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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, ROME

WORLD FOOD PROGRAMME, ROME

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Abbreviations and Acronyms

CBM	Central Bank of Myanmar
CFSAM	Crop and Food Security Assessment Mission
CSO	Central Statistical Organization
DOF	Department of Fisheries
ERCU	Emergency and Rehabilitation Coordination Unit of FAO in Yangon
FAO	Food and Agriculture Organization of the United Nations
FIVIMS	Food Insecurity and Vulnerability Information and Mapping System
GDP	Gross Domestic Product
HIES	Household Income and Expenditure Survey
HYV	High Yielding Variety
IHLCS	Integrated Household Living Conditions Survey in Myanmar (UNDP 2007)
LBVD	Livestock Breeding and Veterinary Department
LDC	Least Developed Country
MADB	Myanmar Agricultural Development Bank
MAPT	Myanmar Agricultural Produce Trading
MAS	Myanmar Agriculture Service
MLF	Myanmar Livestock Federation
MFF	Myanmar Fishers Federation
MMK	Myanmar Kyat
MoAI	Ministry of Agriculture and Irrigation
MoLF	Ministry of Livestock and Fisheries
MoNPED	Ministry of National Planning and Economic Development
MPPA	Myanmar Paddy Producers Association
NDAK	New Democratic Army for Kachin
NGOs	Non-Governmental Organizations
OPV	Open Pollinated Variety
SEE	State Economic Enterprise
UN	United Nations
UNDP	United Nations Development Programme
UNICEF	United Nations Children Fund
USD	United States Dollar
WFP	World Food Programme

Mission Highlights

- During the 2008 monsoon season, agricultural production suffered a significant decline in areas severely affected by Cyclone Nargis, as a result of poor quality seeds, salinity and iron toxicity, lack of agricultural labour and draught animals. Compared to the previous year, average paddy production is estimated to have decreased by 32 percent in 7 affected townships in the Ayeyarwady Division and by 35 percent in 3 affected townships of Yangon Division. At the divisional level, 2008 monsoon paddy output was down by 13 percent in Ayeyarwady, and 9 percent in Yangon.
- Overall, aggretate food production in Myanmar is satisfactory, with positive outputs expected in most states/divisions, reflecting favourable weather and increasing use of F1 and HYV rice seeds. The Mission forecasts a 2008/09 (2008 monsoon and 2009 summer) cereal output of 21 million tonnes (rice at 19.8 million tonnes, maize at 1.11 million tonnes, and wheat at 0.147 million tonnes), 3.2 percent below the previous year, but approximately 10 percent above the five-year average. Cereal exports are expected to be high, with estimated rice exports of 477 000 tonnes and maize exports of 159 000 tonnes conversely, up to 64 000 tonnes of wheat are expected to be imported.
- The cyclone-related damage to the livestock and fishing sectors in the Ayeyarwady Delta will continue to affect food supply and income generation in 2008/09.
- Rats have damaged 685 hectares of rice and 400 hectares of maize in 121 villages of Chin State;localized food insecurity in these villages is expected.
- Despite the increase in international rice prices, paddy prices in Myanmar remained low in 2008 due to domestic market and trade barriers. These low prices, combined with the rising cost of fertilizer and other major inputs, have significantly reduced farmers' incentives profits, and may have negatively impacted agricultural productivity and the country's agricultural exports.
- The Mission received reports of high levels of malnutrition in northern Rakhine State and recommends that a joint UNICEF and WFP food security and nutrition survey be conducted to verify these reports and to plan appropriate interventions, if needed.
- In areas with high percentages of food insecure and vulnerable populations, defined as people living below the food poverty line, baseline surveys are required to measure food security, vulnerability, and nutrition, and plan appropriate interventions. Chin and Rakhine States are of the highest priority for baseline surveys.
- There are more than 5 million people below the food poverty line in Myanmar. States/divisions which the Mission found to be a priority for emergency food assistance are: cyclone-affected areas of Ayeyarwady Division (85 000 tonnes); Chin State (23 000 tonnes), particularly those areas affected by the rat infestation; Rakhine State (15 000 tonnes), particularly the north of the State; Kachin State (8 300 tonnes); north Shan State (20 200 tonnes); east Shan State (7 000 tonnes); and Magwe Division (27 500 tonnes). Most of the food commodities can be procured locally, with only a limited requirement for imported food aid.
- The Mission recommends the following agricultural assistance in cyclone-affected Ayeyarwady and Yangon Divisions: distribution of seeds for the coming summer and next monsoon planting seasons; distribution of draught animals adapted to local climatic conditions; distribution of other livestock for increased meat availability; distribution of hand tractors with training on their usage and maintenance; distribution of fishing equipment; re-establishment of ice production plants; and training in boat-building, net-making and on drafting of fishery laws.
- The Mission recommends the following actions in regard to national food policies: set up a market information and food security warning system; develop balanced food production and trade policies for both producers and consumers; remove domestic market/trade barriers; and improve market integration.

1. OVERVIEW

At the request of the Ministry of Agriculture and Irrigation of Myanmar (MOAI), a joint FAO/WFP Crop and Food Security Assessment Mission (CFSAM)) team visited the country from 5 October to 4 November 2008. The main objective of the Mission was to analyze the food supply situation for the forthcoming year at the national and subnational levels (particularly in Cyclone Nargis-affected areas) and estimate food and agricultural assistance needs. Cyclone Nargis hit Myanmar on 2 and 3 May 2008, affecting the food security of approximately 2.4 million people in Ayeyarwady and Yangon Divisions, through damage to agricultural land, destruction of the livestock and fishery sectors and depletion of food markets. The Mission assessed the 2008 main-crop harvest, forecasted 2008/09 production of secondary crops, and estimated food aid requirements and agricultural assistance for the 2008/09 marketing year (November/October). This assessment also ascertained whether transport and marketing infrastructures have recovered from the disaster.

The Mission team held meetings with relevant institutions, including Government, international agencies, donors, Non-Governmental Organizations (NGOs) and the private sector. Available data and information on food security was also collected and reviewed from different sources. At the institutional level, interviews were conducted with leaders of agricultural research institutes; staff of the Myanmar Agriculture Service (MAS) of various states, districts, and villages; staff of the Livestock Breeding and Veterinary Department (LBVD); staff of the Ministry of Livestock and Fisheries (MoLF); and staff of NGOs in the field. Field trips visited 11 out of 17 of the country's states and divisions in all ecological zones of the country. The Mission team observed crop-growing conditions, analysed the key factors (such as rainfall, fertilizer, disease/insects, price, cost of production), and assessed the yields under various categories. Interviews were conducted with villagers (farmers, labourers, fisherman, etc.), rice/food traders, fertilizer traders, and millers.

The interviews covering households and hospitals collected first-hand information on food consumption, nutrition and health, and coping strategies (remittances, non-agriculture activities, changes in food consumption and assistance by the Government, WFP, NGOs, etc.). In addition, telephone interviews were conducted with the government officials of townships/districts from both Delta and Chin State, that could not be visited by the Mission. The Mission had a briefing session with MoAI in Nay Pyi Daw, prior to the field trips and held debriefings with MoAI and MoLF in Nay Pyi Daw and NGOs in Yangon, prior to its departure.

The FAO team was comprised of the following members: Dr Cheng Fang (FAO team leader), Dr Maung Mar (Agronomist), Dr Thanda Kyi (Economist), Ms Aye Mon (Agronomist), Mr Naing Lin (Data Specialist), and Mr Bernard Cartella (International Agronomist). The WFP team included: Mr Jan Delbaere (WFP team leader), Mr Michael Sheinkman (Senior Regional Programme Advisor), Mr Raul Varela Semedo (International Consultant), Mr Aaron Charlop-Powers (International Consultant), Ms Nang Seng Aye (Programme Assistant), Ms San San Nwet (Programme Assistant), and Mr. Thet Naing (WFP Programme Assistant). Mr. Siddharth Krishnaswamy (WFP Myanmar VAM Officer) contributed to the report

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2. SOCIO-ECONOMIC SETTING, FOOD SECURITY SITUATION AND AGRICULTURE OVERVIEW

2.1 Socio-economic situation

Myanmar is under the category of Least Developed Countries (LDC) and one of the poorest nations in Asia. According to the 2007 Human Development Report, the country ranks 132 among 177 nations on the Human Development Index and has a lower economic growth rate than its neighbouring countries. Annual real Gross Domestic Product (GDP) growth per capita was estimated at 3.4 percent in 2005/06, 3.4 percent in 2006/07, and 0.9 percent in 2007/08 (Table 1).

Table 1. Myanmar: Key economic indicators, from 2000/01 to 2007/08

	2000/ 01	2001/ 02	2002/ 03	2003/ 04	2004/ 05	2005/ 06	2006/ 07	2007/ 08
Real GDP growth rate (%)	5.3	5.3	-2.0	13.6	13.6	3.4	3.4	0.9
Consumer price inflation (year to year)	21	57	37	5	9	20	35	22.8
Consumer price inflation (2000=100)	121	190	260	272	297	356	481	591
Exchange rate	620	970	960	910	1095	1280	1290	1205
Export f.o.b.[1/] (USD million)	2522	2421	2710	2927	3753	4555	6170	5731
Import c.i.f.[2/] (USD million)	2444	2022	1912	1999	1744	2343	2964	3447
Current-account balance (USD billion)	-154	96.6	-19.4	112	570	759	1453	485
Rural population (% of total population)	71	71	70	70	69	69	68	68
Population (million)	50.13	51.14	52.17	53.22	54.30	55.40	56.512	57.66

Source: EIU, WDI, and CSO.
[1/] Free on board.
[2/] Cost, insurance and freight.

Myanmar is an agro-based country in which the agriculture sector forms the backbone of the economy contributing to 43.69 percent of the GDP in 2007/08 (Table 2).

Table 2. Myanmar: Contribution of GDP by economic sector (percent)

Marketing year[1/]	Agriculture[2/]	Service[3/]	Industry[4/]	Trade
1995/96	45.06	17.94	15.48	21.52
2000/01	57.23	9.03	9.69	24.05
2001/02	55.87	9.63	10.61	23.89
2002/03	52.89	10.77	12.78	23.56
2003/04	51.90	11.10	13.55	23.45
2004/05	50.72	11.51	10.6	23.29
2005/06	46.68	14.09	17.52	21.71
2006/07	45.28	14.48	18.58	21.66
2007/08	43.69	14.84	19.86	21.61

Source: CSO, various years.
[1/] April/March.
[2/] Including crops, forestry, livestock and fisheries sector.
[3/] Total services.
[4/] Including with energy and mining sector.

The current system of multiple exchange rates (official and unofficial) allows a small number of people and/or institutions to enjoy substantial benefits as they seek (and keep) access to imports at the official exchange rate. However, the consumer prices fully reflect the market exchange rate, noting inflation increases in Myanmar over the past few years. Since 2000/01, the consumer price index has increased by almost 500% (Table 1), at a rate higher than wages and salaries.

