were facing hardship already before the cyclone. Families that depend on woodcutting and charcoal processing have been severely affected by the disappearance of the forest resource. Farmers growing traditional paddy varieties in saline/brackish water areas risk low yields as a result of soil salinity and bank erosion. Fishermen also suffer from smaller catches in the degraded mangrove environment – loss of tree cover destroyed the wetland fish-breeding habitat. The Forest Department is clearly aware of the situation, and has attempted to initiate several programmes to improve the remaining forest stands. Supplementary planting work using nursery raised seedlings was attempted, with very poor results. Mangrove rehabilitation is complex, and the ecology must be clearly understood for such plantings to work. Rehabilitation through natural regeneration may not always be successful if the seed source is absent or the silt conditions have changed in the area. Community-based mangrove forest management

[7] Source: *Fishery Statistics 2006-2007, Department of Fisheries, Myanmar*

initiatives were also attempted in the past. These too suffered from the fact that the government policies did not give much emphasis to this component, and the Forest Department staff was not adequately trained in participatory approaches and organizing forest user communities. But all these initiatives, even if they held some hope, were thwarted clearly by illegal encroachments from agricultural conversion, opening forests for aquaculture ponds, and premature cutting of trees. The circumstances were premade for the devastating effect of Cyclone Nargis. *If the forests had remained intact, especially along the coasts fringing the sea shore and river mouths, they would have greatly buffered the impact of the wave surge, and considerably reduced loss of life. Studies, mostly since post-tsunami (Indian Ocean) event, are providing evidence to the protective role of mangroves from wave surges and strong winds.*

II. IMPACT ASSESSMENT

Myanmar's hardship caused by Cyclone Nargis is unprecedented - never before in the country's recent history has there been a natural disaster of this magnitude. The cyclone cut a huge swath of destruction about 100 miles wide across 200 miles in the populous Irrawaddy Delta, killing an estimated more than 100,000 people and ten thousands of livestock, while destroying homes, crops, property and entire livelihoods. Those areas exposed to the greatest strength and impact of the cyclone include eastern Ngapudaw, Labutta, Mawlamyinegyun, Bogale townships (districts) of the southern Ayeyarwady Division (province), while Pyapone, Dedaye, and Kaiklat of Ayeyarwaddy Division and Kungyangon, Khawmu, Twantay, and Kyauktan townships of Yangon Division were devastated to a slightly lesser degree. Given the devastation of homes and infrastructure, loss of agricultural land and loss of access to fishing grounds due to persistent flooding and the shifting of sands, many people have been displaced and are currently staying either in government-run settlements of informal temporary shelters such as monasteries, schools and other public building. The number of people in these settlements/shelters is fluid as people attempt to return home and settlements are consolidated or disbanded. According to a survey done in 11 of the 15 the worst affected townships[8], of more than 3500 villages, nearly 1400 were severely destroyed (extensive loss of life and property). In these 11 townships alone, the number of homeless is amounting to more than 660,000 (28% of the affected population). While temporary settlements/shelters are housing some of them, the majority (80%) of the homeless are living with relatives or on their own plot of land.

The cyclone hit against a backdrop of growing and entrenched vulnerability and food insecurity among hundreds of thousands of rural families in Myanmar. The livelihood activities of the severely affected people include crop production, livestock rearing, fishing and petty trade. Over 70 percent of the country's poor live in rural areas and make their living from farming small plots of land. However, in some parts almost half of the rural poor are landless families who work as casual labourers on farms; they earn less than $1 a day and their employment is mostly seasonal, and non-farm jobs are scarce and low-paying. Growing population, decreasing farm size, diminishing soil fertility, declining yields, and high costs of imports such as fertilizer have meant farm families had little cushion before the cyclone. While for many families life was already very harsh and insecure before the storm, those most vulnerable communities have now even less resilience or resources for recovery.

Most families lost their food/seed stocks and livestock and physical access to food markets has been disrupted in the worst-affected areas. The loss of assets and destruction of communication networks have resulted in the non- functioning of a majority of rural markets and limited supply of basic goods and services, leading to increasingly high prices of food commodities. The damage to croplands, livestock, fishing ponds, and tree nurseries has increased unemployment for the extreme poor who depend on wage labour for their livelihood. The coping mechanisms of the severely-affected people include migration to other areas in search of employment opportunities, distress sale of remaining assets, reduction in food consumption, sharing of shelter, loans and borrowings.

[8] Ngapudaw, Labutta, Mawlamyinegyun, Bogale, Pyapon, Dedaye, Kaiklat, Kungyangon, Khawmu, Twantay, and Kyauktan townships.

Soaring food and other inputs prices

Normally, middle and large farmers keep the paddy stock and release it to the market during the rainy season - July and August when the price trend of rice is picking up. However, stored food stock such as paddy grain, salt, agricultural inputs such as rice seeds, farm implements and machineries, draught animals and most of the small rice mills called hullers were lost and damaged by the Cyclone. Consequently, the decreasing trend in supply increased market prices, particularly of local good quality *rice* varieties such as *Pawsan*, *Ngakwae* and *Zeyar* at both Yangon and Mandalay wholesale markets. The market prices of these quality rice varieties are still increasing and are currently 50% higher than before the cyclone during in the last week of April – except for *Ngasein* (rough rice) with 20% price increase. The market price of salt increased up to 300% immediately after the storm, however the price trend tends to decline due to the increased supply from other coastal areas of the country. The market price of edible oil increased by 17% after the cyclone but dropped to normal levels thereafter. Likewise, the prices of other culinary commodities such as onion, garlic, dried chili remained roughly stable - except for potato with an 85% increase as compared to pre-Nargis levels.

Dhani is made of leaves from Nipa palm which is used as roofing material in most of the houses and buildings in rural areas and also for houses at the outskirt of urban areas. The Nipa palm forms part of the mangrove forest plants, and is grown in the tidal salt water intrusion areas. Most of the Nipa palms were also damaged by the cyclone and remaining nipa leaves are now cut and used by the village peoples in cyclone affected areas for roofing of shelters. As a result of the cyclone, the price of *dhani* roof has increased by 600% due to high demand, damage and loss of stock. The business of *dhani* roof making and marketing is one of the non-farm income earners in the southern part of delta area. It is estimated that it will take at least one year to rectify the market to pre-disaster levels. Although the market supply of *fish* from the delta has decreased, the price has remained almost unchanged, since increased supply of fresh water fish from aquaculture in other areas and due to widespread reluctance of consumers related to marine fisheries produce being associated with fish feeding on dead bodies of storm victims. The price changes of other food items and household utilities are not significant. Concerning agricultural inputs, the price of MOP *fertilizer* increased 22% per 50 kg, whereas Urea and TSP remained stable.

A. **Crop Production**

The impact of the cyclone on crop production was six-fold: (i) submergence/severe flooding of paddy lands with water and deposition of sediments and debris; (ii) intrusion of sea water and damage to soils by salt; (iii) loss or damage to the late "summer" rice crop; (iv) breakage and uprooting of tree crops; (v) loss of seed stocks; (vi) loss of draught animals, hand tools and farm machinery; and (vii) damage to flood protection embankments.

Submergence and damage to paddy land

Overall, it is estimated that some 783,220 ha of paddy fields were submerged by the cyclone, i.e. 63% of paddy land in a total of 19 townships of the two main affected Divisions, plus Bago East and Mon State. In the southern areas this was surge of sea water, while in central and northern areas, it was a flood of fresh water. The worst severely affected townships were Labutta, Bogale, Pyapone,Dedaye, Ngapudaw, Mawlamyinegyum and Kyaikiat in Ayeyarwady Division and Kyauktan, Kungyangong, Twantay and Kawhmu in Yangon Division with some 567,302 ha (69%) of the paddy land submerged (Table 1). By the end of May 2008, most of the affected areas had drained with only a few pockets of inundation remaining. However, it is still estimated that some 130,000 ha of paddy fields need to be rehabilitated before farmers can return to their fields and cultivate a crop. With respect to salinity levels, 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. However, the soils were already saturated before the cyclone from earlier rains, the floods drained away within a few days, and any remaining salinity has been washed out by subsequent heavy rains. The only problems that remain are those low lying areas adjacent to saline swampy meadow gley soils which face difficulties with drainage and any reclamation will require long-term assistance.

Destroyed seed stock
It is estimated that between 75 and 85% of seed stocks from the cyclone-affected area were destroyed by flooding or subsequent wetting from rain because traditional bamboo seed stores were severely damaged by the cyclone. Farmers are making every attempt to dry seeds salvaged from the ruins of their stores by spreading them out on plastic sheets in the sun but germination rates can be expected to be low. It can be assumed that all farmers planning to utilise locally stored traditional varieties of rice seed for the June/August 2008 planting season will require assistance from external sources. Farmers generally buy HYV and improved varieties from MAS or public sector suppliers but they now lack the cash to do so. It should also be noted that all of the *farmyard manure* in the cyclone-affected area was washed away by the floods and farmers will have to use expensive chemical fertilisers to accompany the HYV and improved varieties.

Limited land preparation facilities – loss of draught animals and farm implements/machinery
Draught animals are the predominant method of land preparation in the deeper flood waters of Ayeyarwady Division and Kungyangong Township of Yangon Division while power tillers predominate in the shallower and better managed flood waters of the remaining townships of Yangon Division. It has been a trend in recent times for farmers to replace draught animals with "single-wheel" power tillers which are able to cope with deeper flood waters. Farmers tend to make eight "passes" to prepare paddy land for planting rice – this means that a pair of draft animals can cultivate 2 ha per cropping season and a power tiller 20 ha per season. However, due to the destruction caused by the cyclone *the overriding factor preventing farmers returning to rice production is a serious shortage of draught animals and power tillers to cultivate the paddy* fields and, where farmers have access to power tillers, they have no cash to pay for fuel and lubricants. As a general rule, farmers sell their surplus grain in May and June to pay for, *inter alia*, fuel and lubricants – but with most of this seed/grain destroyed by the cyclone the farmers lack essential working capital.

It is estimated that some 122,505 draught animals (Table 1) were lost in the eleven cyclone-affected priority townships. Many of those animals that survived the cyclone are now sick and too weak to work. The worst affected townships were Labutta and Mawlamyinegyun in Ayeyarwady Division where more than 70% of draught animals were lost. Moreover, it is estimated that some 2,996 power tillers, 121,373 harrows, ploughs and rotary cultivators, 19,655 carts and 132,085 other farm implements were lost during the cyclone. The worst affected townships were Kungyangong and Kawhmu in Yangon Division and Labutta Township in Yangon Division where more than 30 per cent of power tillers were destroyed. The loss of draught animals and power tillers means that an estimated 52,121 (3.5 ha average farm size) farmers will not be able to plant monsoon rice between June and August 2008. This translates into a loss of production on some 183,425 ha[9] of paddy land (i.e. 32% of the most severely cyclone-affected area in Ayeyarwady and Yangon Divisions). At present yield rates, this could mean a loss of 550,000 metric tonnes of paddy rice, i.e. 2% of Myanmar's total annual paddy production for 2006/2007.

Loss of summer paddy crop
It is estimated that some 29,500 ha of summer paddy crop that was planted late in the season were destroyed by the cyclone with a loss of 133,051 metric tonnes.

Loss of horticultural production
It is estimated that overall 37% of orchard crops were severely damaged or destroyed by the cyclone in a total of 19 townships of the two main affected Divisions, plus Bago East and Mon State, i.e. 32,048 ha of fruit trees, in particular coconut, banana, (young) mango, jack fruit, guava, cashew nut and betel nut and standing crops of vegetables. While most of the coconut trees are still standing, the cyclone has twisted their crowns which, in due course, will lead to nematode infestation, dwindling production and a slow death. The worst affected townships were Ngapudaw and Labutta where some 10,882 ha were destroyed and will require re-planting. While figures do not exist for individual townships in Yangon and Bago East Divisions and Mon State, it can be assumed that damage to tree

[9] On the assumption that one pair of draught animals cultivates 2 ha per season and one power tiller cultivates 20 ha per cropping season

crops was greatest in the townships of Khawmu and Twantay in Yangon Division and Thaton in Mon State where cropped areas are in excess of 10,000 ha per township. It should be noted that *these figures do not account for the estimated 100,000 to 120,000 landless farmers who also lost tree crops and vegetables from their kitchen gardens*.

Coastal embankments

According to the Ministry of Agriculture, established embankments and polders located in Ngaputaw, Labutta, Bogale, Pyapon and Dedaye townships in Ayeyarwaddy and Yangon division were severely damaged due to abnormal 4m storm surge. The total length of existing embankment is 656 miles with a protected area of 127,500 ha mainly of paddy land. These embankments were constructed by the PLD phase I+II project funded by the World Bank - started in 1976 and completed 1990. According to the initial survey made by the Ministry, a total of 37 polders (about 166 miles in length with an earth work volume of 1.0 million m^3, including the repair of 15 sluice gates) need to be repaired in order to ensure sea water protected rice production during the current monsoon season.

B. **Livestock**

Three Divisions Ayeyarwady, Yangon and Bago and two States Mon and Kayin were initially declared disaster zones by the Government of Myanmar. After the preliminary assessment the LBVD of the Ministry of Livestock and Fisheries decided to focus the attention on the most severely hit seven townships in Ayeyarwady Division (Ngapudaw, Laputta, Mawlamyaing Gyun, Pya Pon, Bogale, KyaikLatt and Daedaye) and 4 townships in Yangon Division (Kungyangon, Twantay, Kawhmu and Kyauktan). Mawlamyinegyun, Labutta, Kyaiklet and Bogale townships of Ayeyarwady division are the most seriously hit township and are considered for priority action.

Direct losses

Based on the primary data gathered by the disaster emergency response group and Ministry of Livestock and Fisheries (MOLF) and published on 22 May 2008, the estimated numbers of livestock killed in the 11 townships are:

Large ruminants:	227,268 *(90,855 cattle; 136,413 buffaloes) of which 122,524 mature draught animals.*
Pigs:	66,000
Poultry:	1,134,000
Ducks:	498,000
Goats:	6,999

Most seriously affected were the Townships of Bogale where 51% and Labutta and Mawlamyinegyun where over 70 % of the large ruminants were killed. In Labutta 85% of the pigs were lost, while in Dadeye, Kyaiklet and Labutta with over 75% mortality practically all poultry and ducks were wiped out. High winds and the storm surge also destroyed *cattle sheds* and pig and *poultry houses*. *Feed reserves* such as rice straw, brans and cakes were either washed away or made unusable due to salt water intrusion. The *veterinary infrastructure* was hit and veterinary clinics and dispensaries were damaged.

Loss of draught animal power

As mentioned above draught animal are an important asset to prepare the paddy fields for the imminent monsoon planting season. The loss of 122,524 draught animals or 61,000 pairs of bulloks means that, if not replaced soonest, an average of 122,000 hectares of paddy cannot be planted or only planted in insufficiently prepared seed beds resulting in lower yields[10]. The inability to plant the 2008 monsoon season would put many of the farming families under great economic threat as loans cannot be paid back and other financial obligations won't be met. The resulting lack of rice would have a negative impact on the food security particularly also in view of the recent soaring of food prices.

[10] Assuming the seeds are made available in time and that the waters has receded and the fields are cleared.

Loss of livestock products meat and eggs
The loss of livestock products impacts the availability of meat and eggs. LBVD estimated the loss in ruminant meat production at 21,752 tons assuming an average weight of 98 kg over all age classes for the animals lost. The supply of livestock products such as meat and eggs to Yangon has suffered seriously. According to the Yangon City administration supply of pigs, chicken, ducks and eggs have decreased substantially because of reduced production but also problems in transport. This has resulted in increasing prices: Pork from Kyat 5500 to 6000 per viss (1 viss = 1.6 kg); local chicken from Kyat 7000 to 7500 per viss; commercial chicken from Kyat 5000 to 6000 per viss; duck meat from Kyat 7000 to 7500 per viss and duck eggs from 110 to 130; chicken eggs from 100 to 120.

Threat of disease outbreaks
The break down of the general infrastructure and the damage to the veterinary stations impede the routine delivery of veterinary services. Seasonal vaccination cannot take place. Dead animals cannot be properly disposed off - they decompose in ditches and fields, contaminate water and are a source of disease. 434,581 cattle and buffaloes, 262,000 pigs, over 5.5 million chicken and 0.9 million ducks have survived. These surviving animals are stressed and weakened, they have limited access to feed and clean water and are therefore more susceptible to diseases. Seasonal outbreaks of livestock diseases which commonly occur under such circumstances cannot be controlled and are a further threat. These animals need particular attention from veterinary services.

Impact on the farming community and on livelihood
Around 32 % of the rural household in Ayeyarwady Division and 51% in Yangon Division are considered landless. Landless families who keep backyard livestock are mostly the most vulnerable communities, including widows and women-headed families. They are most seriously affected as they depend totally on the few livestock and on casual employment opportunities. These together with seasonal-paid farm workers should receive high priority in any recovery programme. However, reliable numbers of affected households, backyard farms and smallholder farms are not available up to now as some of the locations are still not reachable.

C. **Fisheries**

Each sub sector of the fisheries, leasable, open, inshore, offshore, aquaculture and subsistence, employs specific gear and tools and operations. The destruction caused to the fishery by cyclone Nargis in the affected areas of the Ayeyarwaddy, Yangon and Bago Divisions and the Mon and Kayin States was brought about in two main ways: (a.) damage from high winds and debris and related impact caused by the storm surge, and (b.) flooding and intrusion of salt water. Cross-cutting damage for all five categories includes the loss of life and injuries to people. Damage to general infrastructure (transport, power supply etc.) exacerbates the damage to the fishery and hampers in many places the recovery efforts. Common also to all categories is damage to post-harvest capabilities, i.e. the loss of fish processing, marketing and transport infrastructure and equipment. This has an impact on food security in the area and caused the loss of employment opportunities, in particular for women.

The off-shore fisheries were struck hard, partly because there is no early-warning system in place, and many fishing boats were overcome by the cyclone while fishing far out of the coast. Many of the boats were lost at sea with their entire crew and all their equipment. Vessels that happened to be moored or anchored at the time of the cyclone were damaged or sank at their mooring sites, leaving a number of them in a salvageable state. The in-shore fisheries suffered from the same damage as the off-shore fleet, albeit that a number of the vessels and their crews were able to return to shore. Many of the moored or beached vessels were subsequently lost at sea or displaced or damaged when the storm surge caused them to drift uncontrolled. Fish processing installations were damaged or destroyed. Much gear was lost. The inland fisheries suffered damage in the form of loss of or damage to fishing and transport boats, fishing gear and equipment, processing installations and equipment, including ice factories and cooling facilities. Many skilled fishers and processors died in the flooding and the storm. Over 27,000 fisheries workers are missing or dead.

The damage to aquaculture includes loss of stock when ponds were flooded and damage to ponds, cages and infrastructure. In the flooded areas, the loss of aquaculture stock must have been near total. The extent of damage to ponds depends on their size, the construction characteristics and condition of dykes, and debris that has accumulated inside the ponds, including trees, sand and silt. In particular for ponds where the stock is harvested with seines the presence of sizeable debris can make that operation impossible. Salt water intrusion may have had an impact on the freshwater ponds, albeit that this is believed to be limited due to the fact that the soils were saturated with fresh (rain) water. Buildings and shelter used in aquaculture (feed storage, processing areas, animal shelters) have sustained severe damage or complete destruction in many places. The commercial aquaculture is capital-intensive and the loss of mature stock from flooded ponds has caused substantial economic damage, while household ponds are in many cases multi-purpose ponds and with low stock densities, the economic damage might be less significant. Nonetheless, the impact on household food security and nutrition can be substantial. These ponds are less susceptible to physical damage because of their design, and can be readily repaired. Mobile aquaculture equipment such as aerators was also damaged, destroyed or lost. The aquaculture sector also sustained damage to hatcheries, which provide the fish and shrimp material to stock ponds and restock the leasable fisheries. The susceptibility to storm and flood damage of a hatchery depends on the techniques that are used to produce seed or fingerlings. Flooding would in many cases have caused the loss of broodstock and fingerlings or seed. Hatcheries typically have buildings and some laboratory facilities, depending on the techniques used. The below table highlights the impact of the cyclone on the marine fisheries sector:

Off-shore fishing vessels	41
Local off-shore fishing boats	288
In-shore fishing boats (motorised)	553
In-shore fishing boats (non-motorised)	1,206
Off-shore fishing gears	200 sets
In-shore fishing gears (motorised)	330 sets
In-shore fishing gears (non-motorised)	2,230 sets
Crew members dead	17,876
Crew members missing	9,612

Source: Department of Fisheries - 18 May 2008

In addition to the above, unconfirmed secondary sources indicate that on average more than 1,000 small boats of other categories have been lost in each township. Furthermore, in the Ayeyarwaddy Division and Yangon Division, a total of 55 cold storages were damaged. The estimated impact on private sector aquaculture reveals that over 15,000 ha of ponds have been damaged. The total production loss of fish as a result of the cyclone (both from capture fisheries and aquaculture) is believed to be 150,000 tonnes of fish. The DOF expects that the impact of cyclone Nargis will reduce the export of fishery products by 10%.

D. **Forestry**

Based on the information gathering network of the Ministry of Forestry and the analysis of satellite imagery, the cyclone affected both the natural forests and plantation stands especially of the Ayeyarwady Division. About *14,000 ha out of 275,000 ha of mangroves were clearly lost*. Besides mangroves, the Forest Department had established some tree plantations in the Ayeyarwady and Yangon Divisions. Out *of the 63,000 ha of tree plantations in the area, about a third (21,000 ha) was damaged* by the cyclone. Together, the loss of standing timber amounts to about $6 million for the area under consideration. Besides damage to forestry production and timber stands, *infrastructure belonging to the Forestry Department was also destroyed* - mainly office and housing buildings. It does not include other constructions such as forest roads, bridges, camps, vehicles, and logging machinery. Nor was it possible to give value to intangibles such as office records and other data. Similarly, no information is forthcoming with regards to losses suffered by operators, harvesters, planters, wood manufacturers, most of which are borne by private entrepreneurs.

A more urgent concern is how the loss of forestry production chain would have on the rural people heavily or partially dependent on forestry for their livelihood. Considering the current annual production of forest goods with about $10 million in the cyclone devastated areas of the three townships of Myaung Mya, Pyapon, Pathein and Yangon, this would translate into considerable losses for rural people whose livelihoods are more closely tied to natural resources. Precise socio-economic information on how this would impact the most dependent and vulnerable groups is not forthcoming at this early stage. However, some approximations can be deduced based on population statistics, and known estimate of percentage of the population dependent on forestry resources for their survival. The mangrove forests have been aptly described as the poor man's overcoat in that a large number of artisanal fisherman, landless poor, and marginal farmers are dependent on them for their direct and indirect incomes. A socio-economic survey in the mid-1990s made such a case (FAO MYA/90/003, field doc no.8). The study also pointed out the special benefit of mangroves for women – with easy fuelwood availability, women can save time on such pursuits. 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. This quick approximation has not taken into consideration the incomes people receive from aquaculture farming which is directly located in the mangrove areas.

III. STRATEGIC APPROACH

Emergency and Rehabilitation support to the cyclone-affected communities should not simply be punctual in response to the crisis but should comprise actions oriented towards socio-economic development of the agricultural sector, mainly in the affected areas. Fund mobilization and overall efforts should be geared towards enabling farmers and fishers not only to cover their minimum needs to resume pre-cyclone economic activities but also to improve their production systems and income-generating capacity. Consequent to the above findings, the recovery of the most vulnerable farming and fishing communities should contribute to the overall achievement of *three main objectives*:

- Increased levels of food security and food self-reliance;
- Reduction of poverty;
- Increased standards of living.

In order to achieve these general objectives in the devastated areas of the Ayeyarwady delta and other locations hit by the cyclone, the recovery strategy for the agriculture sector should aim at:

- optimizing the utilization of resource endowments for increased productivity in agriculture and fisheries, related income and employment on a cost-effective and sustainable basis;
- overcoming the status of stagnating production levels; based on a secure level of production for home consumption the farming communities should be given the means to increase production volumes in order to benefit from existing and new markets inside and outside of their region; and
- ensuring that emergency/short-term initiatives and medium-term rehabilitation efforts are rationally combined in order to form a sound basis for the long-term development of the sector; in this respect, simultaneous institutional building and human resources development will be fundamental to creating the needed implementation capacity and lasting sustainability.

With respect to the latter, a specific medium to long-term recovery and development strategy would have to be formulated in parallel – with the objective to (1) delineate in detail the needed bridging guidelines between the early recovery stage and medium- to long-term policy and strategy reforms required to modernize the sector, and (2) elaborate a priority medium/long-term Strategic Action Plan for the agriculture sector. Based, inter alia, on the findings of the FAO Needs Assessment Mission,

such strategy would: (a) identify the medium- and long-term policy/strategy implications of the proposed emergency and rehabilitation programme for the different types of farming/fishing activities, e.g. rehabilitation of major embankments; (b) identify key stakeholders of the commodity chains affected by the cyclone (inter alia, service and input providers, chambers of commerce, farmers groups, associations and cooperatives, export quality assurance systems and other entities); and (c) elaborate policy instruments/changes through which capacity-building support over the medium-term could contribute to overall sector recovery.

While the agricultural sector as a whole is expected to bounce back quickly, the same is not necessarily true for the livelihoods of the most vulnerable rural households. Many households will remain burdened by asset/harvest/income losses over the medium-term and may also suffer from the loss of other sources of income. As a priority, assistance should target the lack of *working capital* which poses the greatest threat to the recovery of the agricultural sector. Seasonal credit is dominated by input suppliers. The risk is that farmers and input suppliers will now be unable to pre-finance the 2008/9 crop because of the cash-flow shortfall from 2008 cyclone-related losses. Therefore, the below recommended emergency and rehabilitation programme/projects are largely designed to address the critical situation of accumulated debt and unavailability of needed working capital amongst the farming/fishing communities of the Ayayerwady delta, through appropriate supply of indispensable farm inputs and implements – working capital in kind – crucial to kick-start the re-vitalization of the sub-sectors.[11] Translated into pragmatic action, the recovery strategy of the sector should be focusing on:

Main Benchmarks for Emergency and Rehabilitation:

- Appropriate and timely supply of basic production inputs (including seeds and fertilizer, livestock, fishing gear and boats, etc.);
- Opening accessible and readily available credit avenues for farmers/fishermen, both women and men; and
- Initiating the process of infrastructural, institutional and human capacity building.

A. Crops Sub-Sector

All emergency and rehabilitation interventions will focus on the eleven worst affected priority townships of Bogale, Dedaye, Kyaikiat, Labutta, Mawlamyinegyun, Ngapudaw and Pyapone of Ayeyarwady Division and Khawhmu, Kungyangong, Kyauktan and Twantay Townships of Yangon Division. As a rule, *the crops programme would be targeting those areas which were submerged by the tidal surge and severe floods*. However, the horticultural interventions would go beyond these areas to restore tree crop production damaged and destroyed by the strong winds.

Furthermore, the assessment strategy is also tied to the fact that there is a serious lack of manpower (death and out-migration of entire families), shelter, food and potable water in some areas to support the labour supply required to undertake the recovery work needed. The situation is worsened by the fact that the cost of labour in urban areas has tripled since the cyclone and rural people have been attracted to construction sites in the towns. In this respect, the worst affected townships are Bogale, Labutta and Ngapudaw in Ayeyarwady Division and Kawhmu, Kungyangong and Kyauktan in Yangon Division.