The main objective of the MoAI is the "promotion of productivity in agriculture through providing farmer support service" and to “give high priority to rice and other exportable pulses”. However, Myanmar has not received any significant official development assistance for nearly two decades. National investments in agriculture and its subsectors have been limited by a scarcity of domestic resources and have not always been based on feasible plans. The result has been low productivity growth and increasing poverty in many rural areas.

Income distribution, food security and poverty

A World Bank study from 1999 indicated that the poverty incidence was, on average, 22.9 percent of the overall population and 69.6 percent of the total population are living in rural areas.

Time series data from household income and expenditure studies confirm that overall poverty has not declined in recent years. In terms of food security, Myanmar has accomplished surplus food production at national level, but there are food deficit areas, mostly located in the central dry zones, such as Shan and Chin States. There has been minor assessment on the level of food security at household level in Myanmar, with the exception of one study undertaken by FAO and WFP for the Food Insecurity and Vulnerability Information and Mapping System (FIVIMS) programme (UNDP - Myanmar, 2003). The report indicated that out of the national total of 324 townships, 52 townships were classified as being very highly vulnerable, 49 highly vulnerable, 62 moderately vulnerable, and the remaining 122 having a relatively low level of vulnerability. Among the 52 very highly vulnerable townships, 29 were located in Shan State. All townships in Chin State and two-third of townships in Kachin State were also reported to be highly vulnerable and mostly located in remote areas. Townships in Bago Division, Mon State, and Yangon Division were reported to be the least vulnerable.

2.2 Overview of agriculture in Myanmar

Utilization of land

Myanmar has a total land mass of 678,500 km^2, which is the largest in South East Asia. At present, the net crop coverage is 11.67 million hectares, accounting for 18 percent of the total land mass and approximately 5.7 million hectares (8.4 percent of total area) is still available for expansion. The remaining land mass was accounted for by reserved forests (14.7 percent), other wood lands (23.6 percent) and other uses (24.4 percent) in 2007/08. Cultivation can be further increased by up to 25 percent of the total land mass. Kachin, Shan, and Chin States are promising options for future agricultural expansion.

Labour force participation

The Central Statistical Organization (CSO) estimated a total population of 55.4 million in 2005/06, with a growth rate of 2.02 percent (CSO, 2006). Approximately 16.88 million people were engaged in agriculture in 2003 and almost 69.47 percent of the population (39.27 million) lives in rural areas. The average farm size is roughly 2 hectares. The population density is 84 per km^2 (Myanmar Agriculture in Brief, 2008).

Water resources and irrigation facilities

There are eight available water resources in Myanmar. The potential water resource is 1 576.6 cubic km and less than 10 percent of the total water resources are annually utilized. Since 1988, following dramatic economic changes, the Government has made continuous efforts in the construction of dams, reservoirs and pump irrigation facilities throughout the country. Total irrigated lands have increased from 1.87 million hectares in 2002/03 to 2.25 million hectares in 2007/08 (Table 3) after the completion of 211 irrigation projects, 307 pumping stations and 7 578 tube wells. The percentage of total irrigable land has now reached 17.12 percent of the total net sown area in 2007/08, compared to 12.6 percent in 1988/89.

Table 3. Myanmar: Net sown and irrigated land area (million hectares)

Year	Net sown area	Irrigated area	Percent
2002/03	10.82	1.87	17.28
2003/04	11.04	1.96	17.75
2004/05	11.41	1.93	16.91
2005/06	11.94	2.14	17.92
2006/07	12.61	2.24	17.76
2007/08	13.14	2.25	17.12

Source: Planning Department, MoNPED.

The irrigated paddy area increased significantly from 1.535 million hectares in 1996/97 to 2.21 million hectares in 2007/08 (Table 4). Similarly, irrigated areas increased for other cereals, pulses, oil crops, industrial crops and kitchen crops.

Table 4. Myanmar: Changes in irrigated areas by crops (000 hectares)

Crops	1996/97	2005/06	2006/07	2007/08
Paddy	1 535	2 100	2 419	2 211
Wheat	17	53	44	40
Maize	5	37	44	38
Pulses	40	154	156	176
Groundnut	6	23	28	23
Sesame	57	76	95	96
Sunflower	5	26	18	29
Cotton	21	13	15	13
Jute	30	18	11	5
Sugarcane	6	10	10	9
Kitchen crops	59	152	142	144
Other crops	83	214	252	247
TOTAL[1/]	**1 866**	**2 877**	**3 232**	**3 033**

Source: Planning Department, MoNPED.

[1/] Total area sown - crop-growing activities.

Cropping systems and patterns vary according to agro-climatic conditions (Appendix Table A1). In the irrigated areas, paddy-paddy or paddy-pulses-paddy patterns dominate. In the dry zones and other upland rainfed areas, the mixed cropping or intercropping of pigeon pea with sesame or peanut or other pulse patterns are practiced. In mountain or hilly region's upland paddy, maize, millet, oil crops, and pulses are also grown. Many farmers still practice shifting cultivation in these areas. Fruit crops and vegetables are grown throughout Myanmar all-year-round.

More than 60 kinds of crops are grown in Myanmar, most of them food crops. Among the food crops, a major share of land was sown with paddy, although that share is in current decline. In 2006/07, the paddy area was approximately 8.1 million hectares, accounting for some 40 percent of the total area sown (Table 5). Other major crops sown in the country are pulses and soybeans.

There are two growing seasons for paddy: monsoon season and summer season. Monsoon paddy is usually rainfed in Ayeyarwady Yangon, Bago and Tanintharyi Divisions and Mon, Kayin and Rakhine States. Similarly, the upland paddy in Chin, Kachin and Shan States are also rainfed. However, monsoon paddy is grown under irrigation in Sagaing, Mandalay and Magwe Divisions, and in other parts of Myanmar where irrigation facilities are available. All of the summer paddy crops in Myanmar are grown with total reliance on irrigation. In the deltaic region of lower Myanmar, water from the rivers and creeks can be irrigated gravitationally when the tide is high.

Table 5. Myanmar: Sown areas[1/] of major crops

Crop	1977/78		1987/88		1997/98		2006/07	
	(000 ha)	(%)	(000 ha)	(%)	(000 ha)	(%)	(000 ha)	(%)
Paddy	5 136	53.83	4 668	48.32	5 785	48.8	8 125	39.82
Maize (seed)	84	0.88	156	1.61	162	1.32	327	1.60
Oilseeds	1 774	18.59	2 088	21.61	1 735	14.13	3 314	16.24
Cotton (long staple)	60	0.63	33	0.34	207	1.69	265	1.30
Pulses	708	7.42	818	8.47	2 091	17.03	4 002	19.62
Sugarcane (industry.)	52	0.54	54	0.56	108	0.88	149	0.73
Rubber	82	0.86	78	0.81	135	1.10	173	0.85
Tea	51	0.53	59	0.61	68	0.55	85	0.42
Other	1 595	16.72	1 706	17.66	1 986	16.18	3 965	19.43
Total	**9 542**		**9 660**		**12 277**		**20 405**	

Source: MoAI.
[1/] Including multiple cropping.

Government agricultural policy

During socialist rule (1962-1988), the Government economic policy was one of self-sufficiency and isolation. The import substitution policy designed for this purpose consisted of subsidized fertilizer and credit, marketing arrangements and the banning of competitive imports. By and large, economic policies were characterized by a comprehensive system of trade restrictions and rigid controls on foreign exchange. After 1988, with the introduction of market-oriented economic policies, various control measures of the preceding period were abandoned. Farmers are now allowed freedom of choice in agricultural production and participation of the private sector is encouraged in commercial production of seasonal and perennial crops. Additionally, the private sector is allowed to procure and distribute agrochemicals, quality seeds, farm machinery and other inputs. The new policies also emphasized the need for incentive packages to encourage private sector participation in agriculture.

As a part of the 1988 reform programme, the Government recognized food security as a key element of agricultural policy in Myanmar. Objectives developed for the agricultural sector focused on two main areas: (1) commercialization of agriculture; and (2) maintaining food security. Subsequently, the MoAI emphasized food security and prosperity for farming communities through enhanced productivity and export promotion. Recent economic policy frameworks issued by the Government of Myanmar also identified self-sufficiency in food production and food security as key economic objectives.

Land policy

Land tenure was reformed and the landlord system was eliminated in 1964. The land use policy is stated in the Land Nationalization Act 1953, Tenancy Act and Rules 1963, and Procedures Conferring the Rights to Cultivate Land 1963. Under this policy, all land belongs to the State but farmers are given land use or tillage

rights on their holdings, which cannot be transferred, mortgaged, or taken in lieu of loan repayments. However, land right is legally inheritable by family members who remain as farmers and till the land by themselves. Absentee ownership is illegal. The land allocation committee has the right to change the ownership of misused land holdings according to the act and transfer the right to entitled landless farmers.

The Government allows private investors and farmers to develop fallow land and cultivable wasteland for agriculture. In 1991, to implement this policy, the Government established the Central Committee for the Management of Cultivated Land, Fallow Land, and Waste Land, chaired by the MoAI. The Committee approves local and foreign investment in agriculture and can approve the provision of up to 20 000 hectares of land to investors for agricultural purposes. This was a major departure from the earlier policy, which limited the size of land holdings to less than 20 hectares per family for rice land, 10 hectares for kaing (alluvial land) and 4 hectares for Ya (uplands), for reasons of equity. Farmers' access to land is highly influenced by the strong Government interventions in land distribution.

Government pricing and marketing policy

Before 1988, major crops were set and procured by the Government at a fixed price. The Government undertook all imports and exports. Both the public and private sectors play active roles in the procurement and marketing of agricultural products. In the public sector, state economic enterprises (SEE) under the MoAI are responsible for procurement, processing and marketing of sugarcane, cotton, rubber, jute, cashew and oil palm from the producers. The quota sold to SEE ranges from 15 percent to 45 percent of production. Up until April 2003, the Government continued to force rice farmers to sell 10-15 baskets (1 basket of unmilled rice = 46 lb or 20.9 kg) per acre to Myanmar Agricultural Produce Trading (MAPT), at well below the market price. It was considered an implicit tax on farmers, which constrained the expansion of rice production. The Government justifies the low price by providing high subsidies to farmers for the purchase of fertilizers, pesticides and other agro-inputs. A new rice trade policy was announced in April 2003 and the Government no longer buys paddy directly from farmers.

Policy on agricultural inputs

The production of adequate quantities of fertilizer is an important factor in Myanmar agriculture, as there is a declining rate of fertilizer application. Distribution of farm inputs like chemical fertilizers, pesticides and seeds that were formerly handled solely by the MAS is being dramatically transferred to the private sector, while subsidies on farm inputs are being removed (Table 6). However, lack of sufficient incentives, lack of credit and inappropriate technical support services constrain farmers' ability to use the optimum level of fertilizer. The private sector is permitted to import and distribute fertilizer, but its ability to do so is constrained by the lack of a distribution network, prevailing import and export regulations and scarcity of foreign exchange.