[11] *In addition to the recommended early recovery initiatives, micro-credit/cash for work programmes already operating in the delta (e.g. PACT/UNDP) - or to be set up - should be scaled up where capacity permits. Their experience of managing smallholders' post-cyclone debts will provide useful lessons for the design of any new seasonal credit programmes. In addition, immediate assistance could be used to provide long-term loans to commercial banks (and through them to input suppliers) in return for the writing-off of 2008 seasonal financing debts and the extension of new credits to smallholders to support the recovery in 2008.*

Government Emergency and Recovery Interventions

The MoAI prepared a *Rehabilitation Plan for the Agricultural Sector Affected by Nargis Cyclone* which recommends that affected farmers be provided with some US$ 221 million of cropping inputs and costal embankments be rehabilitated at an estimated cost of US$ 100 million. The estimates for inputs are based on the total replacement cost of agricultural machinery and all seeds and fertilisers required to plant 542,900 ha of paddy land for the 2008 monsoon season, i.e. US$ 28 million for power tillers; US$ 129 million for 50,892 MT of rice seeds and accompanying fertilisers and pesticides; US$ 56 million for sprayers, harvesters, threshing machines, dryers and rice mills; and US$ 6.24 million for fuel and lubricants to operate the agricultural machinery. It should be noted that *MoAI is targeting all landholdings irrespective of farm size*. The MoAI's Rehabilitation Plan for the Agricultural Sector Affected by Nargis Cyclone recommends 13,038 MT of local long-season varieties be supplied to farmers in the cyclone-affected areas. Due to the insufficient time to plant the long-season varieties, the MoAI figures were subsequently revised to 37,854 MT of rice required to support 414,480 ha of paddy land, i.e. 19,362 MT of HYV, 10,275 of *hnankar* improved varieties, and 8,217 MT of salt tolerant varieties. The Government plan is based on the assumption that Dedaye, Kyaikiat, Ngapudaw and Pyapone townships of Ayeyarwady Division and Khawhmu, Kungyangong, Kyauktan and Twantay townships of Yangon Division "can grow their normal monsoon area" without constraints.

The *FAO Need Assessment* estimates that there are 366,070 ha of paddy land cropped by some 101,837 farmers immediately available for planting in the 2008 monsoon cropping season, requiring some 36,607 MT of rice seeds (see Annex 1: Tables 1 + 2). While the FAO and MoAI needs assessments are similar in total, the distributions across townships vary. There is a discrepancy because of MoAI's assumption that eight affected districts can resume normal paddy rice production. Table 1 however shows that between a 62 and 93% of draught animals and 15 and 55% of power tillers were lost from those eight townships during the cyclone and there is no likelihood of them all being replaced before August 2008.

In addition to the above government plan, power tillers and draught animals have been supplied to the cyclone-affected area within three weeks of the disaster, by the MoAI's Agricultural Machinery Department, township councils from other regions in Myanmar and private sector organisations. As of early June, more than 400 power tillers have been received by the MAS Township Agricultural Managers. Moreover, the Ministry of Livestock and Fisheries plans to replace 6,000 draught animals as soon as possible, of which 600 had been supplied by 1 June 2008. The MAS has re-established the "forward extension camps" previously formed (5 to 7 per township) by the "Specially High Yielding Paddy Project" to manage the free land preparation service and seed distribution provided by the Government. The forward extension camps are managed by an "agricultural supervision committees" comprising village heads and MAS Village Tract and Village Extension Managers.

The below table shows the critical path to be considered for the next few weeks in terms of the present 2008 monsoon rice planting season (see also Annex 1, Graph 1):

Activities	**Months/ Weeks**							
	July		**August**				**September**	
week number	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**
Land Preparation								
Sowing (broadcast)								
Fertilizer Application (2)								
Critical Date for Power Tillers	18 th							
Critical Date Delivery of Inputs		25 th						

Target Beneficiary Groups

The FAO Assessment Mission has estimated that there are 49,180[12] affected marginal farmers and 99,000[13] affected landless rural households in the eleven most severely affected townships. It is further estimated that some 30,586[14] marginal farmers (i.e. 62 per cent of all marginal farmers) are able to return to their paddy fields and plant 36,700 ha[15] paddy crop in August 2008 (Annex 1: Table 2). This estimate is based on a *conditionality analysis of three controlling factors, i.e. (i) the land is free of debris and salt intrusions; (ii) draught animals or power tillers (and fuel) are readily available; and (iii) shelter, labour and food are available for farm labour throughout the cropping season*. It is also estimated that a further 11,000 ha[16] could be brought under cultivation with the provision of power tillers, fuel and draught animals and their implements to groups of some 13,585[17] marginal farmers, assuming that there is adequate shelter, food and potable water for the farmers and their labour force.

The sub-sector *strategy* will include packages similar to those recommended by MoAI but would be targeted at the most impoverished rural households that have lost most or all of their livelihoods, i.e. landless households and marginal farmers (0.4 to 2 ha). The crops programme would support the marginal farmers with *seed, fertiliser and insecticide packages and horticultural packages* and the landless households with *backyard gardening packages*. All beneficiaries assisted by the programme would have the opportunity to *benefit from household seed storage and group-based water management and agro-processing interventions*.

Programme Inputs

In the emergency and early recovery phase the crops programme would support the 30,586 marginal farmers[18] and 75,000 landless households able to return to their homesteads with *crop production packages* of: (i) 0.80 ha of HYV rice seed with accompanying fertilisers and pesticides for the 2008 monsoon cropping season[19] and 0.40 ha of pulses seed for the 2008/2009 summer cropping season targeted at marginal farmers; and (ii) 0.02 ha of fruit tree seedlings, vegetable seeds, accompanying insecticides and selected hand tools targeted at landless households with access to backyard gardens. The programme would also provide *power tillers* (including diesel) and *animal-drawn harrows* to groups of additional 13,590 marginal farmers who have adequate shelter, food and potable water to enable them to return to their farms but no tillage equipment. The replacement draught animals would be supplied under the Livestock Programme. These returning marginal farmers would also receive the rice and pulses seed packages described above. *It is estimated that the crops programme would require 3,313 MT of paddy rice seed for the 2008 monsoon cropping season – 1,321 MT of HYV, 1,300 MT of high quality Hnankar, and 694 MT of salt tolerant varieties (Annex 1: see Table 3).*

In the recovery and rehabilitation phase, the crops programme would support the marginal and small-scale farmers who have returned to their farms by November 2008 with *crop production packages* of: (i) 0.40 ha of pulses seed for the 2008/2009 summer cropping season and 0.40 ha of HYV rice seed with accompanying fertilisers and pesticides for the 2009 monsoon cropping season targeted at 26,300 marginal and small-scale farmers[20]; and (ii) 0.20 ha of fruit tree seedlings, vegetable seeds, accompanying insecticides and selected hand tools[21] targeted at 11,430 marginal and small-scale farm families[22]. The accompanying technical advice would inter alia promote growing no-till rice. Again,

[12] Marginal farmers are termed as those farming land holdings between 0.4 and 2 ha.
[13] 32% of all homesteads in Ayeyarwady Division and 51% in Yangon Division are landless households.
[14] percentage of flooded area by the total number of marginal farmers from the cyclone-affected area (see Table 2)
[15] number of marginal farmers able to return by average land holding size (see Table 2)
[16] number of hectares which can be cultivated by marginal farmers who could return if provided with tillage equipment (at a rate of 2 ha per pair of draught animals - 5000; and 20 ha per power tiller - 300)
[17] Number of marginal farmers who could not return because of a lack of draught animals and power tillers (see Table 2)
[18] percentage of flooded area by the total number of marginal farmers from the cyclone-affected area (see Table 2)
[19] It has been assumed that one acre (0.4 ha) of rice production is sufficient to feed an average family of 4.6 persons for one year. A second acre would provide social welfare for the extended family as well as providing a cash income to purchase non-food items as well seeds and hiring power tillers for the 2009 monsoon cropping season.
[20] remaining marginal farmers (5,500) plus 50% of small-scale farmers (cropping between 2 and 4 ha) who have been able to return to plant a pulses crop in November 2008
[21] Including direct seeding implements, e.g. jab planters.
[22] i.e. half of all small-scale orchards damaged and destroyed.

the project would provide *power tillers* (including diesel) to groups of marginal farmers in shallow water areas and *animal-drawn harrows* to groups of marginal farmers benefiting from restocking of draught animals under the livestock rehabilitation programme in deeper water areas. The recovery and rehabilitation phase would also support all landless households and marginal farmers producing seeds and a surplus of produce with *household storage and group-based processing facilities* to enhance income generating opportunities and improve household diets. The phase would also promote cash for work programmes (e.g. WFP and UNDP) and *water pumps* to rehabilitate and sustain polder lands and water pumps to drain contaminated animal drinking water ponds and provide supplementary *small-scale group-based irrigation* in the dry "summer" cropping season.

Implementation Arrangements

The crops sub-programme would collaborate closely with the livestock and fisheries sub-programme ensuring that a livelihoods-based approach is followed, such as (a.) co-ordination on the restocking and feeding of draught animals for marginal farmers; and (b.) income generating initiatives and improved nutritional status of landless households (i.e. integration of fruit, vegetable, egg, meat and fish production). Similarly, the United Nations agencies would follow a unified approach ensuring that shelter, food, potable water and cash for work (i.e. for clearance of paddy fields, repair of minor embankments, cleaning of drainage ditches, etc), are provided to the same rural communities to enhance and complement the interventions of the crops programme. It is recommended the crops programme be implemented by partners familiar with the farming systems of the Ayeyarwady Delta under the umbrella of a management structure headed jointly by MAS and the implementing agency (e.g. FAO). The World Food Programme has already identified 14 United Nations agencies and international and national NGOs to assist with it emergency food distribution activities. Not all of these co-operating partners are familiar with rice and vegetable production in Ayeyarwady and Yangon Divisions. FAO has therefore agreed to undertake a technical and institutional review of these and other potential implementing partners willing to mobilise farmers and deliver inputs and work with MAS on the execution of programme activities. The role of MAS would be one of project co-ordination and overall planning, monitoring and evaluation of programme interventions ensuring that they conform to Myanmar's economic development policies and agricultural development strategies. The MAS would also be responsible for co-ordinating government's inputs to the programme (e.g. production of HYV seeds) and providing technical support services to project beneficiaries, in particular on-farm research and farmers' training through group-based participatory extension approaches.

Coastal Embankments

The MoAI has initiated an emergency programme for carrying out repairs to the damaged coastal embankments. Up to date 19% of earthwork was been accomplished. In order ***to complete the repair work during June and July of this year, the government is searching for extra funding for five amphibious excavators, five back hoe excavators and 315,000 gallons of diesel – at an estimated total cost of roughly US$ 100 million***. Failing to complete the protection of sea water intrusion may cause damage to cultivated rice in the polders. The rehabilitation works would be designed with improved standards so that protection could be provided in these sections in future for cyclones with equivalent strengths. The embankments would be established with milder slopes on the seaside which would be covered with trees for further protection. Priority would be given to rehabilitate sections which do not involve any social issues such as land acquisition and environment issues.

Challenges

All land is the property of the state with farmers having medium-term titles to "own" land. With such a high death toll and large number of displaced persons, there is a risk of land disputes over the coming months and years. Many farmers have lost their land title documents and cannot prove ownership. And many farms are now abandoned because there are no legitimate heirs to replace those owners who have died. Some village organisations have made it known that they will farm idle lands on a community basis until land ownership problems have been resolved.

The cyclone occurred just before the start of the 2008 monsoon cropping season. Very few farmers have been able to plant their traditional local varieties of rice in June 2008 for reasons given above. The only varieties that can now be planted in time to catch the 2008 monsoon season are high quality, short season varieties. The MAS has assured implementing partners of the crops programme that there are sufficient stocks of seed to satisfy the demand of those farmers able to cultivate their paddy fields in time. Even then, MAS is recommending that farmers only make one or two passes with power tillers or animal drawn harrows rather than the conventional eight passes. Moreover, the seeds should be broadcast rather than the conventional seed beds and transplanting of seedlings. Yields will obviously be reduced but they should be more than adequate to ensure household food security for 2009.

B. **Livestock Sub-Sector**

The Ayeyarwady and Yangon divisions are major supplier of rice for the nation and of livestock products, particularly pigs chicken and ducks for the Capital Yangon. The recovery programme would hence focus on the 11 most affected townships, 4 of them in the Yangon Division (Kungyangon, Twantay, Kawhmu and Kyauktan) and 7 in Ayeyarwady Division (Ngapudaw, Pyapon, Bogale, Kyaiklet, Dadeye, Labutta, Mawlamyinegyun). The overall objective is not just to rebuild livestock production and food security to a pre-cyclone stage but to increase the output from the sector through improved production and marketing. Implementation should start immediately after the main human suffering has been addressed, where the water has receded and where displaced people have returned to the farming site or homestead to resume agriculture activities.

Restocking draught animals

A total of 122,524 adult draft animals were lost. In general, the Government intends to take the opportunity and to replace a great number of these draught animals with power tillers[23]. However, in this proposed recovery strategy it is suggested to focus the immediate assistance to those areas with many small scale farmers and where draught animals play a dominant role. The area of deep water rice production system covers 122,000 hectares or 15% of the 807 000[24] hectares of paddy area in the townships, with particular emphasis on Labutta, Mawlamyingyun, Bogale, Ngapudaw. Because of the high water levels in the paddy fields, also during normal monsoon periods, there is little alternative to replacing the draught cattle and buffaloes as mechanical implements are considered not suitable. Adopting the local estimate of 2 hectares per bullock per season 61,000 pairs of bullocks were required to cultivate this area before the cyclone, and assuming the same percentage of loss as for the whole Division of 50 % (61,000 out of 122,524), 30,000 pairs or 60,000 animals would be required for replacement. Taking into consideration that (a.) the window for the forthcoming ploughing season is rather small, (b.) the animals have to be sourced in Central Myanmar, and (c.) the logistical and other difficulties in purchasing large numbers of animals, it is suggested to replace immediately at least 5,000 cattle and buffaloes for the small scale farmers. This would be in addition to the GoM plans to provide 6,000 animals from own resources. Further restocking activities should be considered after this monsoon season. Major beneficiaries should be farmers with up to 2 hectares - an estimated of 46% of the farmers belong to this category. These are expected to share the animals with a neighbor whenever possible thereby increasing the overall number of beneficiaries.

Veterinary services and supply

The veterinary services, already weak before the cyclone, need urgent support. Infrastructure has been destroyed, vaccination campaigns have been interrupted and vital drugs are not available. 434,581 cattle and buffaloes, 286 000 pigs, over 5.6 million chicken and 0.88 million ducks have survived. These animals are stressed due to the cyclone and the limited feed resources and are susceptible to diseases. The Strategy aims at strengthening the veterinary services through the supply of drugs, equipment and transport to be able to deliver the needed field service. The local vaccine production

[23] During the field visits farmers voiced generally their preference for draught animals fearing the cost of petrol and the non-availability of spare parts particular as tillers will come from many different countries.
[24] Total paddy area in 11 priority Townships of Ayaryawaddi and Yangon.

unit requires key equipment items to sustain vaccine production capacity. Simultaneously, feed would be made available to temporarily support the animals.

Backyard livestock keeping
Before the cyclone, small scale and landless farmers of the Ayeyarwady and Yangon divisions were major supplier of agriculture products, particularly pigs, chicken and ducks for the Capital Yangon. Surplus products were picked up by middleman and transported to Yangon. Many have lost everything and now are in camps or are sitting along the road waiting for food. Once the homestead is re-established they would be supported through the distribution of poultry, ducks and piglets creating work and income thereby reducing their dependency on food aid. In the longer term they should be able to maintain production thus creating additional income through the sales of surplus production. Two main types of beneficiaries have been identified: (a.) Farming families which have lost their major assets – draft animals, farm implements, seeds, feed shelter and where the agriculture land is temporarily not usable due to salinity, sand or silt intrusion or debris. Their situation is aggravated should the household head have succumbed to the cyclone. Their major income, before the cyclone, came from rice and pulses cultivation, supplemented by small-scale backyard animal farming such as pig, poultry or ducks; (b.) Poor, landless, woman headed households whose main income comes from working as agricultural laborers, gardening and from small scale backyard farming of pigs, chicken and ducks. Their assets have been destroyed and in the immediate aftermath of the cyclone there are limited income earning opportunities.

The above described strategic approach is taking full account of the *immediate rehabilitation strategy of the Government of Myanmar* which comprises three priority actions: (a.) Establishment of 4 Emergency Animal Health Care Centers, EAHCCs, to provide veterinary assistance to the affected areas - staffs from other parts of the country are moved to these centers for re-enforcement; (b.) Restocking of cattle and buffaloes; The government will make available Kyat 240 million (US$ 0.212 million) to purchase 6000 heads of cattle and buffaloes in addition to those proposed above; (c.) Restocking pigs, chicken and ducks; The government will make available Kyat 120 million (US$0.106 million) for the purchase of animals. Finally, the government will contact International Organizations and Donors to provide further assistance to the restocking needs and to strengthen the provision of veterinary services in the cyclone hit area.

C. **Fisheries Sub-Sector**

Of the principal sub-sectors of fisheries and aquaculture in the affected area, the largest number of vulnerable people is found in in-shore and inland fisheries and household-level aquaculture. However, commercial intensive aquaculture and off-shore and partially the inshore fisheries are economically important and provide primarily employment, while the vulnerability of the labourers involved here is generally less than for those of the three other sectors. Most affected households have needs that go beyond the restoration of their fishing capabilities. Effective livelihood recovery through the provision of fishing gear, boats etc. also depend on related non-fishing conditions of the affected communities and their ability to effectively employ the assistance provided. The provision of boats and fishing gear will be most effective for those households and communities that have lost these facilities in the cyclone but that are otherwise left in reasonable condition. The quick provision of fishing gear is without many technical challenges other than the procurement and distribution to identified beneficiaries; boats, on the other hand, must be built or repaired to meet the requirements of the environment in which they are used and those of the activities for which they will serve.

The particular characteristics of the fisheries sector and the livelihood context of small-scale fishers and fish farmers need to be clearly understood in order to be able to provide adequate disaster response in an emergency situation and to provide early relief as well as assistance in reducing vulnerability in future natural disasters. The immediate emergency response must be based on accelerated establishment of a baseline survey in selected townships. Boats and packages of fishing gear should be provided first to priority affected households and fishers who have the ability to employ it and immediately to restart productive fishing activities, and thereby improve their food security situation. However, in all cases, replacement of boats and gear should aim at restoring fishing

capacity up to but not exceeding pre-cyclone levels while strengthening fisheries management to address any issues related to previous levels of fishing effort. Other critical needs in the value chain such as the availability of ice and transport should be addressed based on the specific requirements of the selected beneficiaries. Ice production capacity has suffered significantly and rehabilitating the ice production and distribution will add to the value of the entire catch. Overall, the lessons learned from the massive response to the tsunami disaster of 2004 are relevant to the emergency caused by cyclone Nargis in Myanmar, and these are taken into account in the formulation of this strategy[25]. Furthermore, it is important that the recovery effort does not result in or exacerbates overfishing as the case may be for certain stocks (the limited information available on stocks and fishing practices needs to be updated within the next 6 months).

Due to logistics and the need to establish activities in the affected areas, Fisheries Livelihoods Rehabilitation and Resource Centres (FLRRC) should be established in six and possibly more strategic locations in the Ayeyarwaddy delta, starting with the hardest hit townships. These centres would serve as distribution centres for boats and fishing gear. Each centre ideally should produce a number of improved and safer boats and demonstration models. These centres would serve as training facilities for boat repair and construction, and provide technical advice on all other aspects of the fishery rehabilitation effort. Boat builders and new recruits to the fisheries would be trained and technical guidance and information on best practices and guidelines would be provided to INGOs and NGOs involved in the emergency and rehabilitation effort. Attention must also be given to the needs of the aquaculture sector to urgently restore the production and distribution of fingerlings and seed and thereby to restart the production of the entire sub-sector. This should be done through rehabilitation of selected hatcheries in the short run, to produce an initial supply of fingerlings and seed to stock as many ponds as possible from which fish or shrimp were lost during the flooding. In addition to provision of stocking material, detailed medium- and long-term rehabilitation programmes are recommended. Stocking of improved brood stock, capacity to deal with diseases, improved husbandry practices and best practices are recommended.

The medium-term recovery effort would address and include a focus on prevention, preparedness and early warning in order to reduce risks and loss of human life and property in future natural disasters which may be caused by natural environment and climate change.

D. **Forestry Sub-Sector**

The overall goal of the forestry sub-sector recovery strategy in the Ayeyarwady delta is to bring ideally at least 30% of the land area, particularly those facing the sea-front areas and river mouths, under mangrove cover through an active planting and natural regeneration programme. It is extremely critical to reverse the damage done to the mangrove forests, as without such a natural vegetation buffer, future wave surges of similar intensity are likely to prove just as destructive to life and habitation. It is equally important that the rehabilitation programme uses a combination of social forestry programmes, participatory approaches, as well as technically proven reforestation systems to bring about this recovery. This forestry sector recovery strategy needs to be implemented in two phases, under emergency and medium-term programmes. With regards to reforestation, the interventions should place particular focus in those delta areas where people are most exposed to the potential damage of wave surges, and where their dependency on the resource is high. The various components of the strategy proposed are consistent with government policies and objectives of the Ministry of Forestry. The continuous loss and degradation of mangroves were the result of development work that over-rode the policies and objectives promulgated by the MOF.

In order for the recovery strategy to work, it would be essential to support the re-establishment of all the district and township forestry offices so they are in a position to lead and coordinate the work outlined in the recovery programme. It is equally vital to emphasize people's participation from the start. By their direct involvement in planning, implementation and management, it would guarantee

[25] Details of the recommendations and their background have been published as *Disaster Response and Risk Assessment in the Fisheries Sector*, FAO Fisheries Technical Paper 479, ftp://ftp.fao.org/docrep/fao/010/a1217e/a1217e00.pdf

the programme is co-owned by the local communities. Furthermore, it would also provide immediate income for people who have lost all forms of livelihood. The rapid recovery of production by the forestry sector would in the medium-term ensure that additional jobs are created and the basic needs of the rural people in the form of construction material, fuelwood, and food sources are rapidly met. Critical for the immediate pragmatic need is to verify in details (a.) the status quo of the mangrove and forest cover; (b.) the respective damage caused by Cyclone Nargis; and (c.) to the gather evidence on the protective role of mangroves – this would convince the policy makers and natural resource managers on the importance of mangroves and the need to manage them prudently.

IV. NEEDS ASSESSMENT - EMERGENCY & REHABILITATION PROGRAMME

The overall objective of the emergency and rehabilitation programme is to restore farmers/fishers to pre-cyclone conditions and rebuild the food security, rehabilitate livelihoods and improve the resilience of the worst-affected communities to future disasters. This would be achieved through grants to replace assets lost or damaged by the cyclone and safeguard assets that survived the cyclone and the adoption of improved production, processing and marketing technologies, as well as safeguarding and promoting environmental protection.

The recovery projects presented below have been prepared to cover urgent needs. These project proposals, however, do *not aim at covering the huge financial losses of the agricultural sector* but represent the technical judgment of the mission for a **first pragmatic and operationally feasible set** of **priority initiatives for urgent implementation within the coming 6-24 months** – especially **for the recovery of the most vulnerable** farming communities. The scale and scope of the recovery programme recommended has been based, *inter alia*, on the following considerations:

- Immediate needs for some of the most vulnerable and resource-poor farmers, those who depend exclusively on agriculture and have no other resources to recover from the imposed hardship by their own means;
- A realistic dimension of achievable project objectives (especially regarding the number of beneficiaries), given the very restricted timeframe at disposal, of 6-24 months; one has to consider that from day one of a project till the execution of the first direct beneficiaries-related operation, sometimes several weeks go by (administrative and operational start-up needs, recruitment of staff, procurement of equipment and expendables/inputs, beneficiaries targeting, etc. need time);
- The currently limited local implementation capacity for the execution of massive agricultural recovery projects;
- The equally low priority usually given to agriculture by the major donor agencies, focusing rather on other sector needs for their immediate financial assistance (infrastructure, housing, health, education etc.) and reserving usually very restricted funds for agriculture recovery; to design/propose, therefore, a very costly agricultural recovery package under such circumstances would be rather counterproductive and most probably fail in attracting the needed donor support overall;
- Proposing too many and costly projects represents also a high risk of under-disbursement of donor funds and failed (sub-optimal) achievement of project objectives – due to the given limited implementation capacity and restricted timeframe; this would automatically backfire on the reputation and credibility of the implementing entities, technical cooperation and government ministries alike – reducing any potential for successive donor support;

Overall, when it comes to the formulation of recovery needs within a very restricted timeframe and with low levels of local implementation capacity, it is of paramount importance to focus on a realistic perception of the given circumstances listed above. The mission's approach was to design **well justified, technically sound, quick-impact projects, with a high probability to attract the needed donor funding and achieve set objectives within the given timeframe set for project implementation**. However, these proposals should only be seen as a first stepping stone to launch and kick-start a process that will hopefully culminate in the elaboration of further recovery and development projects needed for the rehabilitation of the sector, and will contribute to a

comprehensive reconstruction and development programme aimed at restoring the country's sustainable development pattern on which it had embarked prior to the cyclone's impact. At the same time, reconstruction in other sectors (*inter alia*, food supply, housing, schools, feeder roads, power supply) will simultaneously assist families to resume farming in cyclone-affected areas. This is why the elaborated *programme entails focused beneficiaries and geographical targeting in order to complement the programme of other UN agencies* (e.g. WFP for food, UNHCR for shelter, UNDP for cash for work) and actors.

Furthermore, the elaborated programme/project proposals are not definitive in nature, *it est*, once donor interest is confirmed, working sessions between the donor, the government and the implementing agency would review and fine-tune the proposals, tailor it to the financial capacity of the funding agency, in order to reach a common agreement prior to signature – thereby allowing flexibility for justified modifications even at a later stage.

In line with national policies and the strategic thinking of the Government of Myanmar, and based on the analysis of the current situation and the respective needs for recovery and rehabilitation, the section below (chapter IV) summarizes the objectives and the rationale of the individual programmes/projects proposed for external funding. The estimated financial requirements are based on the elaboration of individual 'project profiles' and represent indicative estimates. Once donor resources have been identified, and during the course of subsequent detailed project formulation and preparation, the execution of pre-project studies to quantify (including inventory/survey assessment), the exact order of magnitude of expenditure requirements and area/beneficiaries targeting, will be indispensable. The emergency and rehabilitation programme is composed of eight project/programme proposals targeted for urgent/immediate execution and nine for medium-term implementation. Ideally, and provided donor funding is made available, both packages are to be implemented in parallel - in order to achieve the needed sustainability in the overall recovery effort:

Projects/programmes for '**emergency and immediate**' implementation (0-6/12 months): **32.21 US$ Mio.**	
1. Emergency Coordination Unit	0.48 US$ Mio.
2. Annual Food Crop Production for Marginal Farmers	15.57 US$ Mio.
3. Horticulture Production for Landless Households, Schools/Orphanages	3.27 US$ Mio.
4. Emergency Provision of Draught Animals	3.56 US$ Mio.
5. Emergency Vaccination, Treatment and Feeding of Surviving Animals	1.65 US$ Mio.
6. Chicken and Ducks Production for Landless Households	1.86 US$ Mio.
7. Emergency Supply of Fishing Gear, Boat Repair and Processing Implements	4.90 US$ Mio.
8. Mangrove Verification Assessment and Programme Formulation	0.92 US$ Mio.
Projects/programmes for '**recovery and rehabilitation**' implementation (0-24 months): **51.22 US$ Mio.**	
1. Rehabilitation of Annual Food Crop Production	12.20 US$ Mio.
2. Rehabilitation of Horticulture Production	2.66 US$ Mio.
3. Rehabilitation of Household Agro-Processing and Storage	7.89 US$ Mio.
4. Rehabilitation of Embankments/Polder Lands and Ponds	7.93 US$ Mio.
5. Rehabilitation of Draught Animals Production	5.66 US$ Mio.
6. Promotion of Pig Production for Landless Households	1.90 US$ Mio.
7. Rehabilitation of Fishing Fleet and Basic Sector Services	9.65 US$ Mio.
8. Small-scale Aquaculture Rehabilitation	1.75 US$ Mio.
9. Mangrove-Forestry Sector Rehabilitation	1.58 US$ Mio.

Overall Emergency & Rehabilitation Programme for Agriculture (corps, livestock, fisheries, forestry):

Emergency/Immediate Needs: 32.21 US$ Mio.
Recovery/Rehabilitation Needs: 51.22 US$ Mio.

Total Programme: 83.43 US$ Mio.