Furthermore, the provision of quality seeds is necessary to increase yields, and policies on seed production need to be reviewed.

Table 6. Myanmar: Total use of fertilizer for all crops (tonnes)

Type of fertilizer	2005/06				2006/07			
	MAS	Energy	Private	Total	MAS	Energy	Private	Total
Urea	3 554	40 580	85 059	129 193	4 811	107 241	48 968	161 020
T.S.P	1 290	-	1 788	3 078	36	-	2 244	2 280
M.Opotash	111	-	272	383	850	-	240	1 090
Ammo: Sulphate	121	-	2 001	2 122	-	-	-	-
Rock Phosphate	5 847	-	45 850	51 697	2 722	-	-	2 722
Compound	1 859	-	45 702	47 561	-	-	10 931	10 931
Total	**12 782**	**40 580**	**180 672**	**234 034**	**8 419**	**107 241**	**62 383**	**178 043**

Source: Planning Department, MoNPED.

Rice trade policy and exportation of rice

Before the adoption of the new rice trade policy in 2003, the MAPT coordinated with local regional authorities to use their administrative power to convince farmers to meet their obligations to the MAPT. The annual MAPT procurement at the below-market price was 2-12 baskets (42 kg-250 kg) per acre, according to rice

deficit and surplus acres, which represented 10-12 percent of the total rice production. The MAPT had to undertake the process of milling, packaging, storing and distributing rice for target groups with subsidized prices and organize the export of surplus rice as well.

Rice constitues an important source of foreign exchange in Myanmar. The country exported approximately 1 million tonnes of rice in 1994/95, but this quantity greatly declined by 2000/01. The following year, rice exports rose again to almost 1 million tonnes and has since gradually declined, mainly due to increased domestic consumption and export restrictions (Table 7).

Table 7. Myanmar: Quantities of rice exports (000 tonnes)

Year	Rice export
2000/01	251.4
2001/02	939.2
2002/03	793.5
2003/04	168.5
2004/05	182.0
2005/06	180.0
2006/07	14.5
2007/08	358.5
2008 July	108.0

Source: Selected monthly economic indicators; CSO, 2008.

Rural development and credit policy

The Myanmar Agricultural Development Bank (MADB) is a state-owned bank established in 1953 as the State Agricultural Bank. Between 1970 and 1975, it became the Agricultural Finance Division of a pooled monolithic system called the People's Bank and was reconstituted in 1976 as the Myanmar Agricultural Bank. It became the MADB in 1990 and falls under the Myanmar Agricultural and Rural Development Bank Law, which does not adhere to the Myanmar Companies Act. It is exempt from registration and payment of stamp duty and taxes on income or dues and levies related to banking operations, however, the MADB remits 75 percent of its net profits to the Government.

Loan portfolios consist of three types of loans: (1) a seasonal crop production loan (e.g. paddy 5 000-8 000 ks/ac); (2) a farm development and investment loan; and (3) a border area development loan. Seasonal crop production loans are given for one year, covering three separate seasons for the cultivation of the following main crops: paddy, groundnut, sesame, mustard, maize, peas and beans, sugarcane, jute and long staple cotton. The loans for farm development and investment are given for short- term periods up to 4 years and long term periods from 5 to 20 years. They are primarily used for the purchase of farm implements, pump sets, power tillers, draught cattle, bullock carts, small scale livestock and fish farms, for green tea and orchard plantation, solar salt production and for integrated paddy-fish farming projects. The loans for border area developments deal with the substitution and eradication of poppy plantations and to improve the living standards of ethnic nationals in remote border areas, including the Chin State hills, Kokang and Wa regions in Shan State, and Kabaw Valley in Sagaing Division. However, the MADB are facing difficult issues with insufficiency of funds to meet the demand for agricultural credit, mismatches in the funding-lending structure and geographical constraints.

Until 1996, the Central Bank of Myanmar (CBM) supervised the MADB and regulated its interest-rate policy. It also supports the development of agriculture, livestock and rural socioeconomic enterprises by providing banking services. However, the MADB remains the main source of institutional credit for small-scale farmers in terms of proportion, coverage and accessibility. To attain seasonal loans, farmers have to form groups of 5-10 members and accept liability for their own individual loans, as well as for the loans of other members of the group. For longer-term loans, the MARDB Law requires a security measure by way of a pledge of savings deposits, cattle, farm machinery or implements bought with the loan proceeds, and two reliable personal sureties.

3. FOOD PRODUCTION AND AVAILABILITY, THE NATIONAL AND SUBNATIONAL SITUATION

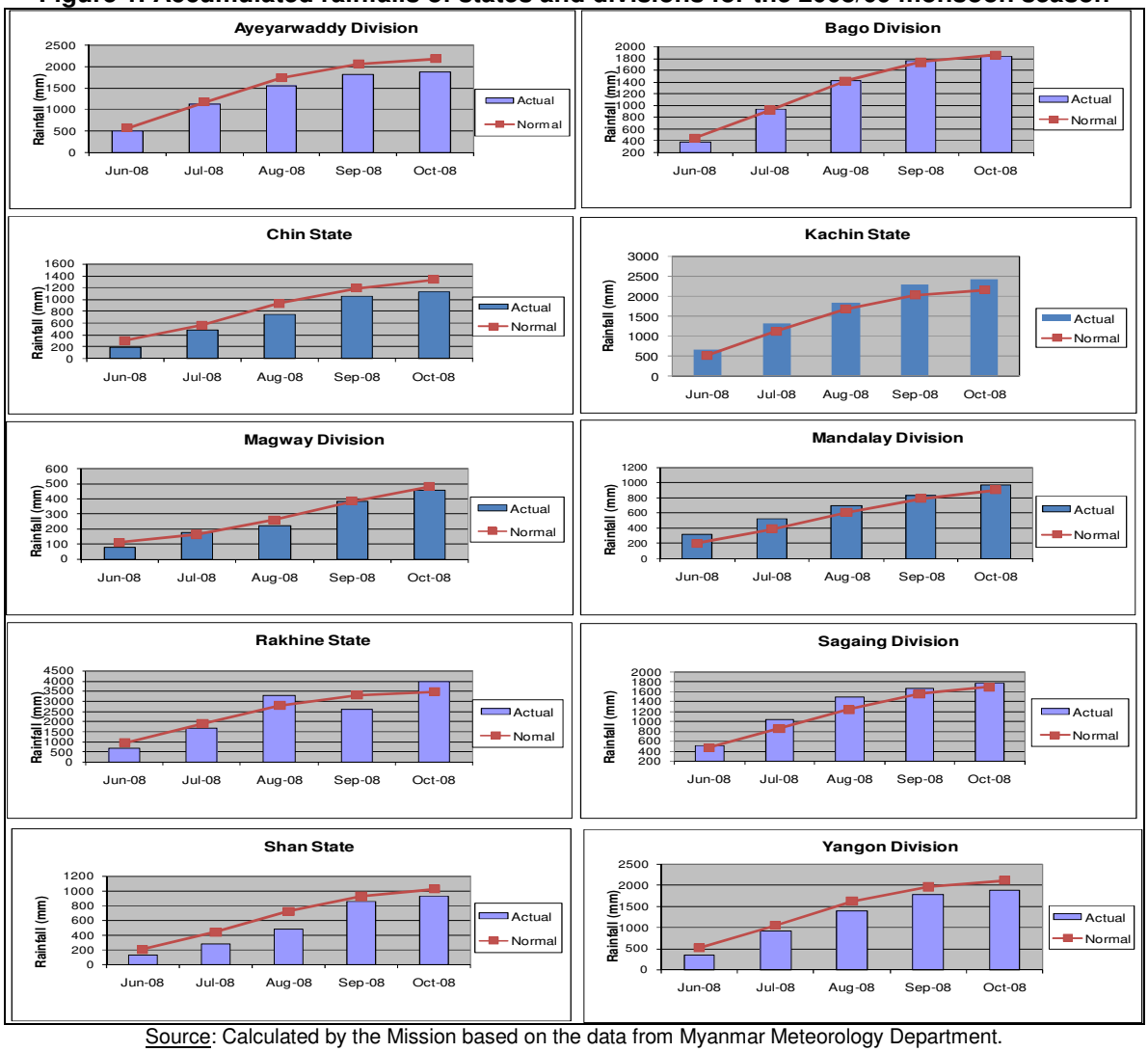
3.1 Factors affecting cereal crop production in 2008

Crop yields are affected by climatic conditions, usage of quality seeds with the correct ratios of organic and chemical fertilizers, soil fertility levesl, tillage procedures, weed control, and pest and disease incidence.

Rainfall in 2008

In the 2008/09 monsoon season, rainfall in Shan State, Chin State, Yangon Division, and Ayeyarwady Division were significantly lower than normal for this period, while the rainfall in Magwe Division and Bago Division were only slightly lower than normal. Alternatively, the rainfall of Kachin State, Rakhine State, Sagaing Division, and Mandalay Division were above normal (Figure 1). Among States/Divisions with lower rainfall like Yangon and Ayeyarwady Division, crop yields are expected to be slightly or not affected. However, the significant lack of rainfall in Chin and Shan State has affected crop yields, barely meeting the rain requirement for these crops. The slighter reduction of rainfalls in Bago Division and Magwe Division was reported to have no impact on crop yields. The higher rainfall in Mandalay Division, Sagaing Division, Rakhine State, and Kachin State is expected to increase the production of rainfed upland crops.

Figure 1. Accumulated rainfalls of states and divisions for the 2008/09 monsoon season



Source: Calculated by the Mission based on the data from Myanmar Meteorology Department.

Usage of High Yielding Variety (HYV) and Open Pollinated Variety (OPV) seeds

The majority of paddy areas grown in Myanmar use HYV seeds. In 2007/08, 61 percent of monsoon paddy was sown using HYV paddy seeds and about 1 percent was sown using hybrid paddy seeds. Shan (north) grew the largest area of hybrid paddy among all states and divisions in Myanmar because these seeds are easily procured from the border with China (Table Appendix A2). Almost 100 percent of the summer paddy was sown with HYV and the remainder with hybrid seeds. Moreover, 54 percent of the total maize areas sown used hybrid maize seeds and 28 percent used HYV maize seeds. Farmers are currently sowing local maize varieties in up to 18 percent of total maize cultivated areas. Shan State (both north and south) and Sagaing Division have the highest hybrid maize cultivation among all states/divisions.

The MAS has the programme of distributing HYV and high quality variety (HQV) seeds and quality saplings. In the 2007/08 Fiscal Year (April/March), the majority of seeds distributed were for paddy, cotton, and pulse cultivation. Many farmers in Myanmar use F1 vegetable seeds.