A. Emergency and Immediate Needs

The proposed interventions to address the emergency and immediate needs of the most vulnerable farming and fishing communities of the cyclone affected townships are foreseen to be implemented within a timeframe of 0-6 months – with an additional six months if funds are committed before the end of month six. This definition is based on the current set-up of the UN Flash Appeal requirements, hence the below programme would have to be considered for the revised Flash Appeal to be launched most probably early July 2008.

EMERGENCY & REHABILITATION COORDINATION UNIT to coordinate emergency and rehabilitation interventions related to agriculture interventions - crops, livestock, fisheries and forestry (US$ 0.48 million)

Government, UN agencies and NGOs have started or are planning activities in agriculture/fisheries, food security, and livelihoods related areas. With this intensive start-up of activities, there is urgent need for strengthened coordination within/between the parties involved in the recovery effort – Government/public entities, UN agencies, bilateral cooperation, NGOs, and other partners and stakeholders. In order to maximise impact, avoid duplication/gaps of efforts/activities and sub-optimal allocation of funding, and to ensure quick coverage of all affected regions with relevant and technically sound projects, the goal is to establish a pragmatic coordination and implementation tool for quick formulation and execution of rapid impact initiatives geared towards the immediate relief of farming and fishing communities affected by the disaster, as well as to elaborate and coordinate sustainable interventions for medium term rehabilitation. Data would be centralized and made available to actors involved with agriculture and food security, as a means of supporting proper planning and decision-making. Overall, the coordination entity would contribute to a more efficient utilization of funds and greater cost effectiveness of recovery efforts in the agriculture, fisheries and forestry sectors.

The Coordination Unit would, *inter alia*: establish an office in Yangon where many of the local development partners are located, and set-up operational facilities; strengthen contacts with/amongst the current and potential stakeholders operating in agricultural/livelihoods emergency and recovery initiatives in the cyclone affected areas; collect and centralize related data and information requirements and make it accessible to stakeholders; provide technical support to humanitarian/development partners and local municipalities in agriculture and fishing related livelihoods recovery initiatives, as well as in formulation and implementation of related recovery projects; create a forum for regular meetings and consolidated action by all development partners for the early recovery of agricultural and fishing communities – with special emphasis on livelihoods development, food security and poverty alleviation; hold information meetings on regional and central levels; verify the various on-going and planned projects and initiatives of the various partners, point out potential geographical and or subject mater related duplications and sub-optimal distribution of resources, as well as necessary synergies, and facilitate respectively a coordinated verification of initiatives; identify and facilitate the implementation of localized assessments/studies, identify ad-hoc needs where and whenever necessary, and formulate respective project proposals for donor funding; in a participatory work in progress streamline all agricultural recovery initiatives planned for the recovery of the farming and fishing communities in the cyclone affected areas.

1. Crop Production

The main objective of the emergency and immediate sub-programme is to restore the food security of the most vulnerable farmers and landless rural households who are able to return to their homesteads and paddy fields, thereby reducing their dependency on food aid. This would be achieved through the emergency supply of agricultural inputs to farmers able to resume rice and vegetable production for the 2008 monsoon cropping season, technical advice to implementing partners and beneficiary farmers, and project co-ordination.

EMERGENCY SUPPORT TO FOOD SECURITY THROUGH THE RESTORATION OF ANNUAL FOOD CROP PRODUCTION BY MARGINAL AND SMALL-SCALE FARM FAMILIES (US$ 15.57 million)

The main objective of the project is to restore crop production and food security of the most vulnerable farmers in areas worst affected by the cyclone through the supply of seeds, fertilisers and tillage equipment to marginal farmers with access to their paddy fields in July 2008 for the 2008 monsoon cropping season and 2008/2009 "summer" cropping season. This project would procure and distribute local high yielding varieties (HYV), high quality varieties (*hnankar*) and salt tolerant varieties of paddy rice with accompanying fertilisers and pulses seeds to marginal farmers to replace those destroyed by the cyclone. The project would target those areas where land is readily accessible for cultivation in July 2008, i.e. where there is no salt intrusion and debris and where draught animals, power tillers and shelter, food and potable water for farm labour are available. The project would also procure and distribute power tillers and animal drawn harrows to groups of farmers who lost their power tillers in the cyclone and whose land is free of debris and salt intrusion and labour is readily available. The inclusion of cowpea, black gram and green gram seeds in the package for the 2008/2009 winter season (November/December to March/April) would not only improve the nutritional status of the impoverished farm families but enhance the fertility of the soils.

The project would target 44,180 of the most affected and food insecure marginal farm families (cultivating less than 2 ha) who are dependent on paddy rice production for their livelihoods. It is estimated that some 30,590 marginal farmers can return to their paddy fields for the 2008 monsoon cropping season to cultivate 43,930 ha. An additional 13,590 marginal farmers cultivating 16,300 ha of land would be brought under cultivation through the replacement of power tillers and animal drawn implements[26]. The power tillers and animal drawn implements would be distributed through *ad hoc* farmers' groups established under the umbrella of existing community-based organisations (CBOs). In total, the total rice seed and fertiliser package would cover some 35,770 ha of land, at 0.8 ha per farm family. The pulses seed package would benefit the same 44,180 farm families on a total of some 17,880 ha of land at 0.4 ha per farm family. Overall, the project inputs would include the supply of rice and pulses production packages, power tillers and animal drawn equipment and training in minimum tillage practices and water and fertiliser management. The beneficiaries would be selected from all eleven of the worst affected townships of Bogale, Dedaye, Kyaikiat, Labutta, Mawlamyinegyun, Ngapudaw and Pyapone townships in Ayeyarwady Division and Khawhmu, Kungyangong, Kyauktan and Twantay townships in Yangon Division. The supply of power tillers would focus on the shallow water areas of Yangon, in particular Khawhmu, Kungyangong and Kyauktan townships where losses of farm implements were at their highest. The animal drawn implements would focus on the deeper water areas of Ayeyarwady Division and Kungyangong Township of Yangon Division.

EMERGENCY SUPPORT TO FOOD SECURITY THROUGH THE RESTORATION OF HORTICULTURAL CROP PRODUCTION BY LANDLESS RURAL HOUSEHOLDS AND SCHOOLS/ORPHANAGES (US$ 3.27 million)

The main objective of the project is to restore fruit and vegetable production and food security of the most vulnerable rural households and orphans in areas worst affected by the cyclone through the supply of quality fruit tree seedling, certified vegetable seeds, insecticides and hand tools to landless households (with access to backyard gardens) and schools/orphanages to replace assets destroyed by the cyclone. Prior to the cyclone, the main income of landless rural households was from labouring on the nearby farms growing paddy rice and pulses and the sale of fruits and vegetables from backyard gardens. The project would also assist rehabilitated schools and newly established orphanages to establish kitchen gardens to enhance on-going feeding programmes. The project would not only generate much-needed income through the sale of surplus horticultural produce, but improve the nutritional status of the landless families, school children and orphans, and rural communities as a whole, through improved access to fruits and vegetables at affordable prices. The diets of landless

[26] Some 5,000 draught animals would be supplied through projects funded under the Livestock Programme.

families and school children could be further enhanced through linkages with livestock and fisheries programmes targeting smallholder fish, milk, eggs and meat production.

The project would target 75,000[27] of the most affected and food insecure landless households (with access to less than 0.02 ha), who are dependent on farm labour, backyard gardening, small livestock and/or fishing for their livelihoods. The project would also target the high number of orphans caused by the cyclone and currently housed at monasteries, government schools, orphanages, etc. It is estimated that some 610 ha of backyard gardens and 110 orphanage gardens[28] would be established and/or school gardens would be restored to full horticultural production. Project inputs would include 0.02 and 0.20 ha horticulture production packages and training. The beneficiaries would be selected from the eleven worst affected townships of Bogale, Dedaye, Kyaikiat, Labutta, Mawlamyinegyun, Ngapudaw and Pyapone Townships in Ayeyarwady Division and Khawhmu, Kungyangong, Kyauktan and Twantay Townships in Yangon Division.

In addition to the above crops programme,and in order to complete the repair work on damaged embarkments during June and July of this year, the government is searching for extra funding for five amphibious excavators, five back hoe excavators and 315,000 gallons of diesel – at an estimated total cost of roughly US$ 100 million. Failing to complete the protection of sea water intrusion may cause damage to cultivated rice in these respective polders.

2. Livestock

The suggested project proposals take into consideration the urgent needs in view of the immediate monsoon rice planting season and to protect surviving animals from disease outbreaks in order not to increase the losses. Special attention would be given to small scale farmers and vulnerable groups.

EMERGENCY ASSISTANCE TO RICE FARMERS THROUGH PROVISION OF DRAUGHT ANIMALS AND SUPPLEMENTARY FEED (US$ 3.56 million)

In the deep water rice production system which are predominant on 122,000 hectares of 807,000 ha of paddy land in the most affected areas, there is little alternative to the use of draught cattle. To replace the estimated losses about 30,000 pairs of bullocks would be required. It will be impossible to replace all lost animals for this monsoon season due to the limited time window and logistical reasons. The immediate replacement of 2500 pairs or 5000 animals is proposed which realistically can be achieved. Supplementary feeding for a further 2500 pairs of surviving bullocks for 90 days is provided keeping these stressed animals in shape for the work in the fields. Shelters, barns and implements have been washed away and particular draught cattle need some protection from sun and rain. Construction material for 5000 sheds would be purchased and distributed as well as 5000 harrows to prepare the tillage. The proposed 5000 pairs of bullocks can prepare about 10,000 hectares of paddy. At an expected yield of 3 tons per ha, 30,000 tons valued at US$ 9 million could be produced (at US$ 300 per ton).

The interventions would focus on small scale rice farmers in the area of deep water rice production in the 4 Townships with the highest losses of draught animals - Labutta, Mawlamyinyun, Bogale, and Ngapudaw. Preference would be given to 2500 small farmers which have lost their bullocks and with up to 2 hectares of paddy. They are expected to share the bullock with other small farmers so that at least an additional 2500 farmers would benefit from the project increasing the total number of beneficiaries to almost 7 500. Minimum criteria should be: Farms in the deep water rice production system; Small scale farmers with less than 2 hectares which have lost a pair of bullocks and the implements; Willingness to share with other farmers.

[27] Estimated to be the those landless households available to participate in kitchen gardening activities; others will not be available due to out-migration to urban areas and other income generating opportunities.
[28] estimated at ten per township.

EMERGENCY VACCINATION, TREATMENT AND FEEDING OF SURVIVING LIVESTOCK (US$ 1.65 million)

The surviving animals are stressed and undernourished making them highly susceptible to disease outbreaks. Access to clean water is limited. Routine vaccination campaigns against HS, BQ, ND and FMD and other diseases are interrupted. Dead animals are not properly disposed off and decompose in the fields and road side ditches increasing the risk of spreading of diseases. Furthermore, the veterinary services, already weak with regard to staffing and inputs before the cyclone, are stretched to the limit and need urgent assistance to deliver the necessary services. Facilities have been damaged. Routine vaccination programmes against Food and Mouth Disease (FMD), Hemorrhagic Septicemia (HS) Black Quarter (BQ) have been interrupted. Supply of other veterinary drugs is very limited or is completely lacking. The lack of mobility does not allow the veterinarians of LBVD to attend sick animals and limit there area of intervention. There is a serious risk of disease outbreaks and the rapid spreading in the susceptible animal population. In response to the cyclone and to address the emergency LBVD has established 4 Emergency Animal Health Care Centres (EAHCC) in the affected areas from which emergency services will be provided. Staff from other parts of the country has already been moved to support these EAHCCs but they lack the above mentioned means.

In the tropical environment there will be, once the water has receded, immediately, re-growth of grass and green fodder meeting some of the basic fodder requirements for the large ruminants. Supplementary feed could help immediately the stressed animals to recover quicker and improve the performance of the animals particularly in view of the forthcoming ploughing season. The penury for the cattle and buffaloes will occur again after the planting season, when animals are tied up, have no access to the fields any more and grazing is limited to the road sides and the communal grazing grounds. The feed reserves (mainly straw ad bran) which are destined for this period have been washed away. So some supplement is required until after the harvest fields can be accessed gain and when straw becomes available. All livestock holders (over 100,000) in the affected Townships as far as they can be reached by the veterinary service are considered beneficiaries of the proposed initiatives. 3,000 households would receive supplementary feed for draught animals.

EMERGENCY ASSISTANCE TO POOR AND LANDLESS FAMILIES THROUGH PROVISION OF CHICKEN AND DUCKS (US$ 1.86 million)

Poor, landless and woman headed households which have lost all their assets are the most vulnerable and needy group of beneficiaries. In Dadeye, Labutta and Kyaikle practically all poultry have been wiped out. In addition in Labutta, Kyaikle and Dadeye 75% of the duck populations were also lost. Before the cyclone, the output from these small undertakings was consumed within the family and the surplus sold to middleman for the Yangon market. The income from selling slaughter birds and eggs was considered an important part of the family income. The project proposes to distribute chicken and duck ‘packages” to beneficiaries. This would allow them in a very short time to get some eggs for own consumption and for sale creating cash income. One chicken package consists of nine 3 -4 months old local chicken and one cock. The duck package consists of 15 one day old ducklings. Part of each package is a feed allocation for 90 days and fencing material to be able to confine the animals. About 15,000 poor, landless families and woman headed households in the townships of Dadeye, Labutta and in Kyaikle. Preference would be given to households where (a.) the senior male or female member of the household has been lost and the household is now deemed to be single headed; (b.) where this condition already existed before the cyclone; (c.) where the head of the household was disabled as a result of injuries received during the cyclone; and (d.) where due to cyclone laborers cannot find work to earn cash in support of the family.

3. Fisheries

EMERGENCY SUPPLY OF FISHING GEAR, BOAT REPAIR TOOLS AND PROCESSING IMPLEMENTS TO IMMEDIATELY RESTORE FOOD SECURITY (US$ 4.90 million)

The project targets the eleven most affected townships in the Ayeyarwaddy and Yangon Divisions. Its purpose is to restart, based on an initial baseline survey, the production activities of an estimated 2,300 direct beneficiary fishers, 7,000 crew members fishers and 2,100 women fish processors, thereby improving their food security situation and providing high quality protein, rich in vitamins and fatty acids for their families and the community in general.

Boat building contemplates the assembly of many and diverse components and the process of building a safe and strong boat requires more time in the selection of materials (dry wood without knots and splits) and the final construction. Many boat builders have a limited capacity to build large numbers of vessels simultaneously. Massive quantities of boat building tools were lost or damaged in the cyclone - the project would provide basic boat building tools to boat builders who lost their implements to resume income generation. Initially the project would provide fishing gear packages to fishers who lost their gear but still have a boat that has been or can be easily repaired, or who are members of a crew that can team up and use one vessel together. The programme would supply fishing gear components such as nets, ropes and floats for the fishers to assemble according to their needs and preferences. Fish catches need to be preserved in ice and/or processed. For this purpose, the programme would provide simple replacement implements to women fish processors to resume storage and transport and to make their preparations for processing. Assistance to damaged ice production facilities would be provided to restore ice production. This process will depend on resumption of electricity supply which is being restored. Due to the complexity of providing appropriate technical advice and harmonized rehabilitation of the entire sector, the programme would facilitate, in cooperation with other agencies, expertise in coordination and technical fisheries matters through national and international experts.

4. Forestry

In-Depth Analysis and Verification of the Extent of Damage, Determination of the Role of Mangrove Forests in Mitigating the Destructive Impact of Wave Surges – Preparation of a Comprehensive Reforestation Programme (US$ 0.92 million)

Many studies in the recent past following tsunami and cyclone damage have made tentative to firm conclusions that the presence of a wide belt of dense vegetation like the mangroves fringing the coastal areas and inland along river mouths, has buffered the damaging effects of strong winds and wave surges resulting in lower loss of life and habitation. The proposed study would prove more firmly to both decision makers and forest users about the need for prudent management of the mangrove forests, and conversion to other uses has to be done with appropriate mitigating measures. Associated with this work is the assessment of the overall status of the mangrove forests and the extent of damage caused by the cyclone. Almost all work done in this regards points to extensive loss and/or degradation of the mangrove forests, while the situation was further exacerbated by the cyclone. In order to develop a comprehensive recovery plan, it is compulsory to elaborate a sound analysis and better knowledge of the status of the forest in the cyclone affected areas, including parameters such as distribution, stocking, and regeneration status. This would lay the foundation for planning subsequent forestry activities which call for protection, regeneration, reforestation and sustainable harvesting of the resource. Decisions on the future use of the mangroves would rely on this assessment.

B. Recover and Rehabilitation Needs

The proposed interventions to address the recovery and rehabilitation needs of the most vulnerable farming and fishing communities of the cyclone affected priority townships are foreseen to be implemented within a timeframe of 0-24 months.

1. Crop Production

The main objective of the recovery and rehabilitation phase of the programme is to restore crop production of the most vulnerable farmers in the worst affected areas to at least pre-cyclone levels

while rebuilding the food security and rehabilitating the livelihoods of the most impoverished farm families who were not able to return to their homesteads and farms in time for the 2008 monsoon cropping season, thereby reducing their dependency on food aid. This would be achieved through: (i) the supply of agricultural inputs and agro-processing equipment to marginal and small-scale farmers who have returned to their farms and are able to resume pulses, rice, fruit and vegetable production for the 2008/2009 summer cropping season and 2009 monsoon cropping season; (ii) critical rehabilitation works to minor embankments and restoration of small-sale irrigation schemes; and (iii) capacity building of the main stakeholders in the crops sub-sector.

SUPPORT TO FOOD SECURITY THROUGH THE RESTORATION OF ANNUAL FOOD CROP PRODUCTION BY MARGINAL AND SMALL-SCALE FARMING FAMILIES (US$ 12.20 million)

The main objective of the project is to restore crop production and food security of vulnerable farmers in areas worst affected by the cyclone through the supply of seeds, fertilisers and tillage equipment to marginal farmers who have secured their shelter, food/potable water supplies and labour, and have returned to their paddy fields after August 2008 but did not benefit from emergency and relief annual food crop interventions. This project would procure and distribute local high yielding varieties (HYV), high quality varieties (*hnankar*) and salt tolerant varieties of paddy rice with accompanying fertilisers and pulses seeds to marginal farmers to replace those destroyed by the cyclone. The project would target those areas where land was not accessible for cultivation for the 2008 monsoon cropping season because of salt intrusion and debris and where draught animals, power tillers and shelter, food, potable water and farm labour were not available. The project would also procure and distribute power tillers and animal drawn harrows to groups of farmers who lost their power tillers and draught animals and implements in the cyclone. The inclusion of cowpea, black gram and green gram seeds in the package for the 2008/2009 summer season (November/December to March/April) would not only improve the nutritional status of the impoverished farm families but enhance the fertility of the soils.

The project would target 26,300 of the most affected and food insecure marginal and small-scale farm families (owning less than 4 ha) who are dependent on paddy rice production as their key livelihood activity and have been able to return to their paddy fields for the 2008/2009 summer and 2009 monsoon cropping seasons. These farmers would benefit from a pulses seeds package covering some 10,650 ha of land, i.e. 0.4 ha per farm family. The same farmers would also benefit from the replacement of 815 power tillers, 5,000 animal drawn implements[29] and rice seed and fertiliser packages covering some 21,300 ha of land, i.e. 0.8 ha per farm family. The power tillers and animal drawn implements would be distributed through *ad hoc* farmer groups established under the umbrella of existing CBOs. The beneficiaries would be selected from all eleven of the worst affected townships of Bogale, Dedaye, Kyaikiat, Labutta, Mawlamyinegyun, Ngapudaw and Pyapone Divisions in Ayeyarwady Division and Khawhmu, Kungyangong, Kyauktan and Twantay Townships in Yangon Division. The supply of power tillers would focus on the shallow water areas of Yangon, in particular Khawhmu, Kungyangong and Kyauktan Townships where losses of farm implements were at their highest. The animal drawn implements would focus on the deeper water areas of Ayeyarwady Division and Kungyangong Township of Yangon Division. However, the project would supply "single wheel" power tillers to suitable deep water areas and where groups of farmers wish to mechanise their operations.

SUPPORT TO FOOD SECURITY THROUGH THE RESTORATION OF HORTICULTURAL PRODUCTION BY MARGINAL FARM FAMILIES (US$ 2.66 million)

The main objective of the project is to restore fruit and vegetable production and food security of the most vulnerable rural households in areas worst affected by the cyclone through the supply of quality fruit tree seedling, certified vegetable seeds, insecticides and hand tools to landless households to marginal farm families to replace fruit trees destroyed by the cyclone and restore fruit and vegetable production. The project would not only generate much-needed income through the sale of surplus

[29] 10,000 draught animals would be supplied through projects funded under the Livestock Programme.

horticultural produce but improve the nutritional status of the marginal farm families and rural communities as a whole, through improved access to fruits and vegetables at affordable prices. The diets of marginal farm families could be further enhanced through linkages with livestock and fisheries projects targeting smallholder fish, milk, eggs and meat production. The project would target 11,430 of the most affected marginal farm families (owning less than 2 ha)[30], who are dependent on farm labour and mixed farming (paddy rice, horticulture and small livestock) for their livelihoods. It is estimated that some 2,310 ha of marginal farms[31] would be restored to full horticultural production. The beneficiaries would be selected from eight of the worst affected townships where horticultural production contributes significantly to rural livelihoods, i.e. Dedaye, Labutta, Mawlamyinegyun and Ngapudaw in Ayeyarwady Division and Khawhmu and Twantay Townships in Yangon Division. Project inputs would include the supply of 0.20 ha horticultural packages and training.

SUPPORT TO THE RESTORATION OF HOUSEHOLD AGRO-PROCESSING AND STORAGE FACILITIES (US$ 7.89 million)

Heavy storms and floods are frequent in the cyclone-affected areas and most houses loose their precious seeds and grains when their homesteads are inundated. The traditional bamboo storage bins provide no real protection against high winds, heavy rain and even moderate floods. The project envisages the distribution of affordable and highly durable storage units (e.g. silos, bins and drums) to individual small-scale farm households which are prone to flooding for storing seeds and grains. The storage units should have proven to be resistant during inundation in Myanmar or neighbouring countries. The storage units would be supplied to farmers in time for the harvests of the 2008 and 2009 monsoon cropping seasons. To enhance the quality and longevity of seeds and grains to be stored or sold, the project would supply groups of farmers with appropriate harvesting, handling and processing equipment, namely diesel-powered reapers, threshers and hullers/mills. Traditionally, larger farmers own such machinery and charge the marginal and small-scale farmers for their use when available. Like the power tillers, many of the reapers, threshers and hullers were destroyed or damaged by the cyclone and, in the worst affected areas, will not be available for the 2008 and 2009 monsoon cropping seasons. The project would also supply groups of women farmers with cooking utensils and storage containers for the processing and preservation of fruits and vegetables. This intervention would not only add value to horticultural produce but improve the diets of impoverished households throughout the year rather than just at harvest time.

The project would target some 50,000 of the most affected landless households and marginal (cultivating less than 4 ha)[32], who are dependent on farm labour, mixed farming (paddy rice, horticulture and small livestock) and paddy rice production for their livelihoods. The beneficiaries would be selected from the eleven worst affected townships of Bogale, Dedaye, Kyaikiat, Labutta, Mawlamyinegyun, Ngapudaw and Pyapone in Ayeyarwady Division and Khawhmu, Kungyangong, Kyauktan and Twantay Townships in Yangon Division.

REHABILITATION OF EMBANKMENTS/POLDER LANDS AND ANIMAL DRINKING WATER PONDS IN AYEYARWADY DIVISION (US$ 7.93 million)

It is estimated that 18 polder schemes, totalling some 90,000 ha were damaged by the surge and floods caused by Cyclone Nargis and are now in urgent need of rehabilitation. Detailed engineering surveys still have to be carried out, but it is estimated that some two million work days and 1,000 pumps are required to repair minor embankments and clean drainage ditches to restore the polder lands and their 26,870 farmers to paddy rice production. It is anticipated that the project would provide half of the civil works as community-based "cash for work" while the other half would be sought from existing "food for work" programmes. The project would also procure and distribute water pumps to groups of farmers who lost their pumps in the cyclone. Moreover, the project would provide training to farmers in improved water management and measures to mitigate against future floods, e.g. tree planting of

[30] i.e. half of all small-scale orchards damaged and destroyed.
[31] half-acre per farm restored.
[32] Approximately one-third of all marginal and landless households in cyclone-affected area.

embankments. The project would also procure and distribute water pumps to groups of marginal farmers whose animal drinking water ponds have been contaminated by salt water, silt, debris and rotting carcasses. The pumps would be used to empty the ponds in the short-term but, in the long-term, would used for small-scale group-based irrigation in the dry season and thereby increasing cropping intensities and diversifying crop production on some 5,060 ha of paddy lands. It is anticipated that some 116,870 farm families would benefit from the project. Project inputs would include community-based cash for work, the supply of water pumps, and training. The beneficiaries would be selected from the seven worst affected townships of Bogale, Dedaye, Kyaikiat, Labutta, Mawlamyinegyun, Ngapudaw and Pyapone of Ayeyarwady Division.

Crop sub-sector summary of funding requirements and total beneficiaries:

In total, the crop production programme would benefit some 313,770 landless households and marginal and small-scale farming families costing an estimated US$ 30.70 million. However up to 166,870 farm families could benefit from more than one project.

Programme/Projects	Estimated Costs (000' US$)	Estimated Number of Beneficiaries HH
Emergency and Immediate Needs:		
1. Annual Food Crop Production for Marginal Farmers	15,572	44,170
2. Horticulture Production for Landless Households	3,273	75,000
Sub-total	**18,845**	**119,170**
Recovery and Rehabilitation Needs		
1. Rehabilitation of Annual Food Crops	12,203	26,300
2. Horticulture for Marginal Farm Families	2,656	11,430
3. Agro-processing and Storage	7,886	50,000 /a
4. Rehabilitation of Polder Lands and Ponds	7,929	116,870 /a
Sub-total	**30,675**	**204,600**
Total	**49,521**	**313,770**

/a most probably receiving support from other projects under the overall programme.

2. Livestock

ASSISTANCE TO FARMERS WITH DRAUGHT ANIMAL AND FOR INCREASED DRAUGHT ANIMAL PRODUCTION (US$ 5.66 million)

The first emergency restocking action (see above 'immediate need) with draught animals was conditioned by the immediate need to provide as quickly as possible draught animals not to miss the monsoon rice planting season. Once the 2008 monsoon season is over an inventory should be carried out to assess how many draught animals are still required. It is suggested to provide an additional 10,000 heads of draught cattle and buffaloes to small farmers. Given the general preference of many farmers for draught animals in particular buffaloes, the GoM wishes to strengthen buffalo breeding activities in the delta area. It is suggested to identify and support farmers interested in buffalo breeding through extension advice in feeding, rearing and in reproductive management. The rearing intensity of draught animals is very low, resulting in very late maturing. Advice in improved feeding and management of the surviving young stock would increase the number of replacement animal available for work in the field. Organizing interested buffalo breeders and providing training and extensions services addressing management, rearing and reproductive management would increase the number of draft animals over time. Around 5,000 small rice farmers in the affected Ayeyarwady and Yangon Division with special emphasis on the area of deep water rice production farmers from other areas may be included pending on the respective inventory to verify. Furthermore, an estimated 500 - 1000 breeders which are interested in improving buffalo/draught animal production would also benefit from the interventions.

SUPPORT TO POOR AND LANDLESS FAMILIES IN SELECTED TOWNSHIPS OF THE AYEYARWADI DIVISION THROUGH DISTRIBUTION OF PIGLETS (US$ 1.90 million)

The three townships with the highest losses in pig population are Dadeye (45%), Labutta (85%) and Bogale (47%). Pig production is an important undertaking for landless and poor families - as it is a short cycled species with high prolificacy perfectly suitable for income generation. Pork is in high demand and the prices are high. Piglets would be distributed to needy households which have lost their pigs or which are interested in pig production and have limited other source of income after the cyclone. It is suggested to support 20 % of the holdings or 1500 households. The pig package consist of 4 weaned piglets – 2 castrates and 2 females and supplementary feed (bran or green feed has to be provided) for 60 days. The 2 castrates are fattened and sold for cash; the females are kept for breeding. Some of the cash can be used to purchase feed for the females and their offspring. Provision would be made by LBVD that communal boars are available for mating. Out of solidarity beneficiaries would give two female weaner piglets from the first litters to other needy households. Around 1500 Landless households would benefit form the interventions. Preference would be given to Dadeye, Labutta and Bogale which have had the highest losses. Farmers from other townships can be included if they meet the beneficiary criteria and are interested and capable to raise pigs.

3. Fisheries

REHABILITATION OF THE FISHERIES SECTOR THROUGH RESTORATION OF THE FISHING FLEET AND BASIC SECTOR SERVICES (US$ 9.65 million)

The project follows on from the initial interventions of the emergency phase of providing immediate assistance to restore food security of fishers of the affected townships. It would be further targeted on the most vulnerable beneficiaries through a 1-2 months baseline survey. The project main objectives are (a) to strengthen the artisanal boat building capacity, (b) to provide additional inputs to fishers and small scale fish processors, (c) to rebuild the fishing fleet to sustainable levels, and (d) to continue to assist the government with efficient coordination and technical advice on the rehabilitation processes according to best practices. In line with these objectives, the project would establish six Fishery Livelihoods Rehabilitation and Resource Centres (FLRRC) which would play a crucial role in longer term rehabilitation and recovery. These Centres would construct 180 demonstration boats, train boat builders in good construction practices, distribute fishing gear packages and fish processing kits, and provide coordination to NGOs in all fisheries-related aspects. As its main component, the project would provide 13,500 small boats. The programme would advise the Government and other stakeholders on boat design and construction techniques and safe fishing operations (including safety at sea) as part of disaster risk management. The project would assist the government in preparing a disaster preparedness and management plan (including early warning and weather forecast facilities). The total number of beneficiaries would be around 28,000 fishers households including families linked to the processing and handling of fish produce.

SMALL SCALE AQUACULTURE REHABILITATION (US$ 1.75 million)

The small-scale aquaculture rehabilitation programme would restore production in many small-scale commercial and household ponds in the affected area and thereby contribute to the livelihoods and income of the most vulnerable groups in the sub-sector. Production and distribution of high quality fingerlings and seed is currently the single most important factor determining the duration of the recovery in the small-scale aquaculture. The project would return damaged backyard and government hatcheries requiring minor repairs and/or restocking with brood stock to operational status to supply seed of acceptable quality in the immediate term and high quality by the end of the project. It would train small-scale and household pond aquaculture farmers to improve production through improved husbandry within a multi-purpose pond system. In doing so, it would improve the resilience of the small-scale aquaculture sector with respect to disaster impact and disease control. In total, 100 hatcheries operators would benefit from the project, as well as at least 10,000 small-scale aquaculture farmers. The training and capacity building component of the programme would ensure that the assistance generates durable contributions to the food security and livelihoods of the farmers involved.

4. Forestry

REHABILITATION OF MANGROVE FORESTS IN CYCLONE NARGIS AFFECTED AREAS IN THE AYEYARWADY DELTA (US$ 1.58 million)

Previous work on reforestation of degraded and denuded mangrove ecosystems in Ayeyarwady Delta was attempted (1990: MYA/90/003). However, without a sound understanding of mangrove regeneration ecology, the work did not deliver the expected success. Since then investigations of the ecosystem have advanced, and reforestation technology has since been improved. Today, mostly a combination of artificial planting and natural regeneration systems are employed for the purpose. Species choice selection is based on a variety of criteria, foremost being the physical and ecological considerations, followed by socio-economic utility and community requirements. Some of the physical factors that require attention in the reforestation of mangroves include tidal range, siltation, availability of fresh water, and salinity. The technologies developed and tested out for the Ayeyarwady delta conditions would be improved and expanded in follow-up phases beyond the life of this project. However, with increasing concern for livelihoods of rural people, heightened further by the destructive cyclone, there is a pressing need to make sure such reforestation programmes also cater for the poor people's needs. The envisaged reforestation programme would need to incorporate participation of rural people, for both co-ownership of the resources, and employment opportunities in the near term. Finally, for the implementation of this project, there is a vital need to rebuild forest camps and other infrastructure of the Ministry of Forestry lost as a result of the cyclone. Without some basic requirements for carrying out forestry operations, there is no scope for such initiative to take successfully off the ground. A bare minimum of camps, vehicles, and other supporting material would be needed for the Forest Department to function and undertake the work planned under the proposed project.

C. Project Profiles

1. Emergency and Immediate Needs

Profile 1:

COORDINATION

Project name: **Emergency and Rehabilitation Coordination Unit**

Main objective: To coordinate emergency and rehabilitation interventions related to agriculture, fisheries and forestry projects.

Geographical area: Coordination Unit located in Yangon – area coverage for the cyclone affected areas of the Ayeyarwady Delta

Duration of activities: initial 6 months (extendable to 12 and beyond)

Justification/Rationale:
On 3 May 2008, Cyclone Nargis made its landfall around the mouth of the Ayeyarwady River in Myanmar with wave surges as high as 3.5 m. The ensuing flooding of the entire low-lying coastal area resulted in the death of an estimated 100,000 people and displaced over 1.5 million people who have lost their homes and livelihoods - a total of 2.4 million people are considered affected by the disaster. In the predominant rural areas, the storm resulted in the devastation of homes and infrastructure, loss of agricultural land and loss of access to fishing grounds. The cyclone hit against a backdrop of growing and entrenched vulnerability and food insecurity among hundreds of thousands of rural families in Myanmar. There is an urgent need to provide emergency recovery assistance to farming and fishing communities until they can resume their agricultural activities again and sustain their incomes and secure food security. Government, UN agencies and NGOs have started or are planning activities in agriculture, food security, and livelihoods related areas. With this intensive start-up of activities, there is urgent need for strengthened coordination within/amongst the actors involved in the recovery effort. In order to maximise impact, avoid duplication/gaps of efforts/activities and sub-optimal allocation of funding, and to ensure quick coverage of all affected regions with relevant and technically sound interventions, the goal is to establish a pragmatic coordination and implementation tool for formulation and execution of rapid impact assessments/initiatives geared towards the immediate relief of farming and fishing communities affected by the disaster, as well as to elaborate and coordinate sustainable interventions for medium term rehabilitation. Data/information would be centralized and technical advice made available to actors involved with agriculture/fisheries and food security, as a means of supporting proper planning and decision-making. Overall, the coordination entity would contribute to a more efficient utilization of funds and greater cost effectiveness of recovery efforts in the agriculture, fisheries and forestry sectors.

Objectives:
- to create a consolidated approach between the various development partners in order to achieve a rapid recovery and rehabilitation of agriculture/fishing based rural livelihoods of the affected communities;
- to strengthen the response capacity of government and national partners, through the creation of capacity building in-country;
- and thereby contributing to poverty alleviation and increased food security.

Activities/Components: The Coordination Unit would, *inter alia*:
- establish an office in Yangon where many of the local development partners are located, and set-up operational facilities;
- strengthen contacts with/amongst the current and potential stakeholders operating in agricultural/livelihoods emergency and recovery initiatives in the cyclone affected areas;
- collect and centralize related data and information requirements and make it accessible to stakeholders;
- provide/share standardized tools for needs assessment, impact assessments, monitoring;
- provide technical support to humanitarian/development partners and local municipalities in agriculture and fishing related livelihoods recovery initiatives, as well as in formulation and implementation of related recovery projects;
- create a forum for regular meetings and consolidated action by all development partners for the early recovery of agricultural and fishing communities – with special emphasis on livelihoods development, food security and poverty alleviation;
- verify the various on-going and planned projects and initiatives of the various partners, point out potential geographical and or subject mater related duplications and sub-optimal distribution of resources, as well as necessary synergies, and facilitate respectively a coordinated verification of initiatives;
- identify and facilitate the implementation of localized assessments/studies, identify ad-hoc needs where and whenever necessary, and formulate respective project proposals for donor funding;
- in a participatory work in progress streamline all agricultural recovery initiatives planned for the recovery of the farming and fishing communities in the cyclone affected areas.

Operational set-up:
The Coordination Unit – headed by a senior international emergency coordinator and assisted by international and national experts -would be based Yangon in order to facilitate direct contact with local partners and satakeholders. It would institutionally be linked to the Ministry of Agriculture in order to benefit from its technical and operational setting. The major partners within the coordination effort would be, *inter alia*: UN agencies, especially WFP, UNDP, UNHCR, and ILO; bilateral cooperation; international NGOs; national NGOs; community based organizations; local municipality committees (existing or to be created where needed); farming/fishing cooperatives/associations/groups; public and government entities. The implementation of emergency and recovery projects would be carried out with the support of NGOs, and facilitated by municipality committees and community based organisations – but supervised and monitored by the Coordination Unit.

Sustainability & Implementation Arrangements:
Through the presence of an Emergency/Recovery Coordination Unit based in the country, the various actors would be provided with the necessary technical support and guidance. The strengthened coordination function would establish a platform for regular meetings and information-sharing, data collection and will encourage collaboration in joint rapid livelihoods and agriculture assessments, creating synergies, linkages and partnerships between various actors. Implementation of response projects would be done through local partners, such as NGOs, and in collaboration with Government and UN agencies – especially WFP and UNDP.

Type of beneficiary group: Government institutions, UN agencies, NGOs, and about 200,000 cyclone-affected families

Total costs: *(in US$)*	**Total**
- Technical staff	138
- Operational staff	177
- Equipment & running costs	165
Total:	**480**

Crops:
Profile 2:

Sub-Sector: AGRICULTURE – CROPS

Project name: **Emergency Support to Food Security through the Restoration of Annual Food Crop Production**

Main objective: Restoration of crop production and food security for the most vulnerable cyclone affected farmers

Geographical area: All 11 priority townships

Duration of activities: 6 months

Justification/Rationale:
It is estimated that some 49,180 marginal farmers cropping between 0.4 and 2 ha of paddy rice have been affected by the cyclone and will not be able to plant their monsoon season paddy crop in July and August 2008 mainly because of a lack of seeds, farmyard manure, draught animals and power tillers and will be dependent on food aid until the next major rice harvest in October 2009. Some 30,590 marginal farmers would be able to return to their paddy fields and plant a paddy crop in August and September 2008 and a pulses crop in November 2008 with the provision of high quality seeds and fertilisers and 13,590 marginal farmers would be able to return through the replacement of power tillers and implements for draught animals.

Objectives:
- Provision of improved varieties of rice seed with accompanying fertilisers and pulses seeds to marginal farmers from the areas worst affected by the cyclone.
- Provision of power tillers and animal drawn harrows.
- Improvement in the nutritional status of the impoverished farm families.
- Enhanced fertility of the paddy soils.
- Participatory research and extension programme to train farmers in improved crop production technologies.

Activities/Components:
- Co-ordinated provision of 3,313 MT of HYV, high quality varieties (*hnankar*) and salt tolerant varieties of paddy rice, 4,418 MT of Urea, 2,209 MT of TSP and 1,105 MT of PoM fertilisers, 4,180 litres and 441 MT of insecticides (in 0.8 ha packages), and 332 MT of improved pulses (cowpea, black gram and green gram) seeds (in 0.4 ha packages), and 300 power tillers with 90 days of fuel and lubricants and 2,500 animal drawn harrows.
- Training of some 8,830 farmers in minimum tillage, improved rice cultivation (HYV varieties, fertiliser management and pest control), water management, post-harvest storage, etc through group-based participatory extension approaches.
- Co-ordination/information services for crop-based emergency and relief projects in cyclone-affected areas of Myanmar.

Outputs and Results:
- 44,170 marginal farmers from the areas worst affected by the cyclone are able to produce sufficient paddy rice and pulses in the 2008 monsoon cropping season and 2008/2009 "summer" cropping season to restore their household food security.
- Technical knowledge and skills of 8,830 marginal farmers to produce improved varieties of rice/pulses are strengthened.

Indicators:
- 44,170 marginal farmers planting improved varieties of paddy rice and pulses with accompanying agricultural inputs tillage and implements.
- 35,770 ha of paddy land restored to rice production by September 2008 for the monsoon cropping season.
- 17,880 ha of paddy fields sown with pulses in the "summer" cropping season
- 2,120 days of farmer's training undertaken through participatory group-based extension approaches.

Sustainability & Implementation Arrangements:
- The project would collaborate closely with the livestock/fisheries projects ensuring a livelihoods approach is followed.
- The project would be implemented in collaboration with the Extension Division of the Myanmar Agriculture Service (MAS) of the Ministry of Agriculture and Irrigation. MAS would also be responsible for co-ordinating government's inputs to the programme (e.g. production of HYV seeds) and providing extension services to project beneficiaries.
- Project activities would be executed by implementing partners (national and international NGOs) familiar with the farming systems of the Ayeyarwady Delta under the umbrella of a management structure headed jointly by MAS and the implementing agency.
- Farmers benefiting from the project would be trained in improved rice production technologies, post-harvest storage, etc.
- All information related to crop production under emergency relief projects in cyclone-affected areas would be coordinated through the Agriculture Cluster established by UN, comprising all major players in the crops, livestock and fisheries sub-sectors, *inter alia*, donors, UN agencies, Government line departments and international and national NGOs.

Issues & Risks:
- The project's rice-based interventions would be implemented during the 2008 monsoon season when weather conditions could restrict access, delay planting, destroy planted crops, disrupt harvesting, etc.
- Potential risks exist in terms of duplication with similar projects executed by other agencies.
- The timely supply of project inputs required for the 2008 monsoon cropping season could be challenged by external causes.

Type and Number of target beneficiaries: 44,180 impoverished farm families cropping less than 2 ha of paddy land.

Total costs: *('000 US$)*

- Equipment and inputs	10,689
- TA and training	212
- Operating expenses	2,425
- Co-ordination services	2,246
Total:	15,572

Crops
Profile 3:

Sub-Sector: AGRICULTURE – CROPS	
Project name: **Emergency Support to Food Security through the Restoration of Horticultural Production by Landless Rural Households and Schools/Orphanages**	
Main objective: Restoration of fruit and vegetable production and food security of landless households, school children and orphans in areas worst affected by the cyclone	
Geographical area: All 11 priority townships	
Duration of activities: 6 months	
Justification/Rationale: It is estimated that there 99,000 landless rural households in the eleven townships most severely affected by the cyclone. The landless households generate incomes from farm labour, sales of produce from backyard gardens and small livestock, and off-farm activities such as salt making, fishing, etc. It is estimated that 37 per cent of tree crops of the affected area were severely damaged or destroyed by the cyclone, in particular coconut, banana, (young) mango, jack fruit, guava, cashew nut and betel nut and standing crops of vegetables. While most of the coconut trees are still standing, the cyclone has twisted their crowns which, in due course, will lead to nematode infestation, dwindling production and a slow death. In some townships losses are higher than 85 per cent.	
Objectives: - Provision of quality fruit tree seedling, certified vegetable seeds, insecticides and hand tools to landless rural households (with access to backyard gardens) and schools. - Assistance to rehabilitated schools and newly established orphanages to establish kitchen gardens to enhance on-going feeding programmes. - Generate much-needed income through the sale of surplus horticultural produce. - Improve the nutritional status of the landless families, school children and orphans, and rural communities as a whole.	
Activities/Components: - Co-ordinated provision of 375,000 fruit tree seedlings, 75,000 vegetable production kits, 24,800 litres of liquid insecticide, 7.5 MT of powder insecticide and selected hand tools (as 0.02 ha packages) to 75,000 landless rural households and 11,000 fruit tree seedlings, 110 vegetable production kits and 55 litres of liquid insecticide, 550 kg of powder insecticide and selected hand tools (as 0.20 ha packages) to 110 schools and orphanages. - Training of some 15,000 men, women and children in improved horticultural production, post-harvest handling and storage, and household nutrition through group-based participatory extension approaches. - Co-ordination/information services for crop-based emergency and relief projects in cyclone-affected areas of Myanmar.	
Outputs and Results: - 75,000 landless rural households from areas worst affected by the cyclone are able to produce sufficient amounts of fruits and vegetables from their backyard gardens by the 2009 monsoon season to enhance their household food security and nutrition levels and generate much needed incomes to supplement farm wages. - The technical knowledge and skills of 15,000 men, women and children are strengthened and the nutritional status of 75,000 families and orphans are significantly improved.	
Indicators: - 75,000 landless rural households each planting 0.02 ha of fruit trees and vegetables. - 110 schools and orphanages each planting 0.20 ha of fruit trees and vegetables. - 1,500 ha of backyard gardens established December 2008. - 55 ha of school/orphanage gardens established by December 2008. - 3,600 days of farmer's training undertaken through participatory group-based extension approaches.	
Sustainability & Implementation Arrangements: - The project would collaborate closely with the livestock and fisheries projects ensuring that a livelihoods-based approach is followed. - The project would be implemented in collaboration with the Extension Division of the Myanmar Agriculture Service (MAS) of the Ministry of Agriculture and Irrigation. MAS would also be responsible for co-ordinating government's inputs to the programme (e.g. production of tree seedlings and vegetable seeds) and providing extension services to project beneficiaries. - Project activities would be executed by implementing partners (national and international NGOs) familiar with the farming systems of the Ayeyarwady Delta under the umbrella of a management structure headed jointly by MAS and the implementing agency. - Farmers benefiting from the project would be trained in improved horticultural production technologies, post-harvest handling and storage, household nutrition, etc. - All information related to crop production under emergency relief projects in cyclone-affected areas would be coordinated through the Agriculture Cluster established by UN, comprising all major players in the crops, livestock and fisheries sub-sectors, *inter alia*, donors, UN agencies, Government line departments and international and national NGOs.	
Issues & Risks: - Many of the project's interventions would be implemented during the 2008 monsoon season when weather conditions could restrict access, delay planting, destroy planted crops, disrupt harvesting, etc. - The timely supply of project inputs required for the 2008 monsoon cropping season could be challenged by external causes.	
Type and Number of target beneficiaries: 31,280 impoverished farm families cropping less than 2 ha of paddy land.	
Total costs: *(000' US$)*	
- Equipment and inputs	2,111
- TA and training	180
- Operating expenses	510
- Co-ordination services	472
Total:	3,273

Livestock
Profile 4:

Sub-Sector: AGRICULTURE – LIVESTOCK	
Project name: **Emergency Assistance to Rice Farmers through Provision of Draught Animals**	
Main objective: Enable farmers to resume rice cultivation through the provision of draft animals & supplementary feeding.	
Geographical area: Townships of Labutta, Mawlamyingyun, Bogale, and Ngapudaw	
Duration of activities: 6 months	
Justification/Rationale: A total of 122,524 adult draft animals were lost in the areas most affected by the cyclone. The immediate assistance is focused in to those sections with many small farmers and where draught animals play a dominant role - the overall area of deep water rice production system covers 122,000 hectares or 15% of the 807 000 hectares of paddy area in the affected townships, with particular emphasis in Labutta, Mawlamyingyun, Bogale, Ngapudaw. Because of the high water levels in the paddy fields, also during normal monsoon periods, there is little alternative to replacing the draught cattle and buffaloes as mechanical implements are considered not suitable. Adopting the local estimate of 2 hectares per bullock per season 61,000 pairs of bullocks were required to cultivate this area before the cyclone, and assuming the same percentage of loss as for the whole Division of 50 % (61,000 out of 122,524), 30,000 pairs or 60,000 animals would be required for replacement. Taking into consideration that (a.) the window for the forthcoming ploughing season is rather small, (b.) the animals have to be sourced in Central Myanmar, and (c.) the logistical and other difficulties in purchasing large numbers of animals, it is suggested to replace immediately at least 5,000 cattle and buffaloes for the small scale farmers. Further restocking activities should be considered after this monsoon season. The selected four townships have lost 88,650 draught animals which are not available for the forthcoming monsoon planting season starting in June up to August 2008. Missing out on the planting season means no rice and no income for thousands of families and reduced food security for the country. Soaring food prices are a further justification for an increase in production and the use of all land drained and cleared from debris for cropping. The project targets smaller and poorer farmers in the deep water rice production system where there is little alternative to the use of draught cattle which have lost their draft animals and where draught animals are indispensable for paddy preparation. Small farmers with up to 2 hectares would be the main beneficiaries as draught animals can be shared thus increasing the number of beneficiary families.	
Objectives: - To provide small-scale paddy farmers with draught power for resuming crop production; - To enable farmers in the Delta area to prepare land for paddy/rice cultivation in the forthcoming planting season.	
Activities/Components: - 5,000 animals or 2,500 pairs of draught animals would be procured and distributed together with feed for 3 months; - Animals would be vaccinated and treated against internal and external parasites; - 5,000 surviving animals would receive supplementary feeding to maintain productivity; - Support to build shelters for 5,000 pairs of bullocks and 5,000 harrows would be provided.	
Outputs and Results: - 2,500 households supplied with a pair of draught animals each; - 5,000 hectares of paddy land prepared for planting; - 2,500 households supported through the provision of supplementary feed for 5 000 draught animals (covering another 5 000 hectares).	
Indicators: - 2,500 pairs of draught animals distributed; - 5,000 shelters erected; - 10,000 ha of paddy/rice grown; - 5,000 animals still productive after one year.	
Sustainability & Implementation Arrangements: The project would be implemented in collaboration with the Livestock Breeding and Veterinary Department (LBVD) and the Myanmar Livestock Federation. NGOS active in agriculture rehabilitation activities in the 4 targeted townships would be major partners in the field delivery. In each LBVD Township office a local staff would oversee and coordinate the activities in the township. The distribution of feed would be done through a voucher to guarantee that feed is stored and used properly.	
Issues & Risks: The project is a run against the time. If the animals cannot be provided within the next two months the planting season will be missed. Although LBVD assures that the quantity of animals are easily available in Central Myanmar but there will be competition for the animals. A potential risks exists in terms of duplications with similar programmes executed by other agencies in the area.	
Type and Number of target beneficiaries: 7,500 small scale rice farmers with up to 2 ha of land (families)	
Total costs: *(in '000 US$)*	
- Equipment and inputs	3120
- TA and training	220
- Operating expenses	120
- Co-ordination services	100
Total:	**3560**

Livestock
Profile 5:

Sub-Sector: AGRICULTURE-LIVESTOCK	
Project name: **Emergency Vaccination, Treatment and Feeding of Surviving Livestock**	
Main objective: Control of animal diseases and maintenance of productivity of surviving livestock	
Geographical area: 14 townships of Ayeyarwady and Yangon Division	
Duration of activities: 6-12 months	
Justification/Rationale: After the impact of the cyclone, the surviving animals are stressed and undernourished making them highly susceptible to disease outbreaks. Access to clean water is limited. Routine vaccination campaigns against HS, BQ, ND and FMD and other diseases are interrupted. Dead animals are not properly disposed off and decompose in the fields and road side ditches increasing the risk of spreading of diseases. Furthermore, the veterinary services, already weak with regard to staffing and inputs before the cyclone, are stretched to the limit and need urgent assistance to deliver the necessary services. Facilities have been damaged. Routine vaccination programmes against Food and Mouth Disease (FMD), Hemorrhagic Septicemia (HS) Black Quarter (BQ) have been interrupted. Supply of other veterinary drugs is very limited or is completely lacking. The lack of mobility does not allow the veterinarians of LBVD to attend sick animals and limit there area of intervention. There is a serious risk of disease outbreaks and the rapid spreading in the susceptible animal population. In response to the cyclone and to address the emergency LBVD has established 4 Emergency Animal Health Care Centres (EAHCC) in the affected areas from which emergency services will be provided. Staff from other parts of the country has already been moved to support these EAHCCs but they lack the above mentioned means. The proposed project would support the Animal Health Care Centres and would be delivered in 4 packages. Each package would provide necessary drugs (antibiotics, anthelmintics, vaccines, vitamins etc) and equipment to address routine veterinary care and emerging animal diseases. Reagents, starter cultures and equipment would be provided to the two vaccine producing laboratories in Myanmar to allow un-interrupted production of vaccines (HS, NB and FMD). Supplementary feed would help immediately the stressed animals to recover quicker and improve the performance in view of the forthcoming ploughing season. The penury for the cattle and buffaloes will occur again after the planting season, when animals are tied up, have no access to the fields any more and grazing is limited to the road sides and the communal grazing grounds. The feed reserves (mainly straw ad bran) which are destined for this period have been washed away. So some supplement is required until after the harvest fields can be accessed gain and when straw becomes available. All livestock holders (over 100,000) in the affected Townships as far as they can be reached by the veterinary service are considered beneficiaries of the proposed project. 3,000 households would receive supplementary feed for draught animals.	
Objectives: - To control animal diseases, reduce loss of animals and to keep animals productive; - Support the vaccination production laboratories to produce required vaccines locally; - To improve the nutritional basis of the population and income generation through the sale of surplus produce.	
Activities/Components: - Drugs and vaccines would be procured; - Vaccine campaigns would be conducted and sick animals would be attended without delay; - Veterinary services would be rehabilitated through the provision of equipment; - Emergency feed would be provided to improve productivity of animals; - Local vaccine production units would be rehabilitated and the required vaccine locally produced.	
Outputs and Results: - Animal losses will be reduced, diseases controlled and the risk of disease outbreak reduced; - Surviving animals will be kept productive; - Productivity of animals maintained; - Supply of animal products for family food security; - Increased farming income from the selling of surplus.	
Indicators: - Numbers of vaccine doses produced and vaccinations performed against HS, FMD, BQ, ND; - 3,000 animals having received supplementary feeding in each of the EAHCC; - Numbers of animals treated.	
Sustainability & Implementation Arrangements: TA would provide technical advice and supervision to implementation. The project would be implemented in collaboration with the Livestock Breeding and Veterinary Department (LBVD) and the Myanmar Livestock Federation. Additional support to the EAHCC would be provided through sub-contracts with NGOs such as VSF Veterinarian without Borders or similar NGOs.	
Issues & Risks: The insufficient man power of LBVD to deliver the field service. If the vaccine production unit is not rehabilitated vaccine has to be sourced internationally. A potential risks exists in terms of duplications with similar programmes executed by other agencies in the area.	
Number of target beneficiaries: Over 100,000 livestock farmer would be reached	
Total costs: *(in '000 US$)*	
- Equipment and inputs	1,290
- TA and training	60
- Operating expenses	200
- Co-ordination services	100
Total:	**1,650**

Livestock
Profile 6:

Sub-Sector: AGRICULTURE-LIVESTOCK			
Project name: **Emergency Assistance to Poor and Landless Families through Provision of Chicken and Ducks**			
Main objective: Restore food security by providing chicken and ducks to cyclone affected landless farmers			
Geographical area: Townships of Labutta, Kyaikle and Dadeye			
Duration of activities: 6-12 months			
Justification/Rationale: Poor, landless and woman headed households which have lost all their assets are the most vulnerable and needy group of beneficiaries. The above three townships were most severely hit by the cyclone. In Dadeye (93%) in Labutta (97%) and in Kyaikle (64%) practically all poultry have been wiped out. In addition, in Labutta 95% and Kyaikle 75 % and Dadeye 75% of the duck populations were lost. More than 80% of the animals lost were kept by landless, small and back yard farmers. Before the cyclone, the outputs from these small activities were consumed in the family and the surplus sold to middleman for the Yangon market. The income from selling slaughter birds and eggs from ducks and chicken is considered an important part of the family income. The project proposes to distribute chicken and duck 'packages" to beneficiaries. This would allow them in a very short time to get some eggs for own consumption and for sale creating cash income. One chicken package consists of nine 3 -4 months old local chicken and one cock. The duck package consists of 15 one day old ducklings. Part of each package is a feed allocation for 90 days and fencing material to be able to confine the animals. The replacement of the lost stock would immediately create some income from the sales of eggs and slaughter birds and ducks. Keeping chicken and ducks would in the very short term contribute to increased household income. About 15,000 poor, landless families and woman headed households in the twnships of Dadeye, Labutta and in Kyaikle. Preference would be given to households where (a.) the senior male or female member of the household has been lost and the household is now deemed to be single headed; (b.) where this condition already existed before the cyclone; (c.) where the head of the household was disabled as a result of injuries received during the cyclone; and (d.) where due to cyclone laborers cannot find work to earn cash in support of the family.			
Other Objectives: - Restocking of landless and vulnerable farmers with backyard animals; - Improving income generating situation of beneficiaries with little alternatives.			
Activities/Components: - 10,000 families would receive a poultry package; which consist of 9 pullets (3- months) and 1 cock which are vaccinated as well as 120 kg of feed good for 90 days, chicken wire to build a small chicken house with confinement; - 5,000 families would receive a duck package which consists of 15 ducklings and feed for 90 days; - Technical advisory services for improved chicken and dug raising.			
Outputs and Results: - Family food security of 15,000 households improved; - Increased farming income from the selling of surplus.			
Indicators: - 15,000 packages distributed; - Animals sold or alive after 6 months; - Number of eggs produced; - Number of birds slaughtered; - Number of training sessions provided.			
Sustainability & Implementation Arrangements: The project would be implemented in collaboration with the Livestock Breeding and Veterinary Department (LBVD) and the Myanmar Livestock Federation. NGOs would play an important role in the identification of the beneficiaries and the follow-up support to the farmers. The distribution of feed would be done through a voucher system.			
Issues & Risks: The delivery to so many beneficiaries is a major logistic undertaking. Identification of NGOs capable to deliver important relief packages; Fair identification of beneficiaries; The insufficient man power of LBVD to deliver the field service; A potential risk exists in terms of duplications with similar programmes executed by other agencies in the area.			
Type and Number of target beneficiaries: 15,000 poor landless and woman headed households			
Total costs: *(in '000 US$)*			
- Equipment and inputs			1,600
- TA Personnel and training			110
- operating expenses			50
- Co-ordination services			100
Total:			**1,860**

Fisheries
Profile 7:

Sub-Sector: FISHERIES

Project name: Emergency Supply of Fishing Gear, Boat Repair Tools and Processing Implements to immediately Restore Food Security

Main objective: Provide basic inputs to restart production and processing activities

Geographical area: 11 townships in Ayeyarwaddy and Yangon Division

Duration of activities: 6 months

Justification/Rationale:
The livelihoods of the fishers of Ayeyarwaddy and Yangon Divisions have been heavily impacted by the cyclone. As of 18 May 2008, the data available from the Department of Fisheries of the Ministry of Livestock and Fisheries reveal that 17,876 fishers died and 9612 are missing, and over 100,000 fishing households have been directly affected by the cyclone. The loss of productive means (boats, implements, gears and tools), essential post-harvest equipment for preserving and marketing the catch, labour opportunities (processing, marketing, transport) and food security require immediate response. The support project would allow fishers to usefully employ replacement gear and processing tools to restore their productive fishing activities.