Usage of fertilizers

In Myanmar, the supply of chemical fertilizers is less than the required amount and demand is increasing. The supply of fertilizers from 1982/83 to 1995/96 was more than 50 percent of the required total, however, since 2001 the supply has reduced to only 4-7 percent of the requirement (Table 8). For crop production, Urea fertilizer is mainly used, followed by compound and rock phosphate (Table 9). There is still no data available for fertilizer usage between 2006/7 and 2008/09. Supplies from 2001/02 to 2005/06 were extremely low. The Mission observed that the rate of fertilizer usage in 2008/09 will be reduced slightly further compared to the previous year, due to higher input prices. However, the slight reduction in fertilizer usage may not affect the crop yield significantly.

Table 8. Myanmar: Requirement and availability of fertilizers (000 tonnes)

Year	Requirement	Supply	Percent
1982/83	626	395	63.1
1983/84	665	451	67.8
1984/85	708	459	64.8
1985/86	747	484	64.8
1995/96	1 000	510	51.0
2001/02	2 888	112.8	3.9
2003/04	3 050	116.14	3.8
2005/06	3 204	234	7.3

Source: MoAI.

Table 9. Myanmar: Type of fertilizers used for crops (tonnes)

Type of fertilizer	2005/06	2006/07
Urea	129 193	161 020
T.S.P	3 078	2 280
M.Opotash	383	1 090
Ammo: Sulphate	2 122	-
Rock Phosphate	51 697	2 722
Compound	47 561	10 931
Total	**234 034**	**178 043**

Source: Planning Department, MoNPED.

Pesticide usage

No serious pest and disease problem was observed in Myanmar during 2008/09, except in Chin State. There is the usual slight damage caused by sea crabs, in paddy near the shoreline area.

Farm Power

In Myanmar, a major source of farm power is from the use of draught animals. There are approximately 9 million large draught animals, while there are only 1 100 tractors, 112 000 power tillers, 2 000 harvesters, and 190 000 water pumps. Almost 5 million hectares were tilled using tractors and power tillers, whereas draught animals tilled over 13 million hectares. Although there is a limited number of tractors, the number of power tillers is fast increasing.

3.2 Yield and production in 2008

3.2.1 Paddy

Ayeyarwady and Yangon Divisions

Seven townships in the Ayeyarwady Division and three townships in Yangon Division were affected by Cyclone-Nargis. Assessments show that of the 60-80 percent of paddy land that was planted, only 50-60 percent has been successful. Some of the successful fields are missing plants and some plants are shorter

in height. Therefore, the production from these areas is expected to be only 50 percent of the previous year. However, the production of the unaffected areas will be close to or better than the previous year.

There are also signs of negative impacts on small-scale and medium-scale farmers, due to the weakening economy. In addition, the rise of input prices like fertilizer and other inputs (e.g. fuel), combined with low paddy prices and the shortage in draught power and labour has caused the farmers to practice less intensified methods like changing from transplanting to broadcasting of paddy. Another cause may be due to the shortage of credit.

The cultivated and harvested areas, their yields, and estimated production for the 2008 monsoon paddy in cyclone-affected townships in Ayeyarwady and Yangon Divisions were assessed and reported (Table 10). Laputta Township in Ayeyarwady Division was mostly affected and the paddy production is expected to be only 56 percent of 2007/08, while Kyauktan Township was the mostly affected in Yangon Division and the production is also expected to be 56 percent of 2007/08 (Table 10). However, the production in Ayeyarwady and Yangon Divisions overall do not seem much affected and the projected paddy production in 2008/09 is expected to be 87 percent of the previous year in Ayeyarwady, and 91 percent in Yangon (Table 11). Likewise, the Myanmar paddy production for 2008/09 as a whole does not seem to have been seriously affected. The Mission prepared production estimates for all states and divisions (Table 12).

Table 10. Myanmar: Estimated 2008 monsoon paddy production in Nargis-affected townships of Ayeyarwady and Yangon divisions

	2007 sown area (ha)	Percent of flooded area	2008 Production				Percent of 2008 over 2007		
			Sown (ha)	Harvested (ha)	Yield (tonnes/ha)	Production (tonnes)	Harvested area (%)	Yield (%)	Production (%)
Affected townships in Ayeyarwady Division									
Ngapudaw	75 642	44	75 642	63 993	3.33	212 820	85	93	79
Laputta	148 204	92	148 204	100 482	3.12	313 276	68	82	56
Mawlamyinegyun	80 173	31	89 926	77 814	3.68	286 360	97	94	91
Pyapon	86 091	71	81 183	61 507	3.35	206 174	71	88	63
Bogale	124 577	83	121 829	86 601	3.24	280 932	70	85	59
Kyaiklatt	55 957	23	55 213	50 969	3.77	192 367	91	97	88
Dedaye	73 764	80	73 568	52 983	3.19	169 059	72	86	61
Total	**644 408**	**67**	**645 565**	**494 349**	**3.36**	**1 660 989**	**77**	**89**	**68**
Affected townships in Yangon Division									
Kyauktan	63 426	91	63 395	43 205	2.02	87 128	68	83	56
Kawhmu	35 846	36	35 703	31 236	3.13	97 746	87	95	83
Kungyangong	41 498	81	41 357	29 642	2.94	87 062	71	85	61
Total	**140 770**	**78**	**140 455**	**104 083**	**2.61**	**271 937**	**74**	**88**	**65**

Source: Mission's estimates.

Table 11. Myanmar: Estimated 2008 monsoon paddy production in Ayeyarwady and Yangon divisions

	2007 sown area (000 ha)	Percent of flooded area	2008 Production				Percent of 2008 over 2007		
			Sown (000 ha)	Harvested (000 ha)	Yield (tonnes/ha)	Production (000 tonnes)	Harvested area	Yield	Production
Ayeyarwady Division									
Affected Townships	644	67	646	494	3.36	1 661	77	89	68
Not affected Townships	854	0	854	835	4.08	3 404			
Total	**1498**	**29**	**1500**	**1329**	**3.81**	**5 065**	**90**	**96**	**87**
Yangon Division									
Affected Townships	141	78	140	104	2.61	272	74	88	65
Not affected Townships	348	0	348	346	3.64	1 259			
Total	**488**	**28**	**488**	**450**	**3.4**	**1 531**	**93**	**98**	**91**

Source: Mission's estimates.

Chin State

Farmers in Chin State practice shifting cultivation. The land area used for cultivation is limited and the population is increasing. Using shorter cycles of shifting cultivation leads to poor soil fertility and poor crop yields. Serious losses of upland crops due to rat damage were observed. Some farmers from the villages visited by the CFSAM reported that they had lost all of their produce and others mentioned that they could harvest only 10 percent of their produce.

Bago Division

The paddy sown in Bago Division was performing well due to good weather and the yield is expected to produce 60 baskets/acre on average.

Kachin State

The yield and overall production of paddy in Kachin State will be higher in 2008/09 due to use of HYV seeds and higher than normal rainfall. Farmers are expecting a better yield for rainfed paddy, upland paddy, maize, sugarcane, and other upland crops. However, the mountain region is expected to have lower crop yields due to the combination of poor agro-techniques used and shorter cycles of shifting cultivation.

Table 12. Myanmar: Estimated 2008/09 paddy production, by state/division and season

State/ Division	Monsoon			Summer			Total		
	Area	Yield	Production (tonnes	Area	Yield	Production (tonnes)	Area	Yield	Production (tonnes)
Kachin	226	3.47	785	9	3.17	27	235	3.46	812
Kayah	41	3.24	132	4	3.98	16	45	3.31	147
Kayin	209	3.07	642	52	3.65	192	262	3.19	833
Chin	55	2.10	115	0	3.32	0	55	2.10	115
Sagaing	745	4.00	2 981	175	4.55	797	920	4.11	3 779
Tanintharyi	180	3.44	618	14	3.51	50	194	3.45	668
Bago (East)	714	3.88	2 771	73	4.17	304	787	3.91	3 075
Bago (West)	501	3.75	1 879	89	4.01	357	591	3.79	2 236
Magwe	312	3.92	1 224	63	4.58	289	375	4.03	1 513
Mandalay	400	4.21	1 684	91	5.16	467	491	4.39	2 152
Mon	356	3.60	1 283	56	4.05	226	412	3.66	1 509
Rakhine	491	3.61	1 775	9	3.91	37	500	3.62	1 811
Yangon	450	3.40	1 531	62	4.18	257	512	3.50	1 789
Shan (South)	247	3.46	853	12	4.64	54	258	3.51	907
Shan (North)	190	4.87	926	9	7.62	70	199	5.00	996
Shan (East)	154	3.95	608	14	4.72	65	168	4.01	673
Ayeyarwady	1 329	3.81	5 065	495	4.94	2 445	1 824	4.12	7 510
Total	**6 600**	**3.77**	**24 872**	**1 227**	**4.61**	**5 654**	**7 827**	**3.90**	**30 526**

Source: Mission's estimates.

Magwe Division

Saw Township is expecting normal levels of production. The production of rainfed paddy is also normal in Siekhpyu Township, but will require further rain in subsequent months. The winter crop, chick peas, were just sown. The actual rainfall in Chauk Township was less than normal, while the actual rainfall in Magwe Township was higher than normal. In Magwe Division, there are both irrigated and upland areas. The monsoon paddy in irrigated areas of Magwe Division was doing well, while the rainfed paddy will require further rain in subsequent months. The monsoon season upland crops like pulses, maize, sorghum and cotton will also require more rain.

Sagaing Division

Sagaing Division comprises large irrigated and rainfed rice producing areas, as well as dry-land agricultural producing areas and usually exports rice and other agricultural products. Production in 2008/09 seems slightly better than normal and rice production may be 5-10 percent higher than the previous year. The production of upland crops is recorded as normal, although this may vary from place to place - the winter crops have just been seeded and it is too early to predict the outcome. The high price of fertilizer and the low price of rice will hamper the future growth of paddy production.

Mandalay Division

Mandalay Division contains important irrigated and rainfed rice producing areas and dry-land agricultural producing areas. The Division also has an important urban population, the destination of most of the surplus rural agricultural production. Production in 2008/09 seems better than normal and paddy production in the irrigated areas is estimated to be higher than the previous year.

Shan State

The northern part of Shan State is now using hybrid seeds imported from China through the border. The farmers in this area also using the required amounts of fertilizers and as a result are seeing higher levels of production and profit. The use of mechanized power is also increasing productivity.

Rakhine State

Paddy in Rakhine State was grown mostly under rainfed conditions. Rice prices decreased due to inflows from the delta, local purchase from WFP and the ban on rice exports following Cyclone Nargis.

Overall country level

The area of monsoon paddy sown increased from 5.44 million hectares in 2003/04 to 6.6 million hectares in 2008/09. The area of summer paddy sown increased from 1.11 million hectares in 2003/04, with some fluctuations, to 1.23 million hectares in 2008/09. In general, the total paddy sown has increased gradually from 6.54 million hectares in 2003/04 to 7.83 million hectares in 2008/09 (Table 13).