Objectives:
- To provide immediate and direct assistance to the small scale fishers and woman processors of the cyclone affected areas through provision of fisheries gear and fish processing equipment;
- To kick-start and boost the artisan boat building capacity;
- To provide direct technical assistance to the Government in the coordination of the overall rehabilitation of the fisheries in the affected areas through aligning recovery efforts with national policy and international best practices in order to ensure recovery of the sector.

Activities/Components:
- Procurement and distribution of fishing gear, including transportation, superintendence, temporary storage, based on priority beneficiary identification targeting the most vulnerable and most capable to benefit from the support;
- Procurement and distribution of tool kits to selected artisan boat builders to immediately restore their boat building capacity, together with technical advice and coaching to maintain the standards of safety and quality of the boats.
- Procurement and distribution of simple fish preservation and processing equipment, including the rehabilitation of 50 ice production facilities, and superintendence, temporary storage, based on priority beneficiary identification targeting the most vulnerable and most capable to benefit from the support;
- Baseline survey to inform and focus the distribution of gear and tools;
- Contract with NGO to prepare beneficiary list and deliver the fishing inputs;
- Monitor the impact of the intervention by monitoring markets before and after the distribution;
- Prepare reports of the impact of the intervention.

Outputs and Results:
- 5,000 fishers and 2,100 fish processors receive fishing gear and fish conservation equipment to restart livelihoods;
- 100 boat builders who lost their tools resume income generation;
- An estimated 15,000 indirect beneficiaries (including crews);
- Co-ordination unit established for fisheries emergency/relief projects in Myanmar at the national and township levels.

Indicators:
- Number of gear kits, tool kits and processing kits properly distributed;
- Increased fish supplies in the local markets;
- Number of tool-less boat builders back in operation.

Sustainability & Implementation Arrangements:
- The project would be implemented in collaboration with the Department of Fisheries and NGOs;
- Local consultants train township fisheries officers in the coordination of fisheries projects in their Districts;
- Replacement gear would be selected so as not to increase the overall fishing pressure compared to the pre-cyclone situation;
- The project would also work with the authorities and NGOs to establish a participatory central coordination/information unit for fisheries emergency/relief projects in Myanmar.

Issues & Risks:
The demand for fishing gear may have been reduced altogether due to the high loss of life and skilled labour in the sector. Other NGO and humanitarian organizations work in un-coordinated manner targeting the same beneficiaries, providing improper or illegal fishing gear, creating conflicts between users and contributing to over-fishing.

Number of target beneficiaries: (individuals)

Type	Fishers	Women Processors	Boat builders	Grand Total
Total:	20,000	2,100	100	22,200

Total costs: *(in '000 US$)*

- Equipment and inputs	4,160
- Personnel and training	295
- operating expenses	210
- Co-ordination services	240
Total:	**4,905**

Forestry

Profile 8:

Sub-Sector: FORESTRY
Project name: **In-depth Verification of the Extent of Damage caused by the Cyclone to the Mangroves, and Determination of the Role of Mangrove Forests in Mitigating Destructive Impact of Wave Surges – Preparation of Comprehensive Reforestation Programme.**
Main objective: To determine the status of mangrove forests after the cyclone and to prepare a Reforestation Programme
Geographical area: Ayeyarwady Delta
Duration of activities: 6 months
Justification/Rationale: On 3 May 2008, Cyclone Nargis made its landfall around the mouth of the Ayeyarwady River in Myanmar with wave surges as high as 3.5 m. The ensuing flooding of the entire low-lying coastal area resulted in the death of an estimated 100,000 people. It also displaced over 1.5 million people who have lost their homes and livelihoods in the affected areas. Experience in the aftermath of the 2004 Indian ocean tsunami indicated that clearance of coastal forests and development of unprotected housing and infrastructure in coastal areas increased loss of life and devastation. Damage and loss of life was significantly reduced in areas where coastal forests were left intact. Similar results were observed with cyclone damage in India and Bangladesh – critical protection was afforded by trees and forests where the winds and waves were of similar devastating power. Moreover, all reports (studies & satellite images) are suggesting that the mangroves in the delta have undergone extensive loss and/or degradation over the years, and have further been damaged by the Cyclone. In order to develop a management plan for the remaining stands, and for developing a recovery/rehabilitation plan for the degraded and barren areas, it is necessary to firstly determine in details the current status of the mangrove/forest, including parameters such as distribution, stocking, and regeneration status. This would lay the foundation for planning subsequent forestry activities which call for protection, regeneration, reforestation and sustainable harvesting of the resource. Decisions on the future use of the mangroves would rely on this assessment. The assessment would also provide further evidence on the extent of damage caused by the cyclone. Both determinations would influence future policy and management of the mangroves of the Ayeyarwady delta. Overall, this assessment would form the basis for formulating an urgently needed project for reforestation of the delta area to be executed during the medium-term recovery and rehabilitation phase.
Objectives: - To determine with greater precision the extent of damage to the mangrove forests caused by Cyclone Nargis; - To provide reliable information to policy makers, forest managers and users on the status of the forest; - To determine the shielding effect of coastal forest vegetation on wave surges caused by cyclones and tsunamis; - To develop a project document for the reforestation and rehabilitation of mangrove forests of the Ayeyarwady delta.
Activities/Components: - Acquiring necessary remote sensing equipment and software for undertaking an assessment of the mangrove forests; - Analysing the pre- and post-cyclone status of mangrove forests through remote sensing procedures; - Conducting field inventories for estimating the health and productivity of remaining mangrove forests; - Studying the damage impact of the wave surge in control (protected by vegetation) and test (vegetation removed or degraded) sites to determine the protective role of mangrove vegetation along the shore fringes. - Preparing a project proposal, based on the assessments above, for reforestation and rehabilitation of the mangrove forests.
Outputs and Results: - Exact and up-to-date information available on post-cyclone status of forests in the Ayeyarwady delta for long-term; - Estimation of forest growing stock available for determining management, including the extent of reforestation needed to maintain existing production levels of the resource; - Influence of bioshields on the buffering effect of wave surges better understood; - Detailed project document proposal for reforestation and rehabilitation of the mangrove forests.
Indicators: -Remote sensing equipment - Satellite imagery, vegetation distribution maps, reports - Forest stand inventory data for representative areas of the delta - Study on the influence of bioshields on the damaging impact of wave surges - Project proposal on reforestation and rehabilitation
Sustainability & Implementation Arrangements: -The field assessment work, on the current status of forest and their productivity would form the baseline for decision making long term on reforestation, conservation and management, as well as the reforestation programme planned to be carried out in the Rehabilitation Phase; - Evidence on the benefits of bioshields would be used by policy makers and planners to make appropriate decisions on the need to protect coastal vegetation; - The Forest Department would be the main collaborator whose staff would be able to acquire the equipment and capacity to continue using the remote sensing technology in the agency for the future.
Issues & Risks: - Importing of some of the technical equipment can become delayed; - National counterparts with the requisite skills for operating the equipment may be difficult to find.
Type of beneficiary group: Land Use Planner/Reforestation Designer (plus in the long run around 6.5 million people between population in situ, users of forest products, and communities dependent on forestry products).

Total costs: *(in 000 US$)*	**Total**
- Equipment and inputs	260
- Technical Assistance & Training	253
- Operating expenses	337
- Co-ordination services	70
Total:	**920**

2. Recovery and Rehabilitation Needs

Crops
Profile 1:

Sub-Sector: AGRICULTURE – CROPS
Project name: **Support to Food Security through the Restoration of Annual Food Crop Production by Marginal and Small-Scale Farming Families**
Main objective: Restoration of crop production and food security of the most vulnerable farmers in areas worst affected by the cyclone
Geographical area: All 11 priority townships
Duration of activities: 24 months
Justification/Rationale: It is estimated that some 91,300 marginal and small-scale farmers cropping between 0.4 and 4 ha of paddy rice have been affected by the cyclone. It is further estimated that 47,120 of these farmers were not be able to plant their monsoon season paddy crop between July and September 2008 because of a lack of seeds, farmyard manure draught animals and power tillers and inadequate shelter, food and potable water and will be dependent on food aid until their next major rice harvest in October 2010.
Objectives: - Provision of improved varieties of rice seed with accompanying fertilisers and pulses seeds to marginal farmers from the areas worst affected by the cyclone. - Provision of power tillers and animal drawn harrows. - Improvement in the nutritional status of the impoverished farm families. - Enhanced fertility of the paddy soils. - Participatory research and extension programme to train farmers in improved crop production technologies.
Activities/Components: Co-ordinated provision of 2,630 MT of gypsum to treat saline soils, 1,973 MT of HYV, high quality varieties (*hnankar*) and salt tolerant varieties of paddy rice, 2,630 MT of Urea, 1,310 MT of TSP and 655 MT of PoM fertilisers, 26,300 litres and 263 MT of insecticides (in 0.8 ha packages), and 198 MT of improved pulses (cowpea, black gram and green gram) seeds (in 0.4 ha packages), and 815 power tillers with 90 days of fuel and lubricants and 5,000 animal drawn harrows. Training of some 5,260 farmers in minimum tillage, improved rice cultivation (HYV varieties, fertiliser management and pest control), water management, post-harvest storage, etc through group-based participatory extension approaches. Co-ordination/information services for crop-based emergency and relief projects in cyclone-affected areas of Myanmar.
Outputs and Results: - 26,300 marginal farmers from the areas worst affected by the cyclone are able to produce sufficient pulses and paddy rice in the 2008/2009 "summer" and 2009 monsoon cropping seasons to restore their household food security. - The technical knowledge and skills of 5,260 marginal farmers to produce improved varieties of rice and pulses are strengthened.
Indicators: - 26,300 farmers planting improved varieties of pulses and paddy rice with accompanying agricultural inputs and tillage implements. - 10,650 ha of paddy fields sown with pulses in the "summer" monsoon cropping season. - 21.300 ha of paddy land restored to production by September 2009 for the monsoon cropping season. - 1,270 days of farmer's training undertaken through participatory group-based extension approaches.
Sustainability & Implementation Arrangements: - The project would collaborate closely with the livestock and fisheries projects ensuring that a livelihoods-based approach is followed. - The project would be implemented in collaboration with the Extension Division of the Myanmar Agriculture Service (MAS) of the Ministry of Agriculture and Irrigation. MAS would also be responsible for co-ordinating government's inputs to the programme (e.g. production of HYV seeds) and providing extension services to project beneficiaries. - Project activities would be executed by implementing partners (national and international NGOs) familiar with the farming systems of the Delta under the umbrella of a management structure headed jointly by MAS and the implementing agency. - Farmers benefiting from the project would be trained in improved rice production technologies, post-harvest storage, etc. - All information related to crop production under emergency relief projects in cyclone-affected areas would be coordinated through the Agriculture Cluster established by UN, comprising all major players in the crops, livestock and fisheries sub-sectors, *inter alia*, donors, UN agencies, Government line departments and international and national NGOs.
Issues & Risks: - The project's rice-based interventions would be implemented during the 2009 monsoon season when weather conditions could restrict access, delay planting, destroy planted crops, disrupt harvesting, etc. - Potential risks exist in terms of duplication with similar projects executed by members not attending the Agriculture Cluster meetings. - The timely supply of project inputs could be challenged by external causes.
Type and Number of target beneficiaries: 26,300 impoverished farm families cropping less than 4 ha of paddy land.
Total costs: *(000' US$)*

- Equipment and inputs	8,416
- TA and training	126
- Operating expenses	1,901
- Co-ordination services	1,760
Total:	12,203

Crops
Profile 2:

Sub-Sector: AGRICULTURE – CROPS

Project name: **Support to Food Security through the Restoration of Horticultural Production by Marginal Farm Families**

Main objective: Restoration of fruit and vegetable production and food security of landless households, school children and orphans in areas worst affected by the cyclone

Geographical area: Dedaye, Labutta, Mawlamyinegyun and Ngapudaw in Ayeyarwady Division and Khawhmu and Twantay Townships in Yangon Division

Duration of activities: 24 months

Justification/Rationale:
It is estimated that 32,048 ha of small-scale orchards were destroyed by the cyclone. The marginal farmers generate incomes from sales of produce from their orchards and small livestock. It is estimated that 37 per cent of tree crops of the affected area were severely damaged or destroyed by the cyclone, in particular coconut, banana, (young) mango, jack fruit, guava, cashew nut and betel nut and standing crops of vegetables. While most of the coconut trees are still standing, the cyclone has twisted their crowns which, in due course, will lead to nematode infestation, dwindling production and a slow death. In some townships losses are higher than 85 per cent.

Objectives:
- Provision of quality fruit tree seedling, certified vegetable seeds, insecticides and hand tools to marginal farmers operating small-scale orchards.
- Generate much-needed income through the sale of surplus horticultural produce.
- Improve the nutritional status of the landless families, school children and orphans, and rural communities as a whole.

Activities/Components:
- Co-ordinated provision of 1,143,000 fruit tree seedlings, 11,430 vegetable production kits, 5,720 litres of liquid insecticide, 51.50 MT of powder insecticide and selected hand tools (as 0.20 ha packages) to 11,430 marginal farm families.
- Training of some 11,430 men and women in improved horticultural production, post-harvest handling and storage, and household nutrition through group-based participatory extension approaches.
- Co-ordination/information services for crop-based emergency and relief projects in cyclone-affected areas of Myanmar.

Outputs and Results:
- 11,430 marginal farm families from areas worst affected by the cyclone are able to produce sufficient amounts of fruits and vegetables from their orchards by the 2010 monsoon season to enhance their household food security and nutrition levels and generate much needed incomes.
- The technical knowledge and skills of 11,430 men and women are strengthened and the nutritional status of 11,430 families significantly improved.

Indicators:
- 11,430 marginal farmers each planting 0.20 ha of fruit trees and vegetables.
- 2,286 ha of orchards restored by June 2010.
- 2,740 days of farmer's training undertaken through participatory group-based extension approaches.

Sustainability & Implementation Arrangements:
- The project would collaborate closely with the livestock and fisheries projects ensuring that a livelihoods-based approach is followed.
- The project would be implemented in collaboration with the Extension Division of the Myanmar Agriculture Service (MAS) of the Ministry of Agriculture and Irrigation. MAS would also be responsible for co-ordinating government's inputs to the programme (e.g. production of tree seedlings and vegetable seeds) and providing extension services to project beneficiaries.
- Project activities would be executed by implementing partners (national and international NGOs) familiar with the farming systems of the Ayeyarwady Delta under the umbrella of a management structure headed jointly by MAS and the implementing agency.
- Farmers benefiting from the project would be trained in improved horticultural production technologies, post-harvest handling and storage, household nutrition, etc.
- All information related to crop production under emergency relief projects in cyclone-affected areas would be coordinated through the Agriculture Cluster established by UN, comprising all major players in the crops, livestock and fisheries sub-sectors, *inter alia*, donors, UN agencies, Government line departments and international and national NGOs.

Issues & Risks:
Many of the project's interventions would be implemented during the 2009 monsoon season when weather conditions could restrict access, delay planting, destroy planted crops, disrupt harvesting, etc.
Potential risks exist in terms of duplication with similar projects executed by members not participating in the UN Agriculture Cluster.
The timely supply of project inputs required could be challenged by external causes.

Type and Number of target beneficiaries: 11,430 impoverished marginal farm families have restored their horticultural production

Total costs: *(000' US$)*

- Equipment and inputs	1,722
- TA and training	137
- Operating expenses	414
- Co-ordination services	383
Total:	2,656

Crops
Profile 3:

Sub-Sector: AGRICULTURE – CROPS
Project name: **Support to the Restoration of Household Agro-processing and Storage Facilities**
Main objective: Enhance the quality of seed production and improve income generating opportunities for rural women
Geographical area: Dedaye, Kyaikiat, Labutta, Mawlamyinegyun and Ngapudaw in Ayeyarwady Division and Khawhmu, Kungyangong and Twantay Townships in Yangon Division
Duration of activities: 24 months
Justification/Rationale: It is estimated that between 75 and 85% of seed stocks from the cyclone-affected area were destroyed by flooding or subsequent wetting from rain because traditional bamboo seed stores were severely damaged by the cyclone.. Traditionally, larger farmers own harvesting machinery and agro-processing equipment and charge the marginal and small-scale farmers for their use when available. Many of these reapers, threshers and hullers were destroyed or damaged by the cyclone and, in the worst affected areas, will not be available for the 2008 and 2009 monsoon cropping seasons.
Objectives: - Provision of affordable and highly durable storage units (e.g. silos, bins and drums) to individual small-scale farm households which are prone to flooding for storing seeds and grains. - Enhance the quality and longevity of seeds and grains to be stored or sold, the project would supply groups of marginal and small-scale farmers with appropriate harvesting, handling and processing equipment, namely diesel-powered reapers, threshers and hullers/mills. - Provision of cooking utensils and storage containers to groups of women farmers for the processing and preservation of fruits and vegetables to add value to horticultural produce ad improve the diets of impoverished households throughout the year.
Activities/Components: - Co-ordinated provision of 11,000 affordable and durable storage units (e.g. silos, bins and drums) to small-scale farmers producing seed, 275 sets of diesel-powered reapers, threshers and hullers/mills and 100 days of fuel and lubricants) to groups of farmers and 3,300 sets of cooking utensils and storage containers to groups of women producing fruits and vegetables. - Training of some 3,960 farmers (men and women) in improved post-harvest handling and storage, small-scale agro-processing, marketing and household nutrition, through group-based participatory extension approaches. - Co-ordination/information services for crop-based emergency and relief projects in cyclone-affected areas of Myanmar.
Outputs and Results: - The production of quality local long duration varieties of paddy rice seed is restored in selected villages. - Marginal farmers are able to maximise the quality and quantity of their rice harvests. - Rural women able to improve their livelihoods through the generation of much needed incomes from the processing and marketing of fruits and vegetables.
Indicators: - 11,000 marginal farmers provided with affordable and durable storage units (e.g. silos, bins and drums) for rice seed. - 275 groups of 25 to 30 marginal farmers provided with rice harvesting, handling and processing machinery. - 3,300 groups of ten rural women provided with cooking utensils and storage containers. - 950 days of farmer's training undertaken through participatory group-based extension approaches.
Sustainability & Implementation Arrangements: - The project would collaborate closely with the livestock and fisheries projects ensuring that a livelihoods-based approach is followed. - The project would be implemented in collaboration with the Extension Division of the Myanmar Agriculture Service (MAS) of the Ministry of Agriculture and Irrigation. MAS would also be responsible for co-ordinating government's inputs to the programme and providing extension services to project beneficiaries. - Project activities would be executed by implementing partners (national and international NGOs) familiar with the farming systems of the Delta under the umbrella of a management structure headed jointly by MAS and the implementing agency. - Farmers benefiting from the project would be trained in improved post-harvest handling and storage, small-scale agro-processing, marketing and household nutrition, etc. - All information related to crop production under emergency relief projects in cyclone-affected areas would be coordinated through the Agriculture Cluster established by UN, comprising all major players in the crops, livestock and fisheries sub-sectors, *inter alia*, donors, UN agencies, Government line departments and international and national NGOs.
Issues & Risks: - Many of the project's interventions would be implemented during the 2009 monsoon season when weather conditions could restrict access, delay planting, destroy planted crops, disrupt harvesting, etc. - Potential risks exist in terms of duplication with similar projects executed by members not participating in the UN Agriculture Cluster. - The timely supply of project inputs required could be challenged by external causes.
Type and Number of target beneficiaries:
Total costs*: (000' US$)*
- Equipment and inputs 5,425 - TA and training 95 - Operating expenses 1,228 - Co-ordination services 1,138 Total: 7,886

Crops
Profile 4:

Sub-Sector: AGRICULTURE – CROPS
Project name: **Support to the Rehabilitation of Embankments/Polder Lands and Animal Drinking Water Ponds in Cyclone-Affected Areas of Ayeyarwady Division**
Main objective: Restoration of crop and livestock production and food security of the most vulnerable farmers in areas worst affected by the cyclone
Geographical area: Bogale, Dedaye, Kyaikiat, Labutta, Mawlamyinegyun, Ngapudaw and Pyapone Townships of Ayeyarwady Division
Duration of activities: 24 months
Justification/Rationale: It is estimated that 18 polder schemes, totalling some 90,000 ha were damaged by the surge caused by Cyclone Nargis and are now in urgent need of rehabilitation. It is further estimated that village animal drinking water ponds have been contaminated by salt water, silt, debris and rotting carcasses. Moreover, some 270,000 farm implments, inclusding water pumps for small-scale irrigation were lost during the cyclone.
Objectives: - Restoration of 90,000 ha of polder land to paddy rice production through the repair of minor embankments and cleaning of drainage ditches. - Rehabilitation of 2,000 animal drinking water ponds and enhancement of irrigated food production through the supply of water pumps.
Activities/Components: - Survey and design of civil works in collaboration with the beneficiaries. - Provision of "cash for work" (i.e. 50 per cent of community-based civil works) – managed by water users associations, established within existing community organisations. - Co-ordinated provision of 2,000 water pumps and/or 50,000 treddle pumps to groups of between 25 and 30 marginal farmers. - Training of some 13,140 marginal farmers in improved water management systems, operation and maintenance of pumps, and social forestry (for protection of embankments and ponds). - Co-ordination/information services for crop-based emergency and relief projects in cyclone-affected areas of Myanmar.
Outputs and Results: - 36,870 marginal farm families able to restore their annual food crop production to pre-cyclone levels. - 2,000 villages able to provide clean drinking water to their animals. - 50,000 farmers able to restore their dry season irrigated crop production beyond pre-cyclone levels. - The technical knowledge and skills of 13,140 men and women are strengthened and the nutritional status of 50,000 families significantly improved.
Indicators: - 90,000 ha of polder land rehabilitated (length of embankments repaired and length of ditches cleaned). - 2,000 village drinking water ponds cleaned. - 80,000 farmers owning livestock using animal drinking water ponds. - 10,000 ha of land irrigated. - 3,150 days of farmer's training undertaken through participatory group-based extension approaches.
Sustainability & Implementation Arrangements: - The project would collaborate closely with the livestock and fisheries projects ensuring that a livelihoods-based approach is followed. - The project would be implemented in collaboration with the Extension Division of the Myanmar Agriculture Service (MAS) of the Ministry of Agriculture and Irrigation. MAS would also be responsible for co-ordinating government's inputs to the programme (e.g. production of tree seedlings and vegetable seeds) and providing extension services to project beneficiaries. - Project activities would be executed by implementing partners (national and international NGOs) familiar with the farming systems of the Ayeyarwady Delta under the umbrella of a management structure headed jointly by MAS and the implementing agency. - Farmers benefiting from the project would be trained in improved water management systems, operation and maintenance of pumps, and social forestry (for protection of embankments and ponds), etc. - All information related to crop production under emergency relief projects in cyclone-affected areas would be coordinated through the Agriculture Cluster established by UN, comprising all major players in the crops, livestock and fisheries sub-sectors, *inter alia*, donors, UN agencies, Government line departments and international and national NGOs.
Issues & Risks: - Delivery of food aid to accompany the project's "cash for work" should be delivered timely, i.e. during the lean period (June to October). - Potential risks exist in terms of duplication with similar projects executed by members not participating in the UN Agriculture Cluster. - The timely supply of project inputs required could be challenged by external causes.
Type and Number of target beneficiaries: 116,870 impoverished farmers able to restore their crop and livestock production.
Total costs: *(000' US$)*
- Equipment and inputs 5,403 - TA and training 148 - Operating expenses 1,235 - Co-ordination services 1,144 Total: 7,929

Livestock
Profile 5:

Sub-Sector: AGRICULTURE-LIVESTOCK

Project name: **Assistance to farmers with draught animal and for increased draught animal production**

Main objective: Enable small-scale farmers to cultivate field crops through the provision of draft animals and feed

Geographical area: Townships of Labutta, Mawlamyingyun, Bogale, Ngapudaw and others to be identified

Duration of activities: 24 months

Justification/Rationale:
The above selected four townships have lost 88,650 draught animals. The first emergency restocking action (see above 'immediate need) with draught animals was conditioned by the immediate need to provide as quickly as possible draught animals not to miss the monsoon rice planting season. Once the 2008 monsoon season is over an inventory should be carried out to assess how many draught animals are still required. It is suggested to provide an additional 10,000 heads of draught cattle and buffaloes to small farmers. Given the general preference of many farmers for draught animals in particular buffaloes, the GoM wishes to strengthen buffalo breeding activities in the delta area. It is proposed to identify and support farmers interested in buffalo breeding through extension advice in feeding, rearing and in reproductive management. The rearing intensity of draught animals is very low, resulting in very late maturing. Advice in improved feeding and management of the surviving young stock would increase the number of replacement animal available for work in the field. Organizing interested buffalo breeders and providing training and extensions services addressing management, rearing and reproductive management would increase the number of draft animals over time. Around 5,000 small rice farmers in the affected Ayeyarwady and Yangon Division with special emphasis on the area of deep water rice production, plus farmers from other areas may be included pending on the respective inventory to verify. Furthermore, animals feed and harrows would be provided. In addition, an estimated 500 - 1000 breeders which are interested in improving buffalo/draught animal production would also benefit from the interventions. There will be a continued demand of draught cattle. Improved rearing, breeding and reproductive performance would result in more animals.

The project targets principally smaller and poorer farmers in the deep water rice production system but also in other areas (based on the field survey) where there is little alternative to the use of draught cattle and where farmers have lost their draft animals. Smaller farmers with up to 2 hectares would be the main beneficiaries - draught animals can be shared thus increasing the number of beneficiary families.

Objectives:
- To increase the availability of draught animals through restocking supply;
- To improve livestock production management;
- To secure food security and income generation for small farmers.

Activities/Components:
- Verification survey of draught animals post cyclone and post emergency;
- 10,000 animals or 5000 pairs of draught animals would be distributed together with feed for 3 months;
- Animals would be vaccinated and treated against internal and external parasites;
- Creation of farmers' buffalo breeding and rearing groups;
- Training and extension for rearing and management of buffaloes including reproductive management;
- Procurement of inputs including harrows.

Outputs and Results:
- Verification survey will confirm the numbers required and the area of intervention for re-stocking;
- 5,000 households will receive 5,000 pairs of draught animals and harrows when required;
- At least 500 buffalo breeders will be re-grouped and improve buffalo production;
- Increased availability of draught animals.

Indicators:
- 5,000 farmers have received draught animals;
- 10,000 hectares of paddy land cultivated;
- Animals still productive after one year;
- Buffalo breeders group established with functional extension service.

Sustainability & Implementation Arrangements:
The project would be implemented in collaboration with the Livestock Breeding and Veterinary Department (LBVD) and the Myanmar Livestock Federation. The livestock distribution would be done in collaboration with LBVD township offices and Village Peace and Development Council. TA would assist in the establishment of buffalo breeders group and provide training and extension NGOs active in agriculture rehabilitation activities in the 4 targeted townships would be major partners in the field delivery. The distribution of feed would be done through a voucher system to guarantee that feed is stored properly and used properly.

Issues & Risks:
The verification survey would confirm the necessity; A potential risks exists in terms of duplications with similar programmes executed by other agencies in the area.

Type and Number of target beneficiaries: 5000 small scale farmers

Total costs: *(in '000 US$)*

- Equipment and inputs	5280
- TA and training	160
- Operating expenses	120
- Co-ordination services	100
Total:	**5660**

Livestock
Profile 6:

Sub-Sector: AGRICULTURE-LIVESTOCK

Project name: **Food Security and Income Creation for Poor and Landless Families through Enhancing Pig Production**

Main objective: Enhance pig production of cyclone affected landless farmers

Geographical area: Townships of Labutta, Bogale and Dadeye

Duration of activities: 12 months

Justification/Rationale:

The above three townships were most severely hit by the cyclone which killed 9,000 pigs (45%) in Dadeye, 17,000 in Labutta (85%) and 14,000 in Bogale (47%). Pig production is an important undertaking for landless and poor families - as it is a short cycled species with high prolificacy. Pork is in high demand and the prices are stimulating. Pigs are kept generally in small holdings and are an important source of income for thousand of families. Before the cyclone, fattened pigs were sold to middleman for the Yangon market. Piglets can either be fattened or sold to neighbouring farmers. It is proposed that Piglets would be distributed to needy households which have lost their pigs or which are interested in pig production and have limited other source of income after the cyclone. It is suggested to support 20 % of the area's holdings or 1500 households. The pig package consist of 4 weaned piglets – 2 castrates and 2 females and supplementary feed (bran or green feed has to be provided) for 60 days. The 2 castrates are fattened and sold for cash; the females are kept for breeding. Some of the cash can be used to purchase feed for the females and their offspring. Provision would be made by Livestock Breeding and Veterinary Department (LBVD) that communal boars are available for mating. Out of solidarity beneficiaries would give two female weaner piglets from the first litters to other needy households. It is proposed to distribute a 'piglet package' to 1500 needy families (20% of the households having had pigs before the cyclone) from the target townships. Farmers from other townships can be included if they meet the beneficiary criteria and are interested and capable to raise pigs.

Objectives:
- To provide piglets to cyclone affected landless households;
- To increase household income and food security of landless vulnerable households;
- To strengthen the livelihoods of poor and landless families.

Activities/Components:
- 1500 families would receive a piglet package;
- Advisory services for improved pig production chicken and dug raising.

Outputs and Results:
- Family food security improved;
- Increased supply of pigs and pork;
- Increased farming income from the selling of surplus.

Indicators:
- 1500 piglet packages distributed;
- Animals sold or alive after 6 months;
- Number of training sessions conducted.

Sustainability & Implementation Arrangements:
The project would be implemented in collaboration with the Livestock Breeding and Veterinary Department (LBVD) and the Myanmar Livestock Federation. The distribution of feed would be done through a voucher system.

Issues & Risks:
The delivery to so many beneficiaries is a major logistic undertaking; The insufficient man power of LBVD to deliver the field service; A potential risks exists in terms of duplications with similar programmes executed by other agencies in the area.

Type and Number of target beneficiaries: 1500 poor landless woman headed households

Total costs: *(in '000 US$)*

- Equipment and inputs			1750
- TA and training			50
- operating expenses			50
- Co-ordination services			50
Total:			**1,900**

Fisheries
Profile 7:

Sub-Sector: FISHERIES

Project name: Rehabilitation of The Fisheries Sector through Restoration of the Fishing Fleet and basic Sector Services

Main objective: Replace or repair fishing boats lost or damaged in the cyclone and provide gear and implements to women processors

Geographical area: 11 townships in Ayeyarwaddy and Yangon Division

Duration of activities: 24 months

Justification/Rationale:
The livelihoods of the fishers of Ayeyarwaddy and Yangon Divisions have been heavily impacted by the cyclone. As of 18 May 2008, the data available from the Department of Fisheries of the Ministry of Livestock and Fisheries revealed that 17,876 fishers died and 9,612 are missing. The loss of productive means (boats, implements, gears and tools), essential post-harvest equipment for preserving and marketing the catch, labour opportunities (processing, marketing, transport) and food security require urgent response. The livelihoods of fishers depend on the economics and operational parameters of the vessels that they fish in. Fishing vessels should be well constructed, low in maintenance and offer a safe platform for operations. In previous disasters, rapid delivery of poor quality boats by well-intentioned organizations put the lives of fishers at risk. The project activities are geared to ensure the delivery of high quality boats and improve coordination in use of best practices.

Objectives:
- To provide immediate and direct assistance to the small-scale fishers of the cyclone-affected areas through provision of replacement fishing boats for food security and income generation;
- Train boat builders in state of the art boat building and repair techniques;
- To provide technical advice and coordination services to the Government and other stakeholders involved in the rehabilitation of the fishing fleet.

Activities/Components:
- Baseline survey to inform and focus the assistance on vulnerable and other priority groups;
- Establishment of six Fishery Livelihoods Rehabilitation and Resource Centres (FLRRC);
- Site identification on land provided by DOF, construction and management of six FLRRC;
- Training in improved boat building techniques, technical fishing and aquaculture best practices, safety at sea, pond reconstruction, distribution and storage centre for fishing gear, fisheries literature resources;
- 180 demonstration boats would be built demonstrating best practices and training boat builders;
- Provision of boats;
- Coordinating the construction of replacement boats, provide technical advice, coordinate the procurement of raw material and engines, identification of beneficiaries.

Outputs and Results:
- 6 FLRRC established and operational in selected townships in the affected area covering all 11 priority townships;
- 30 10m- and 180 6.5m-demonstration fishing vessels built to safe and high quality standards;
- 120 boat builders trained in correct boat construction practices through a training-of-trainers process;
- Improved designs of fishing vessels available to all NGOs in the early stages of the recovery and in the long term;
- 13,500 boats built and delivered.

Indicators:
- Number of demonstration boats built and delivered;
- Number of boat builders trained;
- The number of boats delivered to beneficiaries;
- Availability of improved vessel designs and drawings to NGOs and the public.

Sustainability & Implementation Arrangements:
- The project would be implemented in collaboration with the Department of Fisheries as a main stakeholder;
- The government fisheries officers at township level would benefit from capacity building training provided;
- The location of the 6 FLRRC near the main areas of fishing would ensure accessibility and facilitate distribution of boats and services in the vicinity of the beneficiaries.

Issues & Risks:
The demand for fishing boats may have been reduced altogether due to the high loss of life and skilled labour in the sector. Other NGO and humanitarian organizations work in un-coordinated manner targeting the same beneficiaries, providing improper or illegal fishing gear, creating conflicts between users and contributing to over-fishing.

Number of target beneficiaries:

Type	Fishers	Boat builders		Grand Total
Total:	28,000	120		28,120

Total costs: *(in '000 US$)*	
- Equipment and inputs	7,566
- Personnel and training	1,284
- operating expenses	316
- Co-ordination services	480
Total:	**9,646**

Fisheries
Profile 8:

Sub-Sector: FISHERIES

Project name: Small-Scale Aquaculture Rehabilitation

Main objective: Rehabilitate small-scale aquaculture activities in the cyclone-affected area

Geographical area: Ayeyarwaddy and Yangon Divisions

Duration of activities: 24 months

Justification/Rationale:
The aquaculture infrastructure and activities in the Ayeyarwaddy and Yangon Divisions have been heavily impacted by cyclone Nargis. As of 18 May 2008, information provided by the Department of Fisheries of the Ministry of Livestock and Fisheries (MOLF) indicates that 15,664 ha of fish and shrimp ponds lost their stock during flooding or were otherwise damaged, at an estimated cost of US$ 50 million. Small-scale extensive commercial and household ponds are widespread and are important for food security, employment and household income. Restocking is a main priority for these small-scale aquaculture ponds and needs to be provided by backyard and government hatcheries. Initial reports on damage to hatcheries indicated they suffered substantial damage and many are out of production.

Objectives:
- To return damaged hatcheries requiring minor repairs and/or restocking with broodstock to operational status to supply seed of acceptable quality in the immediate term and high quality by the end of the project to bring the small-scale aquaculture production back to pre-cyclone levels and improve where possible in particular in support of local food security and household income generation;
- To increase the production by small-scale and household pond aquaculture farmers through improved husbandry within a multi-purpose pond system;
- To improve the resilience of the small-scale aquaculture sector with respect to disaster impact and disease control.

Activities/Components:
- Complete a comprehensive rapid review of the small-scale aquaculture sector in the target area to identify priority hatcheries;
- Assist with the rehabilitation of damaged hatcheries through technical advice in the rehabilitation including (re-) design and improved operation of all priority hatcheries;
- Devise rehabilitation strategies for small-scale and household aquaculture farms, including the identification of alternative feeds;
- Assist with the reconstruction of government-owned hatcheries and their distribution infrastructure;
- Identify post-cyclone bottlenecks in the distribution of seed and facilitate distribution to small-scale farmers where indicated;
- Provide technical assistance on the use of alternative indigenous species or practices to regain operational status;
- Assist hatcheries with brood stock selection to ensure genetically healthy brood stock and disease control;
- Provide technical advice on the development and improvement of value chains, marketing and post-harvest treatment of the production for small-scale farmers and households;
- Oversee the impact of the intervention by monitoring hatchery outputs and distribution and livelihoods of household pond aquaculture farmers

Outputs and Results:
- Adequate number of hatcheries and distribution channels rehabilitated to allow aquaculture production to resume and reach pre-cyclone levels;
- The livelihoods of household pond aquaculture farmers are restored and their food security situation has improved at least to pre-cyclone level.

Indicators:
- Number of post-cyclone damaged and unproductive hatcheries supplying adequate seed to household aquaculture farmers;
- Improved income, livelihoods and food security situation of household pond aquaculture farmers.

Sustainability & Implementation Arrangements:
The project would be implemented in collaboration with the Department of Fisheries;
The training and capacity building component of the project would ensure that the assistance generates durable contributions to the food security and livelihoods of the farmers involved.

Issues & Risks:
Household aquaculture farmers use of their ponds for other farm purposes may be incompatible with improved aquaculture methods. As with other non-recognized elements of the fisheries sector (such as rice field fishing), household ponds of less than 8x8 meters do not require a licence and their inventory and the appreciation of their importance is incomplete.

Number of target beneficiaries:

Type	hatcheries operators	household aquaculture farmers	commercial aquaculture farmers	Grand Total
Total:	100	10,000		10,100

Total costs: *(in '000 US$)*	
- Equipment and inputs	1,150
- Personnel and training	250
- operating expenses	250
- Co-ordination services	100
Total:	**1,750**

Forestry

Profile 9:

Sub-Sector: FORESTRY

Project name: **Mangrove/Forestry Sector Rehabilitation**

Main objective: Rehabilitation of mangrove forests in Nargis-cyclone affected areas in the Ayeyarwady Delta

Geographical area: Ayeyarwady Division (Districts: Myaung Mya, Pyapon, Pathein)

Duration of activities: 24 months

Justification/Rationale:

The mangrove forests in the Ayeyarwady delta area are vital for the maintenance of the ecosystem of the region. The forests are also an important source of forest produce such as fuelwood, charcoal, poles, bamboo, roof thatch, etc. Furthermore, the forest creates the nursery for fisheries as well as a being an important source of food for local communities. Overall, this ecosystem forms an important source of livelihood for rural people in the area. Recently, the area was damaged by Cyclone Nargis, resulting in heavy loss of life and habitation from the resulting wave surge. A large swathe of the forest was also destroyed by the cyclone. A rapid estimate of the annual production from forestry in the cyclone affected area comes up to $10 million. Roughly, almost 1.5 million people are directly or indirectly dependent on forestry for their livelihoods. The Ministry of Forestry reported that approximately 14,000 ha of natural forests, and 21,000 ha of plantations were destroyed in three districts alone. The loss in economic terms came to about $6 million, not withstanding future earnings foregone. A massive reforestation programme would be needed for the forestry sector to rebuild its forest area, and ensure that future productivity is not lost. In addition, the reforestation programme should be undertaken through a community-based participatory approach. This would ensure villagers having a role in the reforestation programme from the start, and keeping an influence over future management and profits of the resources that are under their care. In immediate terms, the involvement of villagers would provide additional employment for people who have lost their entire livelihoods. A further consideration is the loss of forest camps and related facilities – the cyclone destroyed all the facilities which would be needed for carrying out forestry operations. There is an urgent need to rebuild some basic facilities for the Forest Department to start operating in the cyclone-devastated area.

Objectives:

- 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;
- Active participation of forest-dependent communities in the reforestation work;

Activities/Components:

- Assistance to the Forest Department to recover basic facilities for it to continue its operations in the cyclone-affected area;
- Implementation of the reforestation cum regeneration programme in accessible mangrove reserves in the delta;
- Incorporation of a participatory and community-based management approach into the reforestation programme;
- Rebuilding of forest camps and operational facilities for Forest Department to begin functioning without delay.

Outputs and Results:

- 19 forest base camps rebuilt, operating equipment resupplied, two vehicles and two boats for forest operations available;
- 10 nurseries with capacity for producing 50,000 mangrove seedlings established;
- 10,000 ha of mangrove forests enriched with trees or placed under natural regeneration system;
- Capacity of national staff in mangrove reforestation techniques raised;
- Mangrove reforestation and rehabilitation guideline developed;
- 20 community-based organizations (one per village) of forest user groups involved in developing nurseries, planting and sustainable management of forest resources.

Indicators:

- Area of coastal forests and shelterbelts rehabilitated or brought under natural regeneration system;
- No. people employed by nursery work, forest rehabilitation and reforestation
- No. of community-based reforestation programmes operating in the delta
- No. of nurseries in operation, and number seedlings produced and outplanted
- No. of forest camps reconstructed and actively operating
- Mangrove reforestation guidelines elaborated

Sustainability & Implementation Arrangements:

- Most appropriate and well proven reforestation and regeneration techniques are adopted;
- Participatory approaches involving local communities regularly involved in management/utilization of mangrove forest resources;
- Project is implemented with full collaboration from both local, district and headquarters' staff of the Forest Department;
- Relevant stakeholders' (FUGs, Department Staff, and NGOs) skills and knowledge of coastal forest management enhanced.

Issues & Risks:

- The project depends on the cessation of both encroachment or conversion of mangrove forests in the project sites;
- Local partners (NGOs, CBOs) uninterested in participating in the project;
- Potential risks exist with conflict over determination of land tenure rights and ownership by communities;
- The government officials' unwillingness to support community participation in the reforestation and rehabilitation programme.

Type of beneficiary groups:

Type	Forest workers	Users forest goods	Population in situ	Grand Total
Total:	3,000	450,000	5,252,000	5,705,000
Total costs: *(in US$)*				**Total**
- Equipment and inputs				290
- Technical Assistance				855
- Operating expenses*				355
- Co-ordination services				80
Total:				**1,580**

(*The costs are estimates based on best judgment, since the assessment on the extent of damage needs (emergency phase) needs to be completed first)

Annex 1: MAIN TABLES & GRAPHS

Table 1. Impact and Losses to the Crops Sub-Sector in Townships Severely Affected by Cyclone Nargis

Townships	Total Paddy Area (ha)	Flooded Area (ha)	%	Inaccessible Land /a (ha)	%	Tree Crops total area (ha)	Tree Crops damaged & destroyed (ha)	%	Summer Paddy Crop Lost (ha)	Estimated Draught Animals in Flooded Area /b (cattle & buffaloes) before /b	lost	%	Estimated Power Tillers in Flooded Area before /b	lost	%	Paddy Land Available for 2008 Monsoon /c (ha)
Ayeyarwady Division:	**644,668**	**431,689**	**67**	**121,527**	**28**	**21,561**	**12,686**	**59**	**12,793**	**168,803**	**118,227**	**70**	**11,396**	**2,359**	**21**	**231,316**
Labutta	148,264	136,920	92	74,300	54	3,594	3,514	98		28,502	23,048	81	529	184	35	**12,354**
Mawlamyinegyun	80,205	24,679	31	1,000	4	1,089	327	30		33,915	32,024	94	2,321	133	6	**45,351**
Bogale	124,627	103,630	83	41,750	40	177	160	90		25,099	15,597	62	2,795	421	15	**56,974**
Pyapone	86,126	61,229	71	520	1	170	153	90		19,534	11,029	56	1,421	294	21	**31,054**
Dedaye	73,794	58,813	80	53		1,027	873	85		23,013	9,475	41	2,305	100	4	**57,634**
Kyaikiat	55,979	12,847	23	74	1	969	291	30		19,246	8,983	47	1,866	1,147	61	**24,941**
Ngapudaw	75,673	33,571	44	3,830	11	14,535	7,368	51		19,494	18,071	93	159	80	50	**3,009**
Yangon Division:	**174,573**	**135,613**	**78**	**38,212**	**28**	**32,387**	**9,716**	**30**	**16,680**	**95,748**	**4,389**	**5**	**2,807**	**637**	**23**	**134,754**
Kyauktan	63,452	57,874	91	20,256	35	461				22,044	3,599	16	905	145	16	**33,654**
Twantay	33,745	31,189	92	3,119	10	11,014				24,007	295	1	981	159	16	**40,147**
Kawhmu	35,861	12,979	36	1,687	13	14,662				7,231	196	3	213	118	55	**8,945**
Kungyangong	41,515	33,571	81	13,150	39	6,250	2,813	45		42,465	299	1	707	215	30	**52,009**
Totals	**819,241**	**567,302**	**69**	**159,739**	**28**	**53,948**	**22,402**	**42**	**29,473**	**264,551**	**122,505**	**46**	**14,203**	**2,996**	**21**	**366,070**

a/ due to river bank erosion, salt water intrusion, sand deposits, lack of labour, shelter, food and potable water, etc.

b/ estimated number of draught animals and power tillers in flooded area before the cyclone (i.e. total number in township by percentage of flooded area).

c/ number of draught animals and power tillers available to farmers with one pair of draught animals cultivating two hectares and one power tiller cultivating 20 hectares per season.

Table 2: Paddy Lands Available in the Flooded Areas of Ayeyarwady and Yangon Divisions and Rice Seeds Required for Cultivation in the 2008 Monsoon Season

Townships	Paddy Land Available for the 2008 Monsoon Cropping Season /a (ha)	Number of All Farmers with Immediate Access to Paddy Land for 2008 Monsoon /b	Number of Marginal Farmers with Immediate Access to Paddy Land for 2008 Monsoon /c	Rice Seed Requirements for 2008 Monsoon Season (MT)		
				All Farmers with Immediate Access to Paddy Land /d	Marginal Farmers with Immediate Access to Paddy Land /e	Marginal Farmers Receiving Power Tillers & Animal Drawn Implements /f
Ayeyarwady Division:	**231,317**	**69,050**	**21,405**	**23,132**	**1,605**	**713**
Labutta	12,354	3,688	1,143	1,235	86	38
Mawlamyinegyun	45,351	13,538	4,197	4,535	315	140
Bogale	56,974	17,007	5,272	5,697	395	176
Pyapone	31,054	9,270	2,874	3,105	216	96
Dedaye	57,634	17,204	5,333	5,763	400	178
Kyaikiat	24,941	7,445	2,308	2,494	173	77
Ngapudaw	3,009	898	278	301	21	9
Yangon Division:	**134,755**	**32,787**	**9,180**	**13,476**	**689**	**306**
Kyauktan	33,654	8,188	2,293	3,365	172	76
Twantay	40,147	9,768	2,735	4,015	205	91
Kawhmu	8,945	2,176	609	895	46	20
Kungyangong	52,009	12,654	3,543	5,201	266	118
Totals	**366,072**	**101,837**	**30,586**	**36,607**	**2,294**	**1,019**
Total Rice Seed Requirement of the Crops Programme for the 2008 Monsoon Cropping Season (MT)					**3,313**	

a/ from Table 1.

b/ Paddy land available by average land holding size (i.e 3.35 ha for Ayeyarwady Division and 4.11 ha for Yangon Division, see Table 1).

c/ Number of total farmers with paddy land available by percentage of marginal farmers (0.4 to 2 ha) from Table 1, i.e. 31 % for Ayeyarwady and 28% for Yangon.

d/ Area of paddy land Immediately available by a seed rate of 100 kg per hectare.

e/ Each marginal farmer would receive a 2-acre (0.4 ha) package, including 75 kg of improved rice seed.

f/ 13,585 marginal farmers benefiting from 300 power tillers and 2,500 animal drawn implements would receive the same 2-acre (0.4 ha) package.

Table 3. Rice Seed Varieties Required for 2008 Monsoon Cropping Season

Townships	Rice Seeds Required for the 2008 Monsoon Cropping Season by Variety (MT) /a			
	HYV	High Quality *Hnankar*	Salt Tolerant	Total
Ayeyarwady Division:	**976**	**1,086**	**258**	**2,320**
Labutta	29	52	43	124
Mawlamyinegyun	46	410	0	455
Bogale	354	206	11	571
Pyapone	103	31	178	312
Dedaye	370	208	0	578
Kyaikiat	70	180	0	250
Ngapudaw	5	0	25	30
Yangon Division:	**345**	**213**	**436**	**994**
Kyauktan	226	0	22	248
Twantay	83	213	0	296
Kawhmu	36	0	30	66
Kungyangong	0	0	384	384
Totals	**1,321**	**1,300**	**694**	**3,314**

a/ Based on ratios from the "Township-wise and Variety-wise Seed Requirement.
(Annex (d))" of MoAI's "Rehabilitation Plan for Agricultural Sector Affected by Nargis Cyclone".

Table 4. Land Distribution in Ayeyarwady and Yangon Divisions

	Ayeyarwady Division		Yangon Division		Overall
Farm Size (ha)	**Holdings**	**%**	**Holdings**	**%**	**%**
Less than 0.4	71,301	15	13,175	10	14
0.4 to 1.2	75,901	16	11,028	9	14
1.2 to 2.0	75,633	15	12,809	11	14
2.0 to 4.0	125,949	26	31,552	26	26
4.0 to 8.0	98,885	20	36,334	30	22
8.0 to 20.0	39,903	8	13,338	10	9
More than 20.0	2,091	4	509	4	1
Total	**490,885**	**100**	**119,162**	**100**	**100**
Average Landholding	**3.35 ha**		**4.11 ha**		**3.50 ha**

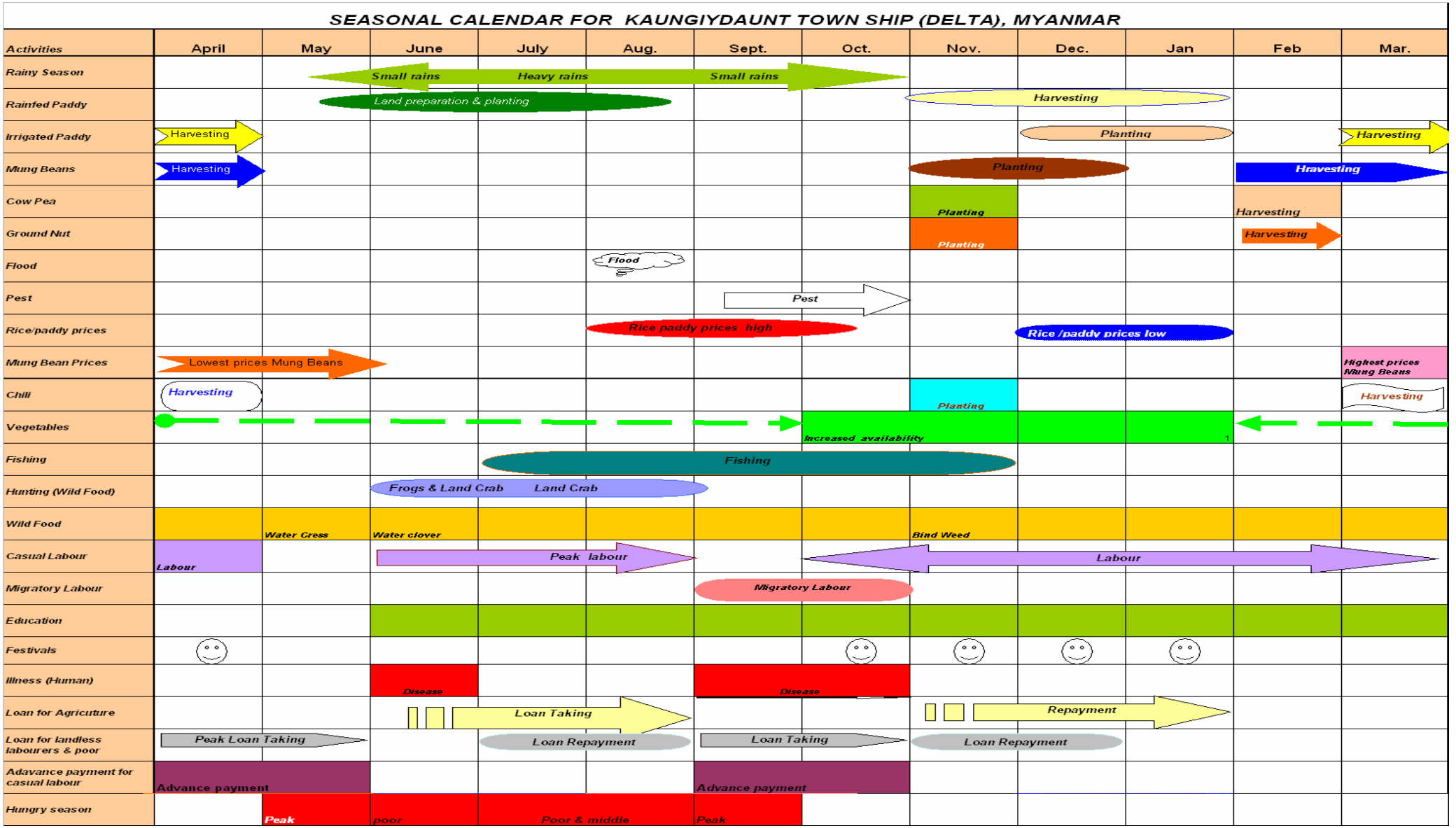
Source: Ministry of Agriculture and Irrigation, Settlement and Land Records Department;
Report on Myanmar Census of Agriculture, 2003; March 2007

Table 5. Estimation of large ruminants including draft cattle pre and post cyclone