Table 13. Myanmar: Paddy production from 2003/04 to 2008/09

	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
Area sown (million hectares)						
Monsoon	5.435	5.824	6.237	6.894	6.820	6.600
Summer	1.107	1.034	1.152	1.230	1.269	1.227
Total	**6.543**	**6.858**	**7.389**	**8.124**	**8.089**	**7.827**
Yield (t/ha)						
Monsoon	3.41	3.52	3.62	3.70	3.80	3.77
Summer	4.19	4.31	4.44	4.55	4.61	4.61
Total	**3.54**	**3.64**	**3.75**	**3.83**	**3.93**	**3.90**
Production (million tonnes)						
Monsoon	18.513	20.310	22.563	25.327	25.796	24.872
Summer	4.622	4.442	5.120	5.597	5.654	5.654
Total	**23.136**	**24.752**	**27.683**	**30.924**	**31.450**	**30.526**

Source: 2003/04 to 2007/08 from CSO; 2008/09 from Mission's estimates.

In Myanmar, approximately 18-20 percent of the rice production comes from the summer crop season, while the majority portion comes from the monsoon paddy season. The yield of monsoon paddy increased from 3.41 tonnes/hectare in 2003/04 to 3.80 tonnes/hectare in 2007/08. However, the yield is expected to decline slightly to 3.77 tonnes/hectare in 2008/09, due to the impact of Cyclone Nargis. Alternatively, the summer paddy yield is forecasted to increase from 4.19 tonnes/hectare in 2003/04 to 4.61 tonnes/hectare in 2008/09 (Table 13).

In 2007/08, approximately 25 percent of the total sown area and 26 percent of paddy production was in Ayeyarwady Division. Some 11 percent of total sown area of paddy and 12 percent of the country total production were from Sagaing Division. The other major producing states/divisions were Bago Division (east), Bago Division (west), Yangon Division, Mandalay Division, Rakhine State, Mon State, and Magwe Division (Table 14). The share of sown area and production in Ayeyarwady in 2008/09 is expected to decline to 22 percent and 25 percent, respectively, due to the impact of Cyclone Nargis on the region.

Table 14. Myanmar: Paddy sown area and production by state/division in 2007/08 and 2008/09

State/Division	2007/08		2008/09	
	Area (%)	Production (%)	Area (%)	Production (%)
Ayeyarwady	25	26	22	25
Sagaing	11	12	11	12
Bago (East)	10	10	10	10
Bago (West)	7	7	7	7
Yangon	7	6	7	6
Mandalay	6	7	6	7
Rakhine	6	6	7	6
Mon	5	5	5	5
Magwe	5	5	5	5
Others	18	16	19	17
Total	**100**	**100**	**100**	**100**

Source: 2007/08-Department of Agriculture Planning, MoAI; 2008/09-Mission's estimates.

3.2.2 Other major crops

Maize

Maize is one of the main staple foods after rice in some regions, like Chin State. Overall, maize cultivation covered 346 000 hectares in 2007/08 including Sagaing Division, north and south Shan State, Chin State, and Magwe Division. The highest yields were recorded in Kayin State, Ayeyarwady Division and Shan State (north), respectively. The highest producers of maize were Shan State (north), Sagaing Division and Shan State (south). The Mission prepared production estimates for 2008/09 for all states and divisions (Table 15). The total national area sown and total production were estimated at 342 000 hectares and 1.11 million tonnes. There were no adjustments to the 2007/08 data in other states and divisions, except Chin State and Magwe Division. The estimates for Chin State and Magwe Division were made according to the Mission's findings (Table 15). Overall, there has been an increasing trend in maize production between 2003/04 and 2008/09 (Table 16). However, the 2008/09 maize production in Chin State was estimated to have reduced due to damage by the rat infestation. According to data collected from the MAS, maize and upland rice were affected by rodent infestations in 7 out of 12 townships in Chin State. Damage was reported in 121 villages, covering 685 hectares of upland rice and 400 hectares of maize (Appendix Table A3).

The CFSAM to Kampetlet Township in Chin State in October 2008, reviewed the crop damage by rodents. During the mission visits, farmers reported damage with differing intensity, according to each farmer and each village. Some farmers reported the total loss of maize crops and some farmers reported that they could only harvest about 10 percent of their normal yield. However, crop damage due to rodents seems to be localized and affects differ from place to place.

A reduced maize output was estimated in 2008/09 in Magwe Division due to dry weather. The area sown was estimated to be reduced by 10 percent and the estimated yield forecasts a decline by 20 percent.

Wheat

Wheat is consumed in Myanmar, but is not one of the main staple foods. In 2007/08, approximately 98 000 hectares of wheat was grown and 158 000 tonnes was produced. In 2008/09, the largest wheat-growing area was Sagaing Division, with subsequent high yields. Other states and divisions such as Mandalay Division and Shan State (north and south) are expected to produced reasonable amounts of wheat overall. The wheat sown areas (Table 15) fluctuated between 2003/04 and 2007/08 (Table 16), however, yields and production figures of sown areas remain positive.

Pulses

Pulses are consumed almost daily in most areas of Myanmar, especially in dry-zone regions. Pulses are also becoming an important export crop and more than 1 million tonnes of pulses have been exported in recent years. Nationally, some 5 million tonnes of pulse output is estimated in 2008/09, mainly coming from Sagaing Division, Ayeyarwady Division, Magwe Division, Mon State, and Bago Division (Table 15). The production of pulses throughout the country have been in a rising trend since 2003/04 (Table16).

Soybeans

Soybean cultivation covered 160 000 hectares of land in 2008/09, with an estimated output of 221 000 tonnes (Table 16). The largest sown areas were in Shan State (north and south), followed by Ayeyarwady Division, Shan State (east), Bago Division (west), Sagaing Division, and Mandalay Division. There has been an in increasing trend in soybean cultivation in the 3 Shan State areas, where soybean is used for daily consumption. In other states and divisions the trend fluctuates.

Table 15. Myanmar: Estimated maize and wheat output by state/division in 2008/09

State/ Division	Maize			Wheat			Pulses		
	Area (ha)	Yield (tonne)	Production (tonne)	Area (ha)	Yield (tonne)	Production (tonne)	Area (ha)	Yield (tonne)	Production (tonne)
Kachin	10 323	3.01	31 072	71	1.00	71	26 431	1.39	36 817
Kayah	7 375	3.55	26 181	0	0.00	0	18 349	0.87	15 910
Kayin	12 501	5.35	66 880	0	0.00	0	41 625	0.90	37 307
Chin	36 392	1.86	67 689	101	0.73	74	19 324	0.77	14 853
Sagaing	77 546	2.97	230 312	60 704	1.37	83 280	887 110	1.29	1 143 775
Tanintharyi	96	1.47	141	0	0.00	0	1 672	0.52	870
Bago (East)	1 155	3.39	3 915	0	0.00	0	377 545	1.41	531 424
Bago (West)	225	2.95	664	0	0.00	0	284 338	1.30	369 854
Magwe	32 213	3.13	80 661	607	1.43	871	751 235	1.03	771 567
Mandalay	17 971	3.04	54 632	13 430	1.78	23 843	587 689	0.99	580 280
Mon				0	0.00	0	38 503	1.03	39 596
Rakhine	43	2.73	117	0	0.00	0	75 641	0.94	71 455
Yangon	737	1.36	1 004	0	0.00	0	167 948	1.16	194 631
Shan (South)	57 825	3.26	188 510	8 839	2.20	19 471	78 835	1.17	92 368
Shan (North)	68 928	4.26	293 633	6 440	2.88	18 529	58 129	1.33	77 363
Shan (East)	11 583	3.41	39 498	0	0.00	0	24 730	1.14	28 291
Ayeyarwady	6 632	4.45	29 512	780	1.15	898	768 279	1.34	1 025 760
Total	**341 545**	**3.26**	**1 114 422**	**90 972**	**1.62**	**147 037**	**4 207 383**	**1.20**	**5 032 121**

Source: Mission's estimates.

Table 16. Myanmar: Maize, wheat, pulses and soybean production from 2003/04 to 2008/09

	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
Maize						
Area (000 ha)	284	293	320	327	345	342
Yield (tonne/ha)	2.48	2.68	2.87	3.16	3.32	3.26
Production (000 tonnes)	704	784	918	1 032	1 146	1 114
Wheat						
Area (000 ha)	95	108	112	92	98	91
Yield (tonne/ha)	1.31	1.42	1.42	1.55	1.61	1.62
Production (000 tonnes)	124	152	159	142	158	147
Pulses						
Area (000 ha)	3 391	3 542	3 801	4 003	4 172	4 207
Yield (tonne/ha)	0.91	1.00	1.05	1.11	1.15	1.20
Production (000 tonnes)	3 096	3 530	4 007	4 442	4 797	5 032
Soybeans						
Area (000 ha)	135	145	156	157	158	160
Yield (tonne/ha)	1.1	1.15	1.21	1.3	1.37	1.38
Production (000 tonnes)	149	167	189	204	217	221

Source: 2003/04 to 2007/08 from CSO; 2008/09 from Mission's estimates.

3.3 Livestock and fishery sectors

In Myanmar, the majority of farmers raise pigs and chickens for their own consumption and for additional income pruposes. In 2007/08, the total number of livestock in the country was approximately 2.84 million buffalo, 12.63 million cattle, 470 000 sheep, 2.38 million goats, 6.95 million pigs, 107.24 million chickens, 11.11 million ducks, 300 000 quails and 1 million other birds. Meat production from the livestock sector increased in all states/divisions from 2003/04 to 2007/08. In 2007/08, the largest producer of livestock meat was Ayeyarwady Division, followed by Sagaing and Bago Divisions. Magwe Division, Yangon State and

Shan State also produced considerable amounts of meat. The total livestock meat production for that year was 1.4 million tonnes. (Appendix Table A4).

Fish and prawn culture areas in Myanmar have increased significantly in the last decade. In 2007/08, the total fish production was recorded as approximately 3.17 million tonnes. The largest areas of fish production came from Ayeyarwady Division, followed by Tanintharyi Division. Although much lower in quantity than the leaders, Yangon and Bago Divisions and Mon State also produced a high turnover. (Appendix Table A5).

The affects of Cyclone Nargis on the livestock and fishery sectors

Cyclone Nargis caused substantial damage to livestock, sheds for housing livestock, and feed. The significant mortality of livestock, including up to 50 percent of buffalo and 20 percent of cattle, occurred in the worst cyclone-affected townships, such as Bogale, Ayeyarwady Division. The animals that did survive in these areas were weakened due to saltwater ingestion during the storm, lack of fodder and were inevitably unfit for work. The impacts of the cyclone reduced meat production by 22 800 tonnes (beef), 4 000 (pork), 5 400 tonnes (chicken/duck), and 30 million (chicken/duck eggs), to the equivalence of k30 800 mililion [1/]

Specifically, cyclone damage to livestock in Ayeyarwady and Yangon Divisions and Kayin and Mon States accounted for the mortality of 136 000 buffaloes, 91 000 cattle, 2 400 goats, 41 000 pigs, 880 000 chickens and 271 000 ducks (Table 17). In Bogale township, 69 percent of cattle and 17 percent of buffalo were destroyed and 51 percent of draught animals were destroyed (Table 18). These long-term impacts will be devastating as draught animals are the main tool for land preparation and consequently, crop production. Furthermore, the loss of livestock will reduce the availability of meat produce and will directly and indirectly affect employment opportunities.

Table 17: Myanmar: Livestock animal loss and damage in Cyclone Nargis-affected areas

State/Division	Buffalo	Cattle	Goat	Pig	Poultry	Duck	Total
Ayeyarwady	132 133	88 720	6 896	67 724	1 112 194	502 686	1 910 353
Yangon	4 291	2 280	103	93	138 000	0	144 767
Kayin	0	0	0	0	150	0	150
Mon	0	11	0	0	750	0	761
Total	**136 424**	**91 001**	**2 402**	**41 368**	**879 763**	**270 619**	**1 421 577**

Source: Livestock Rehabilitation in the Nargis Storm-hit Areas and Work Plan for the Prevention of Future Natural Disasters.

Table 18: Myanmar: Affect of Cyclone Nargis on draught animals in Bogale, Ayeyarwady Division

	Original Population (2007/08)			Dead due to storm			Remaining animals		
	Cattle	Buffalo	Total	Cattle	Buffalo	Total	Cattle	Buffalo	Total
Total	37 424	19 356	56 780	25 902	3 249	29 151	11 522	16 107	27 629
Percent				69	17	51			
Draught animal			30 240			14 643			
Percent						48			

Source: Livestock Rehabilitation in the Nargis Storm-hit Areas and Work Plan for the Prevention of Future Natural Disasters.

In the fishery sector, the cyclone caused the loss of fishing boats, fishing gear, equipment, and fish processing facilities, and caused salt water intrusion to fish ponds. Off-shore fisheries were struck hard and lost many fishing boats, nets and crew members, and in-shore fisheries suffered similar damage, plus the damage of ice production facilities. More than 1 800 licensed boats were officially reported lost and the actual number may be significantly higher. FAO Needs Assessment Mission reported that 2 000 off/in-shore boats and vessels were lost and more than 1 000 small boats of other categories were destroyed. Fifty-five cold storage facilities were damaged in Ayeyarwady and Yangon Divisions. Over 15 000 hectares of ponds were damaged. The total loss of fish due to the cyclone was estimated at 150 000 tonnes and the export of fishery products has suffered a 10 percent reduction.

[1/] Post-Nargis Joint Assessment report prepared by the Tripartite Core Group comprised of Representatives of the Government of Myanmar, the Association of Southeast Asian Nations and the United Nations with the support of the Humanitarian and Development Community.

The fishery sector in Ayeyarwady Division was particularly hard hit. In Labutta in Ayeyarwady Division, 33 percent of fishery households lost their livelihoods. In Dedaye and Bogale, both in Ayeyarwady Division, where 20 percent of households claimed fisheries as their main income, the fisher households dropped to 8 percent after the cyclone. Pyapon, another township in Ayeyarwady Division, was struck hard when 136 marine fishing vessels were lost and 168 vessels were damaged. Fishing gear was also lost and most jetties were partially damaged. These damages have affected the availability of fish and fishery products in these areas and will consequently affect local employment opportunities for some time.

4. FOOD SUPPLY/DEMAND OUTLOOK 2008/09

4.1 National cereal supply/demand balance

The total population of Myanmar is currently estimated as 57.6 million (17.6 million in urban areas and 40 million in rural areas). According to the Household Income and Expenditure Survey (HIES) of 1997, the annual consumption of rice per capita was 129 kg in urban areas, but varied significantly in rural areas, from 135 kg per capita in Chin State to 220 kg per capita in Rakhine State. Consumption figures for paddy would be higher, considering the 65 percent approximate conversion ratio when milling paddy into rice. In addition, rice is often consumed in the form of processed snacks such as noodles, vermicelli, rice cakes etc. Futhermore, rice bran is utilized as feed for fish farming and for oil extraction.

In 2008/09, domestic rice availability is forecast as approximately 22.84 million tonnes and the total domestic utilization including seed, waste, food consumption of the population, and other uses is estimated as 22.37 million tonnes, based on calculations from the CFSAM findings. The surplus is estimated as 476 700 tonnes (Table 19).

The total domestic availability of maize in 2008/09 is forecast as 1.17 million tonnes and total domestic utilization is estimated as 1.01 million tonnes. The surplus, which is expected to be exported, is estimated as 159 400 tonnes.

The total domestic availability of wheat in 2008/09 is forecast as 172 000 tonnes, while domestic utilization is estimated as 236 400 tonnes. Therefore, 64 400 tonnes are forecasted to be imported to meet domestic utilization needs.

Aggregate cereal (rice, maize, and wheat) output is forecast as 21.1 million tonnes and the country is expected to be a net cereal exporter in 2008/09, with a net export of 572 000 tonnes.

Table 19. Myanmar: National food balance sheet for November/October 2008/09 (000 tonnes)

	Rice[1/]	Wheat	Maize	Total
Domestic availability	**22 842.0**	**172.0**	**1 174.0**	**24 188.0**
Opening stocks	3 000.0	25.0	60.0	3 085.0
Total production	**19 842.0**	**147.0**	**1 114.0**	**21 103.0**
2008 monsoon season	16 166.6	0.0	0.0	16 166.6
2008 winter season	0.0	147.0	0.0	147.0
2009 summer season	3 675.4	0.0	0.0	3 675.4
Total utilization	**22 942.0**	**236.4**	**1 174.0**	**24 352.4**
Domestic utilization	22 365.3	236.4	1 014.6	23 616.3
Food use[2/]	13 215.4	200.0	167.1	13 582.5
Seed use[3/]	685.5	7.0	35.0	727.5
Feed[4/]	0.0	0.0	646.5	646.5
Losses and other uses	4 464.4	4.4	106.0	4 574.9
Closing stocks	4 000.0	25.0	60.0	4 085.0
Commercial and informal exports[5/]	576.7	0.0	159.4	736.1
Total Import Requirements	**100.0**	**64.4**	**0.0**	**164.4**
Anticipated commercial/food aid imports[5/]	0.0	64.4	0.0	64.4
Food aid received or committed[6/]	100.0	0.0	0.0	100.0
Gap[7/]	0.0	0.0	0.0	0.0

Source: Mission's estimates.

1/ In cereal equivalent (ratio=65 percent).

2/ Based on the estimated population of 57.657 million and per capita food use requirements of 235.5 kg of milled cereal (229.2 kg of rice, 2.7 kg of maize, 3.5 kg of wheat), and about 12.90 kg of pulses.

3/ Based on planting area and per hectare seed requirements of 206 kg of paddy, 121 kg of wheat, 15 kg of maize and 20 kg of pulses.

4/ 60 percent of production of maize.

5/ "Exports" are not derived from Government data or plans, but represent the net exportable surplus of rice and maize.

6/ If Myanmar government policy changes to permit local purchase of food commodities, this figure will decrease.

7/ As a cereal surplus is anticipated, local purchase is recommended to meet the requirement of 220 000 tonnes of emergency food assistance estimated in section 5.4 of this report.

4.2 Food crop supply situation at state/division level

The table below forecasts the three major cereal outputs (rice, maize, and wheat) for 2008/09 and the total aggregate 5 food-crop outputs (three major cereal plus pulses and soybeans) and their geographical breakdown (Table 20). Ayeyarwady Division is by far the highest producer in aggregate cereal numbers, followed by Sagaing Division and Bago Division (east), while Chin and Kayah States are the lowest producers in this category.

Table 20. Myanmar: 2008/09 forecast output of five major food-crops by state/division (tonnes)

State/Division	Rice	Maize	Wheat	Pulses	Soybeans	Rice, maize and wheat	Total five crops
Ayeyarwady	4 881 312	29 512	898	1 025 760	27 534	4 911 722	5 965 016
Sagaing	2 456 046	230 312	83 280	1 143 775	14 302	2 769 638	3 927 715
Bago (East)	1 999 059	3 915	0	531 424	416	2 002 974	2 534 814
Mandalay	1 398 643	54 632	23 843	580 280	12 546	1 477 118	2 069 944
Bago (West)	1 453 363	664	0	369 854	19 197	1 454 026	1 843 077
Magwe	983 538	80 661	871	771 567	4 896	1 065 070	1 841 533
Yangon	1 162 539	1 004	0	194 631	14	1 163 543	1 358 188
Rakhine	1 177 202	117	0	71 455	0	1 177 319	1 248 774
Shan (North)	647 569	293 633	18 529	77 363	60 279	959 732	1 097 374
Mon	981 064	0	0	39 596	2 047	981 064	1 022 707
Shan (South)	589 374	188 510	19 471	92 368	37 622	797 355	927 345
Kayin	541 766	66 880	0	37 307	2 952	608 646	648 905
Kachin	527 717	31 072	71	36 817	9 694	558 860	605 371
Shan (East)	437 606	39 498	0	28 291	20 849	477 104	526 244
Tanintharyi	434 461	141	0	870	0	434 602	435 472
Chin	74 898	67 689	74	14 853	763	142 661	158 277
Kayah	95 821	26 181	0	15 910	3 902	122 002	141 814
Myanmar	**19 841 977**	**1 057 510**	**147 037**	**5 032 121**	**217 013**	**21 046 524**	**26 295 658**

Source: Mission's estimates.

The Table below forecasts the three major cereal per capita outputs for 2008/09 and the per capita aggregate 5-food crop figures (Table 21). The ranked order provides the relative food security situation for each State/Division. The findings indicate that the top five areas with a high level of food security per capita at State/Division level are: Bago Division (east), Ayeyarwady Division, Bago Division (west), Shan State (east) and Sakaing Division, while the five State/Divisions with the lowest per capita food security are Chin State, Tanintharyi, Magwe Division, Mandalay Division, and Yangon State. The low per capita output figures in these five States/Divisions suggests that there are large deficits in cereal and are vulnerable to rising food prices and income difficulties.

Table 21. Myanmar: 2008/09 forecast outputs per capita of five major food-crops by state/division

State/Division	Rice (kg)	Maize (kg)	Wheat (kg)	Pulses (kg)	Soybeans (kg)	Rice, maize and wheat		Total five crops	
						(kg)	Ranking	(kg)	Ranking
Bago East	624.1	1.2	0.0	165.9	0.1	625.3	1	791.4	1
Ayeyarwady	619.3	3.7	0.1	130.1	3.5	623.2	2	756.8	2
Bago West	558.3	0.3	0.0	142.1	7.4	558.6	3	708.1	3
Shan (east)	491.7	44.4	0.0	31.8	23.4	536.1	4	591.3	5
Sakaing	390.3	36.6	13.2	181.8	2.3	440.2	5	624.2	4
Shan (north)	263.9	119.7	7.6	31.5	24.6	391.1	6	447.2	6
Shan (south)	276.4	88.4	9.1	43.3	17.6	374.0	7	435.0	7
Rakhine	368.9	0.0	0.0	22.4	0.0	368.9	8	391.3	10
Kachin	348.3	20.5	0.0	24.3	6.4	368.9	9	399.6	9
Kayah	284.3	77.7	0.0	47.2	11.6	362.0	10	420.8	8
Kayin	310.5	38.3	0.0	21.4	1.7	348.8	11	371.9	11
Mon	326.3	0.0	0.0	13.2	0.7	326.3	12	340.1	13
Chin	140.3	126.8	0.1	27.8	1.4	267.2	13	296.4	14
Tanintharyi	265.4	0.1	0.0	0.5	0.0	265.5	14	266.0	15
Magwe	181.9	14.9	0.2	142.7	0.9	197.0	15	340.6	12
Mandalay	173.0	6.8	2.9	71.8	1.6	182.7	16	256.0	16
Yangon	172.4	0.1	0.0	28.9	0.0	172.6	17	201.4	17
Myanmar	**344.1**	**19.3**	**2.6**	**87.3**	**3.8**	**366.0**		**457.1**	

Source: Mission's estimates.