Townships	Pre cyclone					Post cyclone							
	Buffalo	Cattle	Total	Draft cattle	Draft cattle %	Buffalo lost	Cattle lost	Total loss	Total loss %	Loss of adult draught animals	Loss of draught cattle %	Available draught cattle	Available total
Ngapudaw	32,308	49,931	82,239	44,305	54	13,159	20,332	**33,491**	41	**17,981**	41	**26,324**	**48,748**
Pyapon	27,540	22,937	50,477	27,513	55	13,254	7,252	**20,506**	41	**11,029**	40	**16,484**	**29,971**
Bogale	37,424	19,356	56,780	30,240	53	25,902	3,249	**29,151**	51	**15,597**	52	**14,643**	**27,629**
Kyaiklet	19,499	41,144	60,643	32,573	54	7,020	9,938	**16,958**	28	**8,983**	28	**23,590**	**43,685**
Dadeye	26,867	27,739	54,606	28,766	53	13,772	4,435	**18,207**	33	**9,475**	33	**19,291**	**36,399**
Labutta	41,946	15,127	57,073	30,980	54	31,015	11,369	**42,384**	74	**23,048**	74	**7,932**	**14,689**
Mawlamyinegyun	39,854	46,117	85,971	46,048	54	28,000	32,000	**60,000**	70	**32,024**	70	**14,024**	**25,971**
Ayeyarwady	**225,438**	**222,351**	**447,789**	**240,425**	**54**	**132,122**	**88,575**	**220,697**	**49**	**118,137**	**49**	**122,288**	**227,092**
Kungyangon	13,477	73,531	87,008	52,426	60	75	55	130	0	**299**	1	**52,127**	**86,878**
Twantay	5,686	41,291	46,977	26,095	56	11	57	68	0	**295**	1	**25,800**	**46,909**
Kawhmu	6,782	29,457	36,239	20,087	55	49	25	74	0	**196**	1	**19,891**	**36,165**
Kyauktan	14,112	29,724	43,836	24,224	55	4,156	2,143	6,299	14	**3,597**	15	**20,645**	**37,537**
Yangon	**40,057**	**174,003**	**214,060**	**122,832**	**57**	**4,291**	**2,280**	**6,571**	**3**	**4,387**	**4**	**118,463**	**207,489**
Overall total	**265,495**	**396,354**	**661,849**	**363,257**	**55**	**136,413**	**90,855**	**227,268**	**34**	**122,524**	**34**	**240,751**	**434,581**

Table 6. Estimation of pigs poultry and ducks pre and post cyclone (in '000)

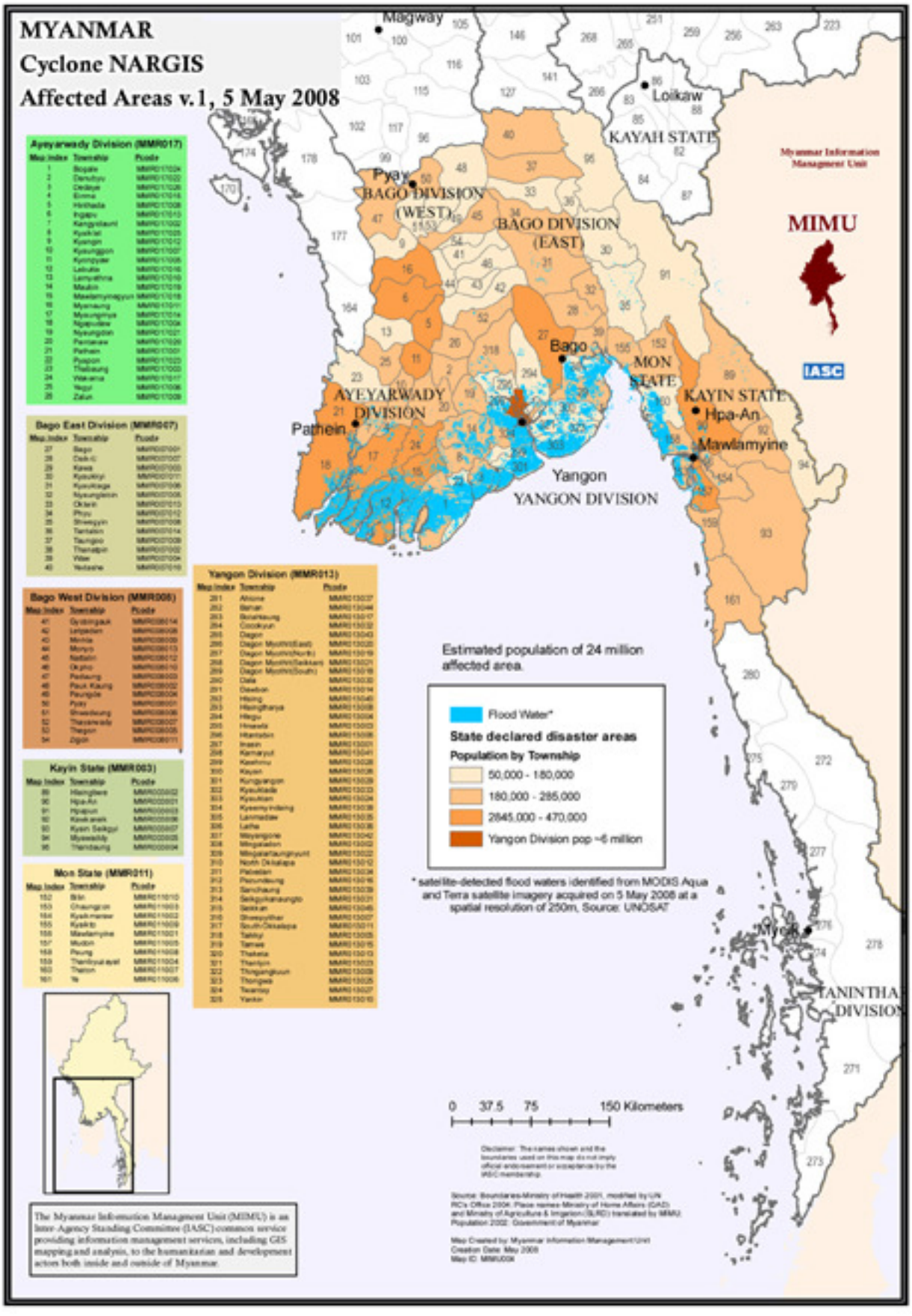
	Pigs			Poultry			Duck		
	Pre cyclone	**Loss**	**% loss**	**Pre cyclone**	**Loss**	**% loss**	**Pre cyclone**	**Loss**	**% loss**
Ngapudaw	45	7	16	486	46	9	73	21	29
Pyapon	13	5	38	340	190	56	70	40	57
Bogale	30	14	47	330	140	42	180	7	4
Kyaiklet	30	10	33	220	140	64	120	90	75
Dadeye	20	9	45	280	260	93	160	120	75
Labutta	20	17	85	310	300	97	130	120	92
Mawlamyinegyun	60	1	2	470	20	4	210	90	43
Ayeyarwady	**218**	**63**	**29**	**2,436**	**1,096**	**45**	**943**	**488**	**52**
Kungyangon	20	2	10	1,100	4	0	70	7	10
Twantay	20	1	5	1,070	2	0	70	3	4
Kawhmu	40	0	0	1,010	28	3	130	0	0
Kyauktan	50	0	0	1,170	4	0	170	0	0
Yangon	**130**	**3**	**2**	**4,350**	**38**	**1**	**440**	**10**	**2**
Overall total	**348**	**66**	**19**	**6,786**	**1,134**	**17**	**1,383**	**498**	**36**



Graph 1: Seasonal Calendar (Source: Save the Children UK/Myanmar)

Annex 2: MAPS

MYANMAR
Cyclone NARGIS
Affected Areas v.1, 5 May 2008



Ayeyarwady Division (MMR017)

Map Index	Township	Pcode
1	Bogale	MMR017004
2	Danubyu	MMR017002
3	Dedaye	MMR017006
4	Einme	MMR017016
5	Hinthada	MMR017008
6	Ingapu	MMR017013
7	Kangyidaunt	MMR017002
8	Kyaiklat	MMR017005
9	Kyangin	MMR017012
10	Kyaunggon	MMR017007
11	Kyonpyaw	MMR017006
12	Lemyethna	MMR017016
13	Maubin	MMR017009
14	Mawlamyinegyun	MMR017018
15	Myanaung	MMR017011
16	Myaungmya	MMR017014
17	Ngapudaw	MMR017004
18	Nyaungdon	MMR017007
19	Pantanaw	MMR017020
20	Pathein	MMR017001
21	Pyapon	MMR017023
22	Thabaung	MMR017003
23	Wakema	MMR017017
24	Yegyi	MMR017006
25	Zalun	MMR017009

Bago East Division (MMR007)

Map Index	Township	Pcode
27	Bago	MMR007001
28	Daik-U	MMR007007
29	Kawa	MMR007005
30	Kyauktaga	MMR007011
31	Kyaukkyi	MMR007006
32	Nyaungtaton	MMR007008
33	Okpho	MMR007013
34	Phyu	MMR007012
35	Shwegyin	MMR007009
36	Taikkyi	MMR007014
37	Taungoo	MMR007003
38	Thanatpin	MMR007002
39	Yedashe	MMR007004
40	Yedashe	MMR007010

Bago West Division (MMR006)

Map Index	Township	Pcode
41	Gyobingauk	MMR006014
42	Letpadan	MMR006008
43	Minhla	MMR006009
44	Monyo	MMR006013
45	Nattalin	MMR006012
46	Okpho	MMR006010
47	Padaung	MMR006003
48	Paukkaung	MMR006002
49	Peungde	MMR006004
50	Pyay	MMR006001
51	Shwedaung	MMR006006
52	Thayarwady	MMR006007
53	Thegon	MMR006005
54	Zigon	MMR006011

Kayin State (MMR003)

Map Index	Township	Pcode
89	Hlaingbwe	MMR003002
90	Hpa-An	MMR003001
91	Hpapun	MMR003003
92	Kawkareik	MMR003006
93	Kyain Seikgyi	MMR003007
94	Myawaddy	MMR003005
95	Thandaung	MMR003004

Mon State (MMR011)

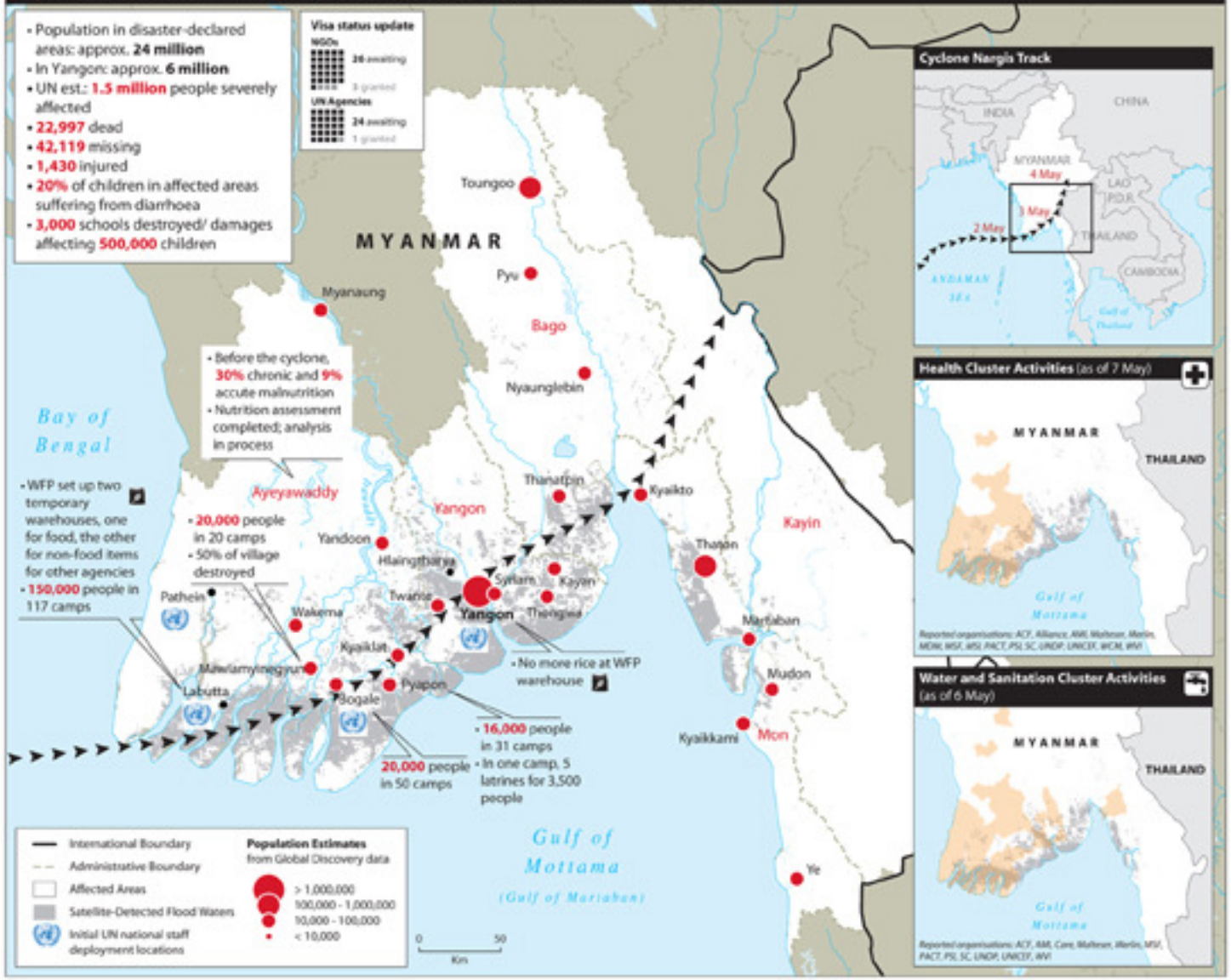
Map Index	Township	Pcode
152	Bilin	MMR011010
153	Chaungzon	MMR011003
154	Kyaikmaraw	MMR011002
155	Kyaikto	MMR011009
156	Mawlamyine	MMR011001
157	Mudon	MMR011005
158	Paung	MMR011008
159	Thanbyuzayat	MMR011004
160	Thaton	MMR011007
161	Ye	MMR011006

Yangon Division (MMR013)

Map Index	Township	Pcode
251	Ahlone	MMR013027
252	Bahan	MMR013044
253	Botahtaung	MMR013017
254	Cocokyun	MMR013032
255	Dagon	MMR013043
256	Dagon Myothit(East)	MMR013020
257	Dagon Myothit(North)	MMR013019
258	Dagon Myothit(Seikkan)	MMR013021
259	Dagon Myothit(South)	MMR013018
260	Dala	MMR013035
261	Dawbon	MMR013014
262	Hlaing	MMR013040
263	Hlaingtharya	MMR013038
264	Hlegu	MMR013004
265	Hmawbi	MMR013003
266	Htantabin	MMR013036
267	Insein	MMR013001
268	Kamayut	MMR013041
269	Kawhmu	MMR013028
270	Kayan	MMR013026
271	Kungyangon	MMR013029
272	Kyauktada	MMR013023
273	Kyauktan	MMR013024
274	Kyeemyindaing	MMR013039
275	Lanmadaw	MMR013025
276	Latha	MMR013030
277	Mayangone	MMR013042
278	Mingaladon	MMR013002
279	MingaladonTaungnyunt	MMR013022
280	North Dagon	MMR013012
281	Pabedan	MMR013034
282	Pazundaung	MMR013016
283	Sanchaung	MMR013033
284	Seikgyikanaungto	MMR013031
285	Seikkan	MMR013046
286	Shwepyithar	MMR013007
287	South Dagon	MMR013011
288	Tahtay	MMR013005
289	Tamwe	MMR013015
290	Thaketa	MMR013013
291	Thanlyin	MMR013023
292	Thingangkuun	MMR013009
293	Thongwa	MMR013025
294	Twantay	MMR013027
295	Yankin	MMR013010

The Myanmar Information Management Unit (MIMU) is an Inter-Agency Standing Committee (IASC) common service providing information management services, including GIS mapping and analysis, to the humanitarian and development actors both inside and outside of Myanmar.

Myanmar: Tropical Cyclone Nargis (as of 11 May 2008)



SITUATION

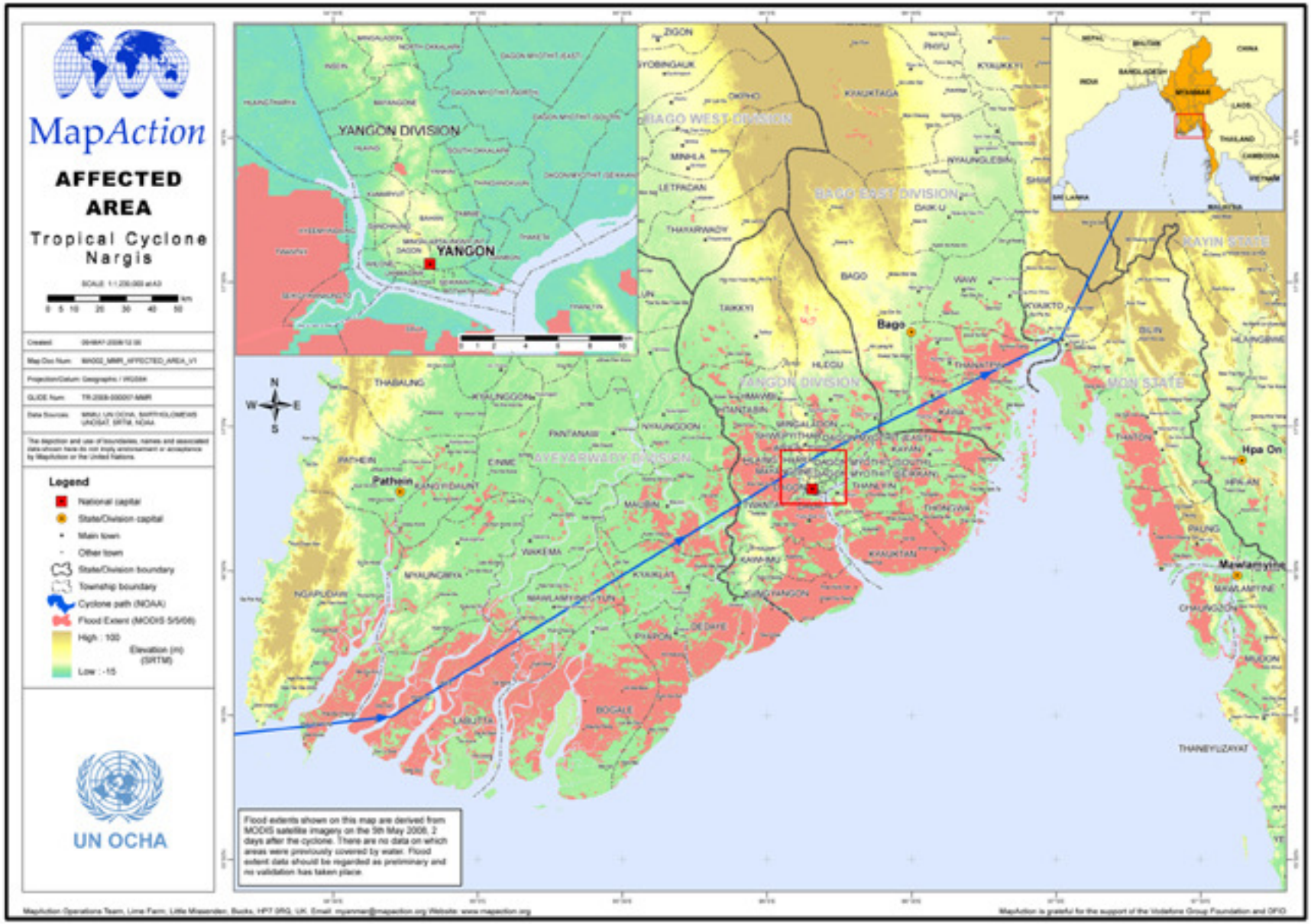
- Cyclone Nargis struck Myanmar on 2 and 3 May 2008, sweeping through the Ayeyarwady Delta region and the country's largest city, Yangon.
- More warehouse space is urgently needed and being sought to relieve the pressure at Yangon International Airport.
- Growing number of reports of families being forcibly displacement to non-affected townships.
- World Meteorological Organisation announced that Myanmar's recovery could be hindered by strong winds and rain over the coming week.

LINKS

- OCHA Situation Report No. 8
- Latest updates for Myanmar: Tropical Cyclone Nargis
- Related maps

Creation date: 11 May 2008
Map sources: UNCS, UNSYS, UNOSAT, Europa Technologies (Global Discovery), MIMU.
Narrative and statistical sources:
UN OCHA, 11 May 2008. OCHA Situation Report No.8.

ReliefWeb
www.reliefweb.int
Office for the Coordination of Humanitarian Affairs
United Nations


MapAction
AFFECTED AREA
Tropical Cyclone Nargis
Legend
National capital
State/Division capital
Main town
Other town
State/Division boundary
Township boundary
Cyclone path (NOAA)
Flood Extent (MODIS 5/5/08)
High : 100
Elevation (m) (SRTM)
Low : -15
UN OCHA
YANGON DIVISION
YANGON
BAGO WEST DIVISION
BAGO EAST DIVISION
AYEYARWADY DIVISION
MON STATE
KAYIN STATE
Bago
Pathein
Hpa On
Mawlamyine
Flood extents shown on this map are derived from MODIS satellite imagery on the 9th May 2008, 2 days after the cyclone. There are no data on which areas were previously covered by water. Flood extent data should be regarded as preliminary and no validation has taken place.
MapAction is grateful for the support of the Vodafone Group Foundation and OFID

ESTIMATED TOTAL POPULATION LIVING WITHIN FLOOD-AFFECTED AREAS, MYANMAR

Flood Analysis with MODIS Terra & Aqua Data Recorded 5 May & 15 April 2008; and LandScan 2005

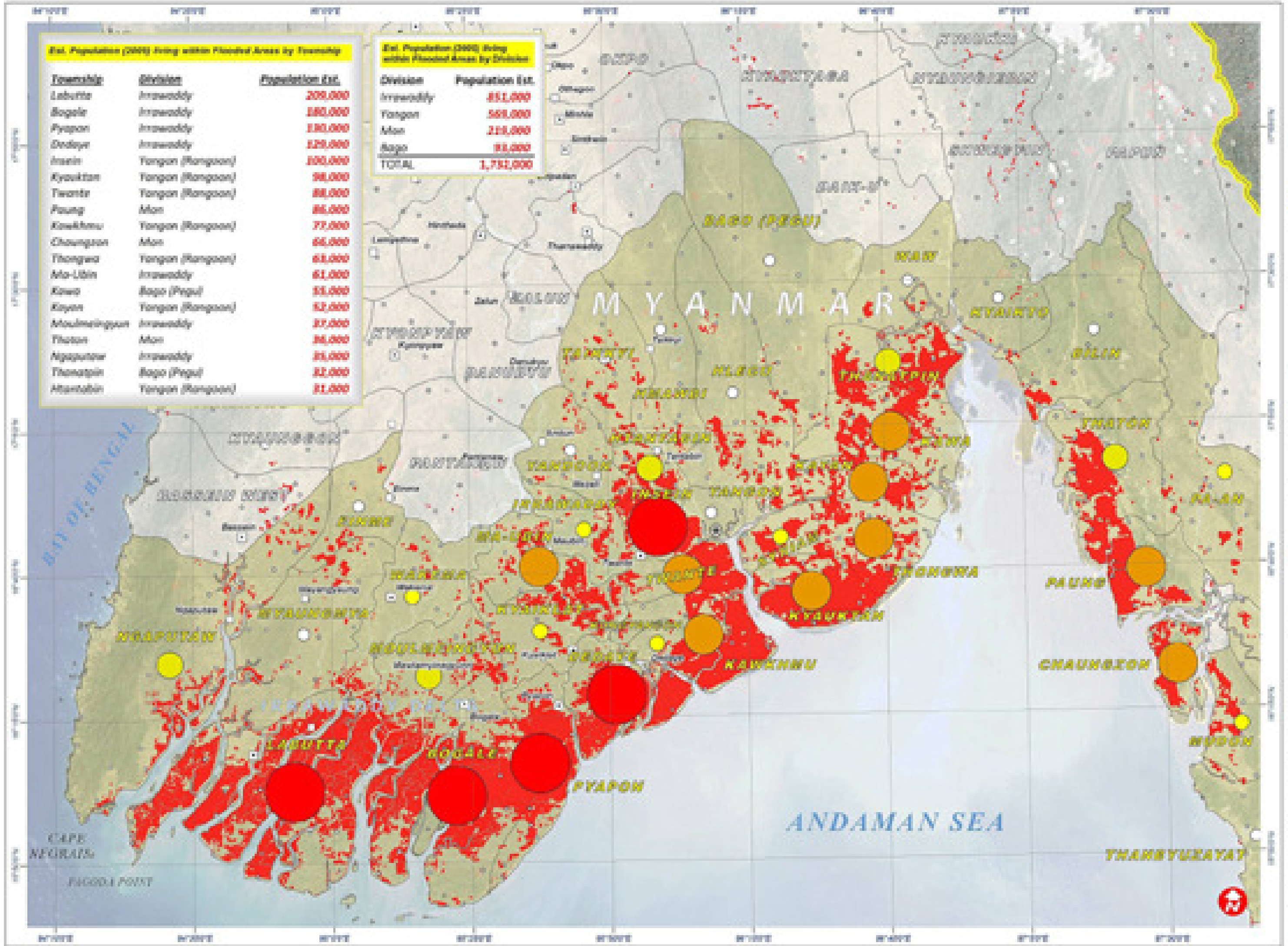
This map provides an estimate of those potentially-affected people living directly within flooded areas of southern Myanmar. Red areas shown in the map represent standing flood waters identified from MODIS satellite imagery acquired on 5 May 2008 at a spatial resolution of 250m. Population estimates have been aggregated by township using the LandScan 2005 database. This flood detection is a preliminary analysis & has not yet been validated in the field.

Cyclone Nargis

6 May 2008

Version 1.2

TC-2008-000057-MMR



Est. Population (2005) living within Flooded Areas by Township

Township	Division	Population Est.
Labutta	Irrawaddy	209,000
Bogale	Irrawaddy	180,000
Pyapon	Irrawaddy	130,000
Dedaye	Irrawaddy	120,000
Insein	Yangon (Rangoon)	100,000
Kyauktan	Yangon (Rangoon)	98,000
Twante	Yangon (Rangoon)	88,000
Paung	Mon	86,000
Kawkhmu	Yangon (Rangoon)	77,000
Chaungzon	Mon	66,000
Thongwa	Yangon (Rangoon)	63,000
Ma-Ubin	Irrawaddy	61,000
Kawa	Bago (Pegu)	55,000
Kayan	Yangon (Rangoon)	52,000
Moulmeingyun	Irrawaddy	37,000
Thaton	Mon	36,000
Ngaputaw	Irrawaddy	35,000
Thanatpin	Bago (Pegu)	32,000
Htantabin	Yangon (Rangoon)	31,000

Est. Population (2005) living within Flooded Areas by Division

Division	Population Est.
Irrawaddy	851,000
Yangon	569,000
Mon	219,000
Bago	93,000
TOTAL	1,732,000

Legend

SATELLITE FLOOD ANALYSIS

EST. POPULATION IN FLOODED AREAS

EST. CYCLONE NARGIS TRACK & WIND SPEED

Map Scale for A3: 1:1,300,000

UNOSAT

satellite solutions for all

MapAction

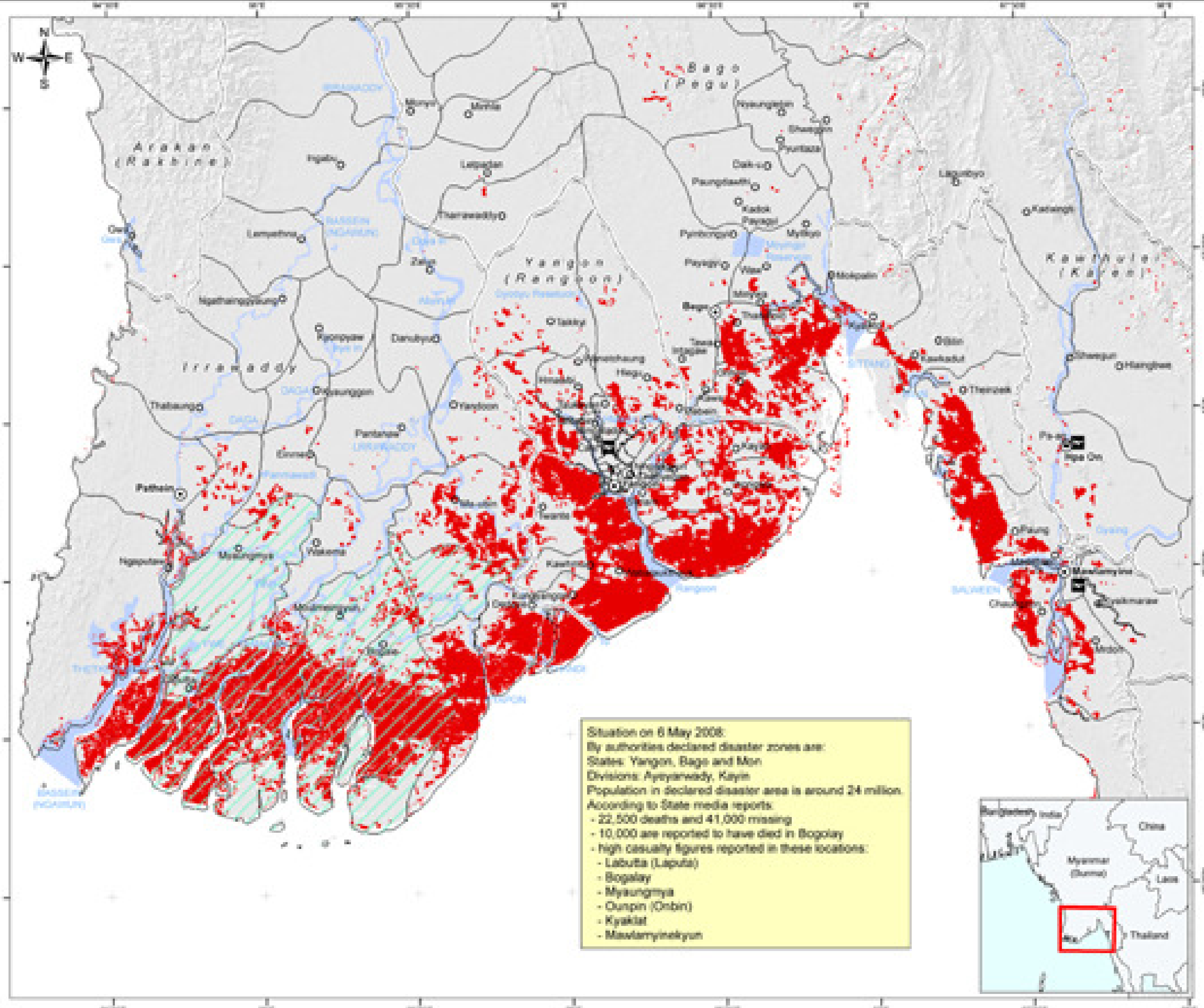
Situation Map
7 May 2008

Cyclone Nargis Myanmar

0 25 50 Km

Nominal Scale 1:1,250,000 at A3 size

Created:	07-05-2008/19:00
Map Doc Num: ma001_mmr_situation_v1_07052008	
Projection/Datum:	UTM Zone 46N/WGS84
GLIDE Num:	TC-2008-000057-MMR



State Capital

Town

Airport

Flood Water

State and Division Boundary

reported high casualties

inland water

Township Boundary

Data Source: Flood Water: UNOSAT, 06May2008; Administrative Boundaries: UNOCHA; reported high casualties: UNOCHA, Bangkok.

MapAction Operations Team
Email: myanmar@mapaction.org
Website: www.mapaction.org

MapAction is grateful for the support of the Vodafone Group Foundation and DFID

ESTIMATED TOTAL FLOOD WATER AREA BY AFFECTED TOWNSHIP, MYANMAR

Flood Analysis with MODIS Terra & Aqua Data Recorded 5 May & 15 April 2008

This map provides an estimate of the total area (km2) of flood water by Township in southern Myanmar. Red areas shown in the map represent standing flood waters identified from MODIS satellite imagery acquired on 5 May 2008 at a spatial resolution of 250m. This flood detection is a preliminary analysis & has not yet been validated in the field.

Cyclone Nargis

6 May 2008

Version 1.2

TC-2008-000057-MMR

Est. Total Flood Water (km2) by Township

Township	Division	Est. Flood Area
Labutta	Irrawaddy	1,583
Bogale	Irrawaddy	1,233
Kawhmu	Yangon (Rangoon)	579
Dedaye	Irrawaddy	561
Kyaiklat	Yangon (Rangoon)	529
Ngapudaw	Irrawaddy	513
Pyapon	Irrawaddy	463
Thanatpin	Bago (Pegu)	362
Paung	Mon	360
Kawa	Bago (Pegu)	348
Thongwa	Yangon (Rangoon)	335
Thaton	Mon	292
Insein	Yangon (Rangoon)	279
Mia-Ubin	Irrawaddy	273
Twante	Yangon (Rangoon)	260
Moulmeingyun	Irrawaddy	248
Kayan	Yangon (Rangoon)	203
Hlegu	Yangon (Rangoon)	191
Kyaiklat	Irrawaddy	154
Chaungzon	Mon	154
Syriam	Yangon (Rangoon)	118
Htantabin	Yangon (Rangoon)	109
Mudon	Mon	100

List not inclusive of all flood-affected Townships

Est. Total Flood Water (km2) by Division

Division	Est. Flood Area
Irrawaddy	5,174
Yangon	1,773
Mon	992
Bago (Pegu)	846

Legend

Capital
City / Large Town
International Border
River
Village

SATELLITE FLOOD ANALYSIS

Satellite-Detected Flood Waters (5 May 2008)
Flood Affected Townships

EST. TOTAL FLOOD WATER (KM2) BY TOWNSHIP

Townships with significant flood waters are labeled in yellow

EST. CYCLONE NARGIS TRACK & WIND SPEED

CATEGORY

Map Scale for A3: 1:1,200,000

Kilometers

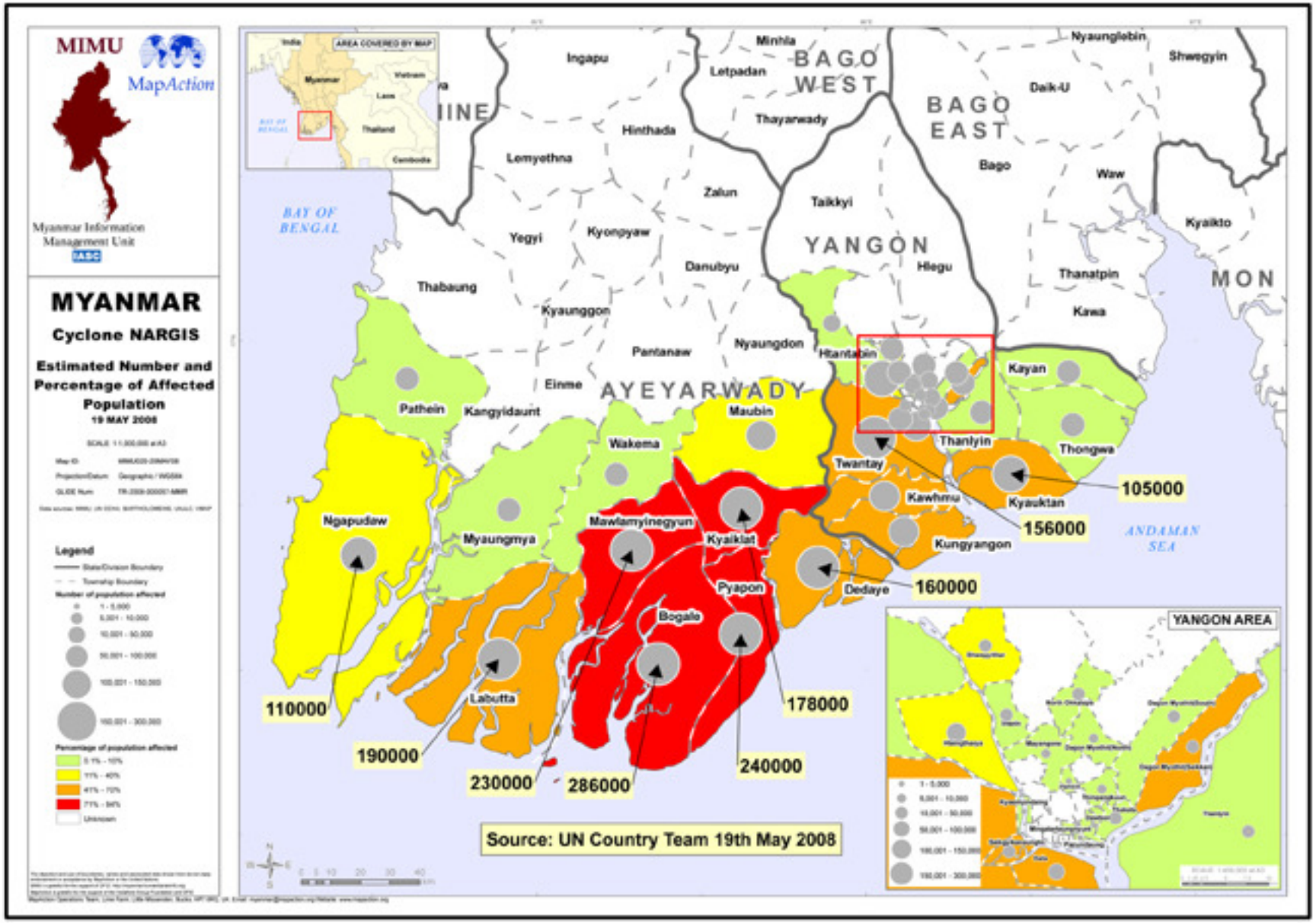
0 5 10 20 30 40 50

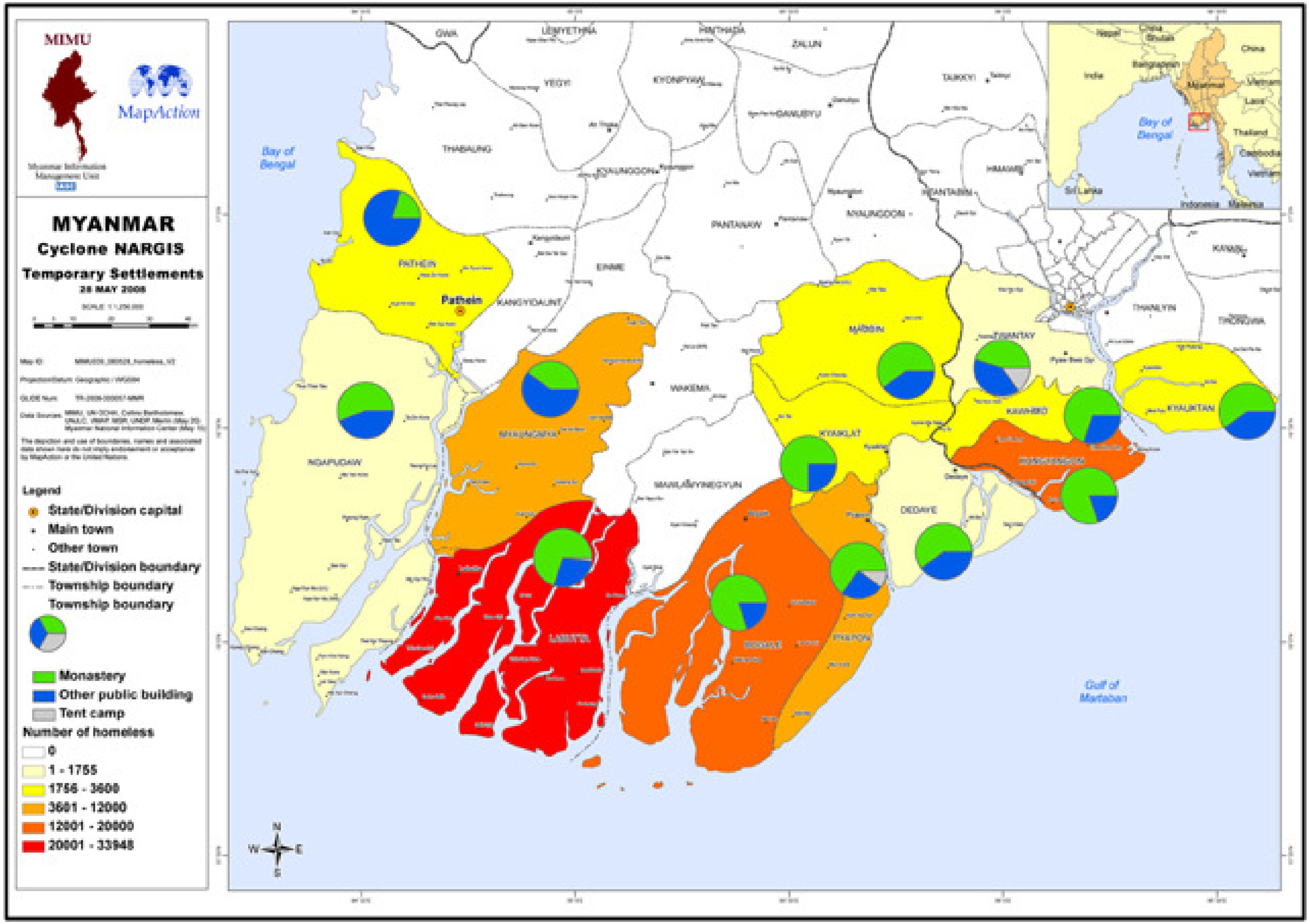
Cyclone Data ..... NASA, Uni of Hawai'i, Tropical Storm Risk
GIS Data ..... USGS, NGA, UNDP, ResponseKeyohe
Population Data ..... LandScan 2005
Satellite Data ..... MODIS Aqua & Terra
Imagery Date ..... 5 May & 15 April 2008
Resolution 250m
Flood Analysis ..... UNOSAT (5 May 2008)
Map Production ..... UNOSAT (6 May 2008)
Projection ..... UTM Zone 46 North
Datum ..... WGS 1984

UNOSAT

satellite solutions for all

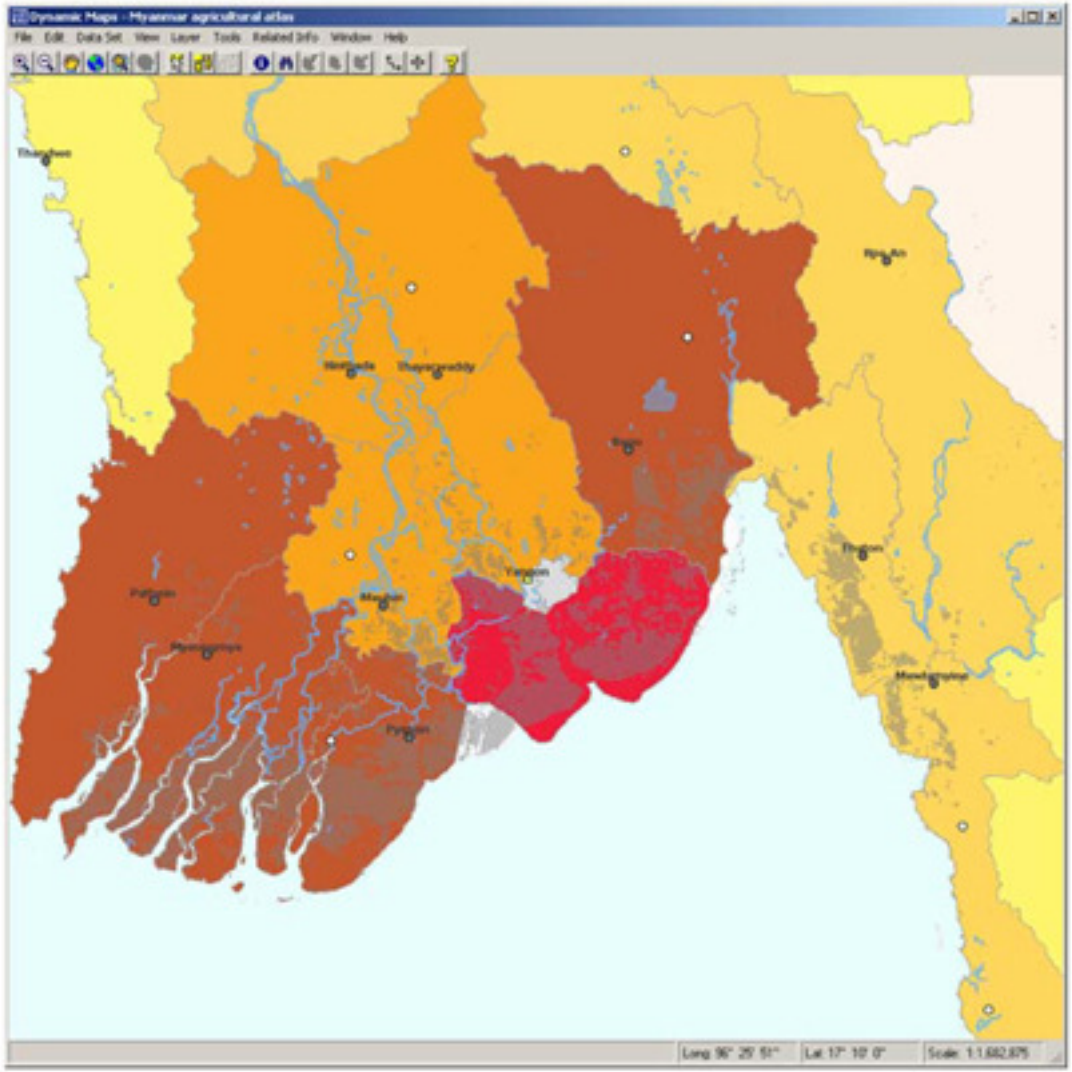
Contact information: info@unosat.org
24/7 Hotline: +41 76 487 4958
www.unosat.org

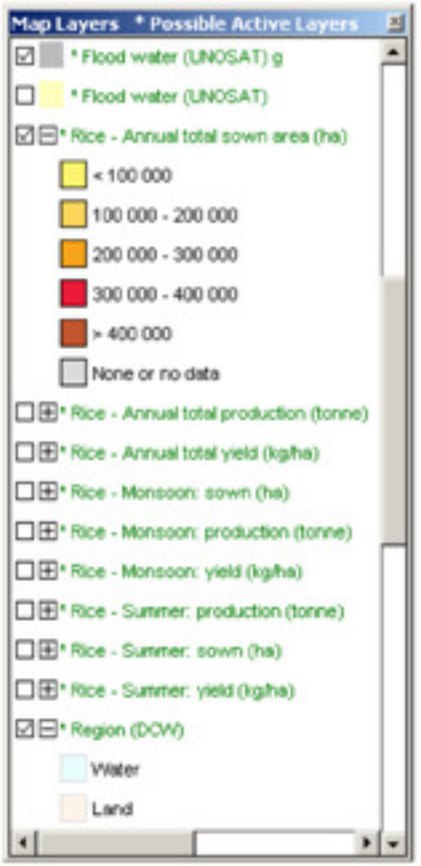

MIMU
MapAction
Myanmar Information Management Unit
MYANMAR
Cyclone NARGIS
Estimated Number and Percentage of Affected Population
19 MAY 2008
Legend
Source: UN Country Team 19th May 2008
BAY OF BENGAL
ANDAMAN SEA
AYEYARWADY
YANGON
BAGO WEST
BAGO EAST
MON
YANGON AREA
110000
190000
230000
286000
240000
178000
160000
156000
105000



MIMU
MapAction
MYANMAR
Cyclone NARGIS
Temporary Settlements
Legend
State/Division capital
Main town
Other town
State/Division boundary
Township boundary
Township boundary
Monastery
Other public building
Tent camp
Number of homeless
0
1 - 1755
1756 - 3600
3601 - 12000
12001 - 20000
20001 - 33948
Bay of Bengal
Gulf of Martaban
PATHEIN
Pathein
NGAPUDAW
MYAUNGMYA
LABUTTA
WAKEMA
BOGALE
PYAPON
DEDAYE
KYAIKLAT
MAUBIN
TWANTAY
KAWHMU
KYAUKTAN
THANLYIN
THABAUNG
KANGYIDAUNT
EINME
PANTANAW
NYAUNGDON
ZALUN
HINTHADA
LEMYETHNA
YEGYI
KYONPYAW
DANUBYU
GWA
HMAWBI
HTANTABIN
TAIKKYI
KAYAN
THONGWA
India
China
Bangladesh
Myanmar
Laos
Thailand
Cambodia
Vietnam
Sri Lanka
Indonesia
Malaysia
N
S
E
W

Myanmar: Rice annual total sown area (ha)





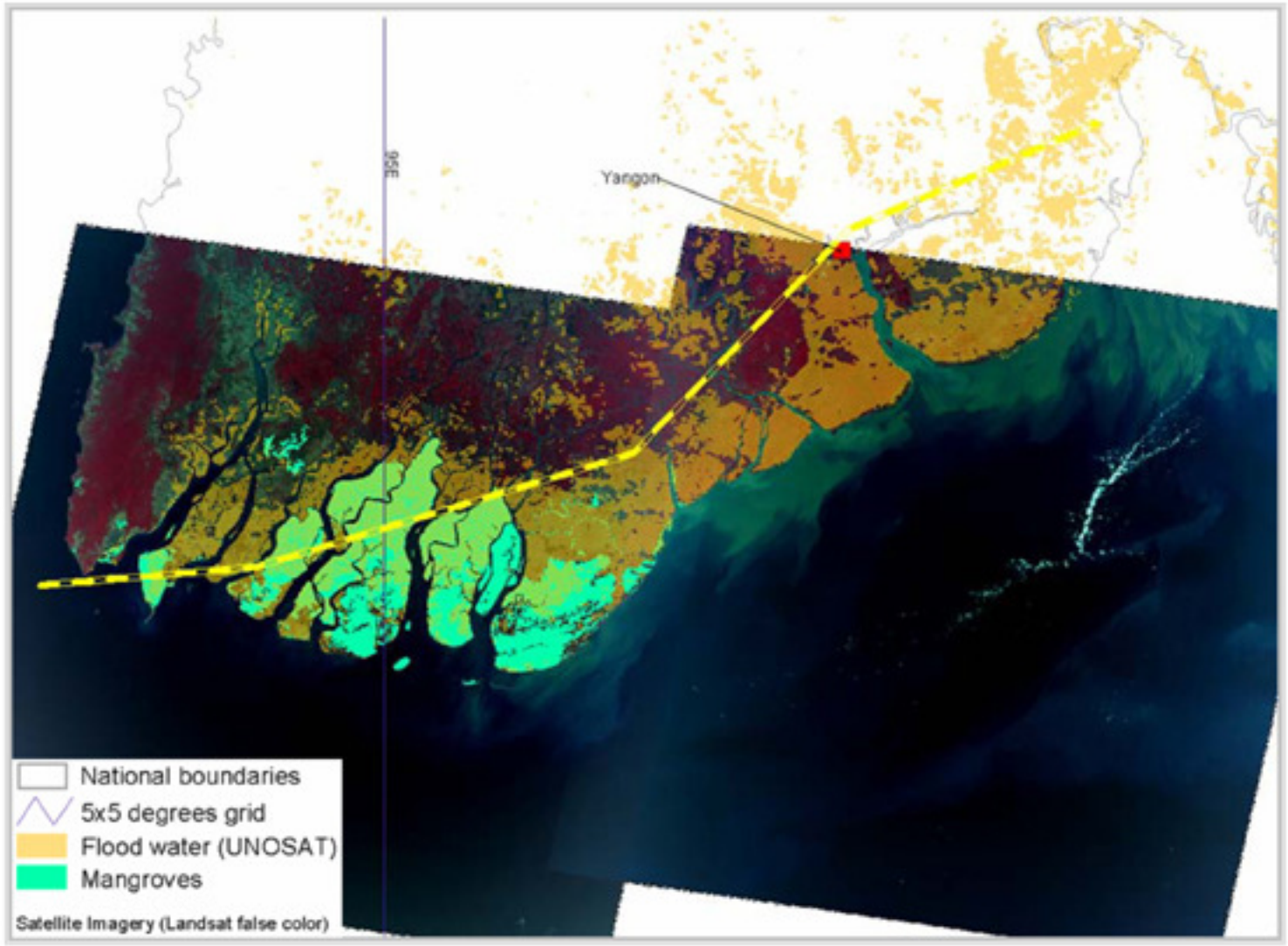
source:

-Digital Agricultural Atlas of the Union of Myanmar: national statistics 2001-2002

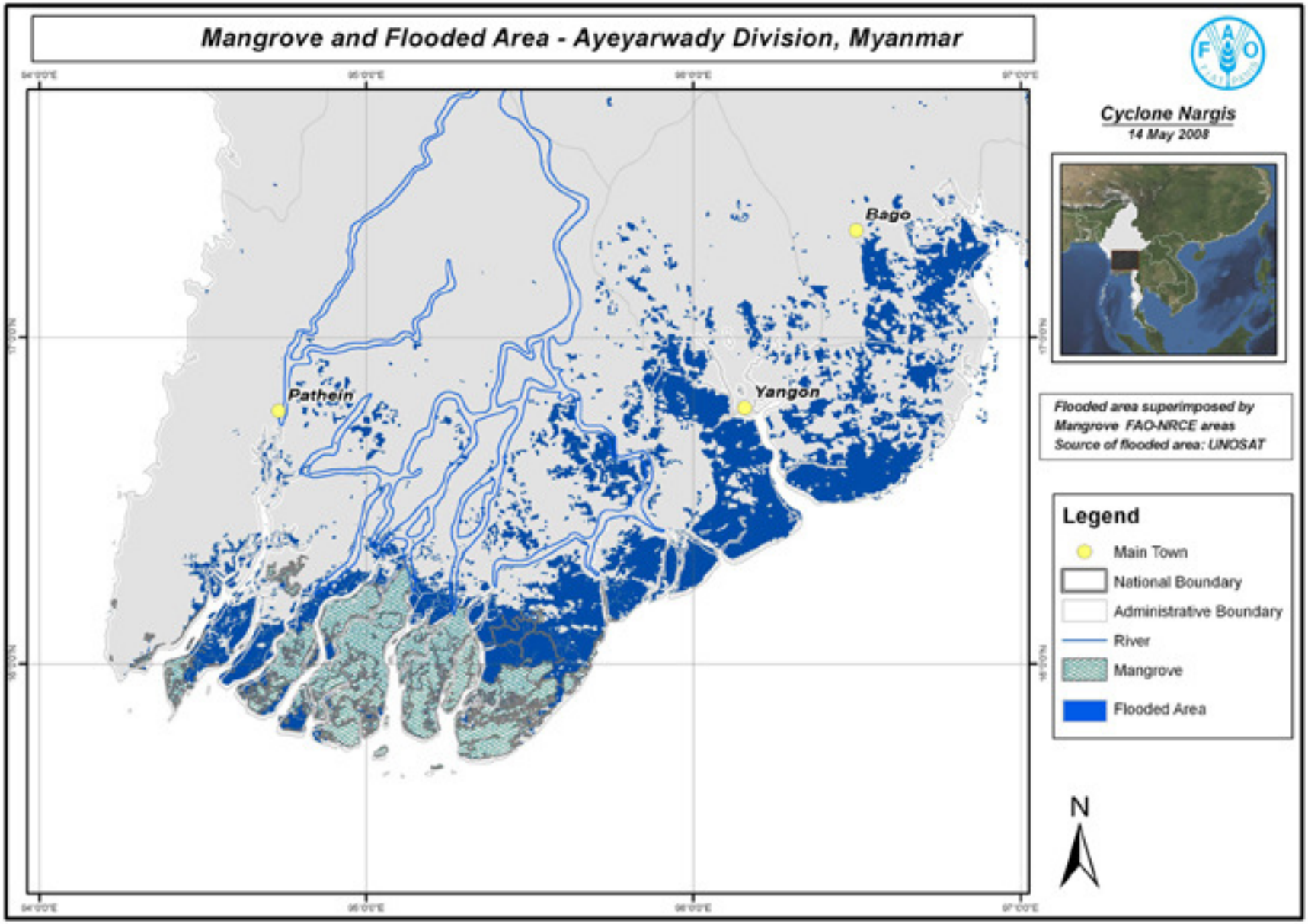
-satellite detected flood water identified from Aqua and Terra satellite imagery on 5 May 2008 at 250m resolution. By UNOSAT

Mangroves (~3000 sqkm) in Ayeryawaddy and Yangoon divisions affected by NARGIS

source: ongoing mapping (by NRCE) in support of preparation of the 2nd edition of the World Atlas of Mangroves.



Mangrove and Flooded Area - Ayeyarwady Division, Myanmar




Cyclone Nargis 2 May 2008