4.3 Agricultural marketing and price trends

Prices play an essential role in coordinating agricultural production and consumption. Prices perform a broad range of vital economic functions including, signalling the demand for production inputs and outputs, influencing the income of the producer and welfare of the consumers, and determining the level of a nation's export earnings.

Rice marketing

After liberalization of the rice marketing system in 2003, the Government tried to boost rice exports, however, average exports over the last five years have declined. Due to the importance of rice, rice marketing and related policies affect almost everyone in the country, whether a producer or a consumer.

For the country as a whole, paddy production is in surplus. However, with national production concentrated so heavily on production from the Delta region, rice production is insufficient to meet local requirements in 4 of the country's 17 Divisions. The largest flow of rice is from surplus areas in the lower part of the country such as Ayeyarwady Division, Bago Division (east and west), Sagaing Division and Shan State (east), to the rice deficit areas of Yangon Division, Magwe Division, Mandalay Division and the hilly regions, Shan and Chin States.

Most farmers sell their crop as paddy in their own villages, to a range of primary collectors. In some cases, rice millers anticipated contracts with the agents. Small village mills are common in rural areas and provide custom milling for home consumption. They may also buy on their own account. Most rice millers did not provide credit to farmers.

Town wholesalers play an important role in rice marketing and are often involved in inter-State/Division trade. None collect rice directly from farmers and most do not provide advance payments to collectors. Market wholesalers purchase rice from other traders, collectors and town wholesalers and sell mainly to market retailers. A few retailers purchase from millers and directly from farmers.

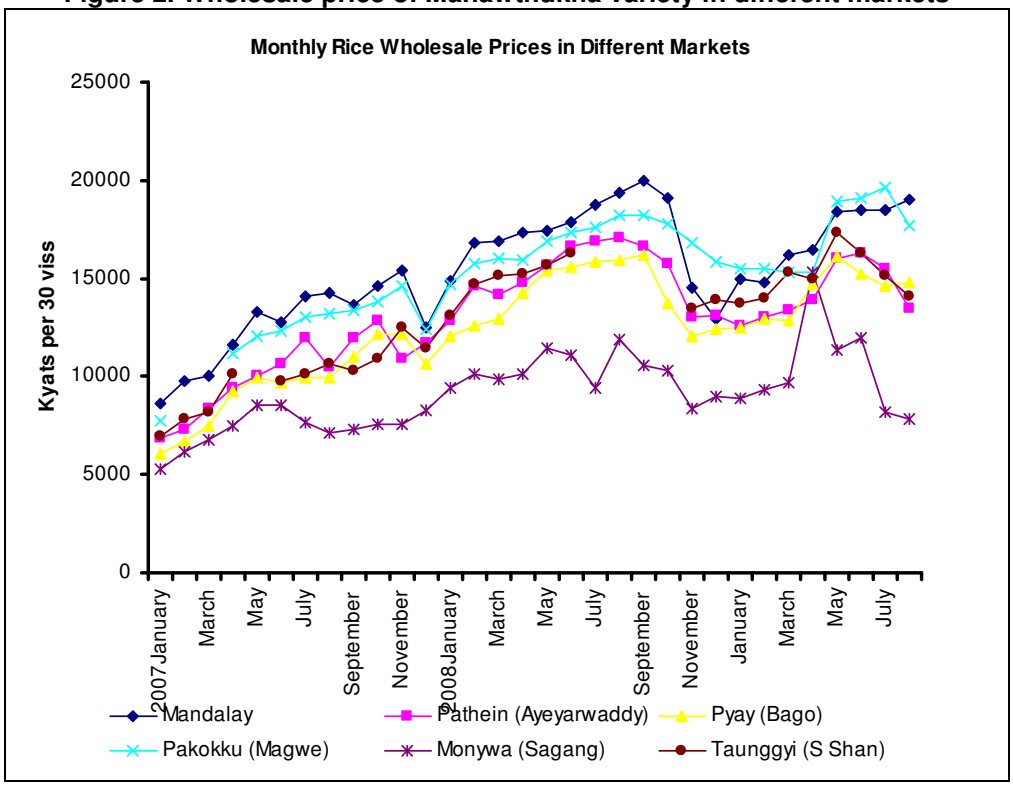
Wholesale market-price of rice

International prices of most agricultural food commodities have risen sharply during the past two years. Several factors have contributed to this development: (1) the low level of world stocks; (2) crop failure in major producing countries; (3) a rapidly growing demand for grain-based bio-fuel production, supported by subsidies; (4) gradual changes in agricultural policies; and (5) strong economic growth in developing countries and expanding world populations.

Monthly wholesale prices (January 2007 to August 2008) of the Manawthukha rice variety in different markets are presented in Figure 2, which indicates that:

- Due to Cyclone Nargis in April 2008 and high international food prices, the price of rice became abruptly higher, but prices stabilized after 6 months. This may be due to the domestic policy on rice, where food aid agencies are not allowed to buy within the country and export is banned. The increase in rice prices are much less that of the international markets, especially after 2008.
- The price of Manawthukha variety in the market in Mandalay Division, the deficit region, proved to be the highest, while that of Monywa in Sagaing Division, the surplus region, had the lowest among the observed markets. The markets were not fully integrated, as indicated by the opposite moving trends after March 2008. The high prices in the food deficit region (Mandalay) would negatively affect the poor consumers and the low prices in surplus areas would negatively affect the producers' welfare.

Figure 2. Wholesale price of Manawthukha variety in different markets

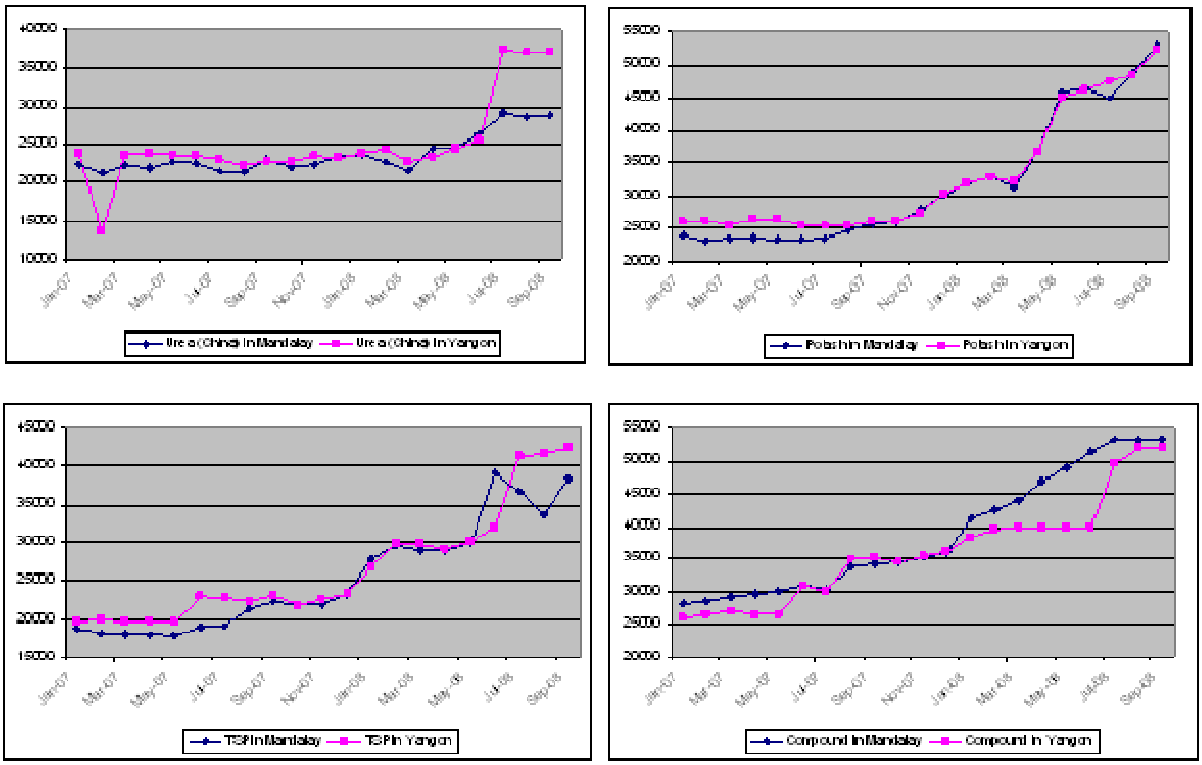


The biological nature of production causes price variabilities within the same year. Due to seasonal yields, the food commodity market frequently becomes gutted at harvest time, even though during rest of the year supplies may be scarce. Food prices reflect this seasonal variability of supply associated with cropping cycles, where prices typically fall at harvest time and climb steadily during the rest of the year, until the cycle is completed. The variability associated with food prices is not entirely caused by supply-side factors. Demand conditions often compound price fluctuations and particularly, trade policies are significant in determining Myanmar rice prices.

Market-price of fertilizer

When fertilizer prices were analysed, it was found that they had an increasing trend since January 2007, and had a substantial increase after March 2008, due to the strict supply and increased export duties by the major fertilizer export countries (Figure 3). The price of fertilizer in 2008 was double that of the previous year. As a result, farmers seemed to limit the amount of fertilizer application in the paddy fields and/or making the cost of cultivation higher. This will have a negative impact on intensifying paddy production.

Figure 3. Fertilizer wholesale prices in Mandalay and Yangon



Profitability of rice production

Although input levels, yields and prices may vary significantly from region to region, average benefit levels were calculated for monsoon and summer paddy production, based on farmer responses. Both yields and production costs were higher for summer rice than for monsoon rice in irrigated areas of Mandalay and Sagaing Divisions. As a result of the lower price of rice and the higher price of fertilizer in 2008, the profitability levels were lower than the previous year and in some areas a negative figure was recorded (Table 22). This finding suggests that producers in the rainy season suffered a loss when producing paddy, due to the distorted prices of the rice market within the country.

Table 22. Myanmar: Unit production cost and net profit of rice production in Mandalay and Sagaing divisions

Item		Actual	2007	2008
Rainy season rice production in Mandalay Division				
Total cost of cultivation	Ks/acre	217 300	195 928	238 050
Break-even price of paddy	Ks/Bskt	2 716.75	2 449.1	2 975.63
Farm-gate price of paddy	Ks/Bskt	2 700	3 500	2 700
Net benefit for one basket	Ks/Bskt	-16.25	1 050.9	-275.6
Per kg net benefit	Ks/kg	-0.77	50.04	-13.13
Summer rice production in Sagaing Division				
Total cost of cultivation	Ks/acre	166 500	162 365	188 345
Break-even price of paddy	Ks/Bskt	2 006.02	1 956.20	2 269.22
Farm-gate price of paddy	Ks/Bskt	3 000	3 500	3 000
Net benefit for one basket	Ks/Bskt	993.98	1 543.80	730.78
Per kg net benefit	Ks/kg	47.79	74.22	35.13
Rainy season rice production in Sagaing Division				
Total cost of cultivation	Ks/acre	104 000	108 425	127 250
Break-even price of paddy	Ks/Bskt	1 223.53	1 275.59	1 497.06
Farm-gate price of paddy	Ks/Bskt	2 700	3 500	3 000
Net benefit for one basket	Ks/Bskt	1 476.47	2 224.41	1 502.94
Per kg net benefit	Ks/kg	70.98	106.94	72.26

Source: Mission's estimates.

Farm-gate prices and yields of rice did not differ much between the two harvests. However, due to the higher costs involved, summer rice had a higher break-even price level than monsoon rice and therefore obtained lower benefit margins.

This reduced profitability would shift farming towards a lower intensification of production. The consequence is likely to impact not only the overall level of production (quantitatively), but also impact negatively on the employment rate in rural areas, and export earnings.

5. HOUSEHOLD VULNERABILITY TO FOOD INSECURITY AND NUTRITION STATUS

5.1 Household vulnerability to food insecurity

The Mission used the following methods to gather information during visits to 11 states/divisions: field observations; household interviews (over 80); key informant questionnaires (23); community focus groups (15); and review of secondary sources.

Ten states/divisions were selected based on poverty, malnutrition, food insecurity, production and land distribution indicators. Townships were purposely selected considering time and logistical constraints. The townships chosen were plotted along a travel route and were accessible by boat, or less then 4 miles from a road. Up to four villages were selected in each township, so that a fair opinion on food availability, food access and food utilization and nutrition could be collected. Food security indicators were collected from 82 households, specifically including landless labourers, farmers and fisher folk. In several villages in Rakhine State, the most vulnerable households were selected for interview.

5.1.1 Vulnerability at Myanmar level

In a normal year, Myanmar produces enough food to supply its people and export to external markets. However, net outputs are not an accurate indicator of household vulnerability to food insecurity. Poor infrastructure and restrictive market policies prevent the movement of food commodities from some surplus to some deficit regions. As a result, food security and nutrition situations at household level vary considerably between and within states/divisions, and within villages. These variations are the manifestation of complex relationships between diverse cultures, livelihoods, agriculture potential, and policies governing markets and trade.

In Myanmar, household food insecurity is primarily due to differences in the ability of households to access sufficient food throughout the year. The two principle mechanisms used to access food are own-production and/or market purchases. Constraints that affect a household's ability to feed itself from its own production include inadequate access to: land, credit for purchase of agricultural inputs, and post-harvest storage facilities. Households relying on market purchases to access food are dependent upon income sources, the existence of markets, and the efficiency with which markets function to deliver food at affordable prices. The Mission observed both chronic and acute lack of access to food resulting from poorly functioning markets; poor transportation infrastructure; and inadequate demand for skilled or unskilled labour.

According to the Integrated Household Living Conditions Survey (IHLCS) (UNDP, 2007), 10 percent of Myanmar's population are below the official Food Poverty Line. However, there are important differences between states/divisions, with a very high poverty level in Chin State (40 percent) and a high poverty level in northern Shan State (21 percent) and eastern Shan State (20 percent). The headcount index of food poverty is generally higher in states than divisions and higher in rural than urban areas (Table 23).

Table 23. Myanmar: Food poverty headcount index (percent of population)

State/Division	All	Rural	Urban
Chin	40	49	5
Shan North	21	22	16
Shan East	20	23	8
Kachin	14	17	9
Kayah	13	17	5
Shan South	13	14	8
Magwe	13	14	7
Rakhine	12	13	7
Mandalay	11	13	6
Tanintharyari	11	12	9
Ayeyarwaddy	10	10	9
Sagaing	8	8	4
Bago West	7	7	5
Bago East	6	5	12
Mon	5	5	8
Yangon	4	4	4
Kayin	2	2	0

Source: IHLCS 2007.

The percentage of expenditure on food items as a percentage of total household expenditures is a widely used indicator to measure household access to food. According to the IHLCS (2007), 69 percent of all household expenditures, including health, are spent on food nationally which is very high. In all states/divisions the percentage exceeds 60 percent, which indicates the broad scope of household vulnerability to food insecurity. Although average consumption expenditures of non-poor households are nearly twice that of poor households, the percentage spent on food is also high, indicating that vulnerability to food insecurity is not limited to the poor in Myanmar. The average cost of a monthly food basket at the poverty line[2/] is approximately MMK 118 492 (USD 99 at the unofficial exchange rate[3/]). The average total household expenditure, including health-related expenses, is MMK 232 504 (USD 194) per month nationwide, MMK 212 093 (USD 177) per month in rural areas, and MMK 289 355 (USD 241) per month in urban areas.

Table 24. Myanmar: Share of food expenditures in overall consumption (including health expenditures)

State/Division	All	Rural	Urban
Bago West	76	76	71
Chin	75	79	66
Sagaing	75	77	68
Kayin	75	76	71
Magwe	75	76	67
Shan North	74	76	69
Mon	72	72	71
Shan East	72	74	66
Kayah	71	72	69
Mandalay	71	74	65
Bago East	70	71	67
Rakhine	68	69	66
Ayerawady	68	69	64
Shan South	66	69	59
Tanintharyi	65	67	61
Kachin	65	68	58
Yangon	62	74	60

Source: IHLCS 2007.

[2/] Food Poverty Line - Proportion of the population whose income is lower than the cost of local food basket providing the Minimum Dietary Requirement. UNDP estimates 10 percent of the population is living below the food poverty line in the Union. Chin State (40 percent), north Shan State (20 percent) and south Shan State (21 percent) are the lowest.

[3/] The unofficial exchange rate is USD = MMK 1 250.

5.1.2 Vulnerability at state/division level - acute and chronic

Acute food insecurity

Ayeyarwady Division, Delta areas: Post-Cyclone Nargis relief efforts in the Delta are operating on a smaller scale than earlier in 2008, but are still providing food to affected populations. Mission members observed that many households are not earning a living by their pre-Cyclone Nargis livelihoods because they could not access the capital required to acquire productive assets lost during the storm. Households reported that they would no longer require food assistance if they could replace the productive assets needed to recover their livelihoods. Small-scale farmers in areas severely affected by Cyclone Nargis suffered from reduced production during the 2008 season and expressed concern about the availability of good seeds for the next planting season. Reduced employment opportunities from agriculture and fishing are likely to limit the income of landless labourers until April 2009.

Chin State: Chin State is the poorest state of Myanmar and is not self-sufficient in rice production; most of its population is chronically food insecure. In all 15 households interviewed in Chin state, food consumption was found to be either poor or borderline, worse than any other region visited by the Mission. The diet consists mainly of cereals and vegetables. The Mission noted the absence of a transportation infrastructure, poor hygiene conditions, lack of potable water supplies, lack of improved sanitation, and heard reports of deaths from preventable diseases such as diarrhoea.

Mission observations are supported by findings of the IHLCS (UNDP, 2007). Chin had the highest percentage of expenditure on food as a proportion of total household expenditure (UNDP 2007). The traditional shifting cultivation practices are no longer sufficient to feed the population. As a result of population pressures, the field rotation cycle becomes too short (5-7 years instead of 8-10 years) to allow soil fertility to recover. As a result, agricultural productivity is in steady decline.

Triggered by the flowering of the bamboo, a rat infestation started gradually since the beginning of 2007, which destroyed large parts of the 2008 harvest, leading to acute food insecurity in many villages, exacerbating an already food insecure situation. In affected villages visited by the Mission, nearly all households reported losing that year's harvest[4/]. A Rapid Food Need Assessment report conducted by WFP in response to the rat infestation found increased emigration and unsustainable coping mechanisms (sale of livestock, days without eating). The situation will remain critical until July 2009 and households without alternative income sources (female, single-headed or the elderly) are especially vulnerable.

Northern Rakhine State: Although not visited by Mission members, reliable reports indicate a food insecurity and malnutrition situation deserving immediate humanitarian attention. According to a recent study, 25 percent of the population may be suffering from global acute malnutrition. Less than 60 percent of boys and less than 50 percent of girls were considered "normal" as measured by Mid-Upper Arm Circumference (MUAC) being greater than 13.5 cm. These reports urgently need to be confirmed by a nutrition survey measuring weight, height, and age.

A WFP assessment undertaken in June 2008 in northern Rakhine State found that fewer than 30 percent of households meet their food requirements through their "own production," instead relying on markets to access their food. The study noted that the cost of rice increased 75 percent compared to the previous year. Households were found to be reducing the number of meals consumed, the average number of meals declined from 2.8 to 2.0 over the year prior to the assessment.

More than 51 percent of the population drinks water from an unprotected source, this percentage even reaches 80 percent in some areas. The lack of access to potable water, sanitation, and healthcare facilities is compounded by crowded living situations. Diarrhea, tuberculosis, and acute respiratory infections have been reported at levels warranting further investigation and urgent intervention, if confirmed.

Chronic food insecurity

Rakhine State: The Mission observed poorly maintained roads and bridges, factors that negatively impact food commodity transport. Local authorities informed of policies that had the effect of restricting transportation of food commodities, constraining movement of products from farm to potential markets. As a result, market access is poor, even if macro-level agricultural output is high.

[4/] Approximately 90 percent of households lost nearly 90 percent of their crop, the remaining lost roughly 50 percent.

The Mission noted a lack of clean drinking water sources and improved methods of sanitation disposal during household visits. These observations are consistent with results of the IHLCS, 2007. Approximately 12 percent of the population in Rakhine State is below the poverty level, and there is a 0.35 economic dependency ratio (UNDP 2007).

Kachin State: The Mission observed chronic vulnerability to food insecurity in the mountain areas. In flatland areas, families appeared to be able to access food year-round. The observations were consistent with the recent WFP Food Security Assessment, which covered three areas of Kachin: Special Region 1 (SR1) administered by the New Democratic Army for Kachin (NDAK); Special Region 2 (SR2) administered by the Kachin Independency Organization (KIO); and the Tanai area under Government control. The October 2008 study found that more than 90 percent of households in SR1 and SR2 and 75 percent of households in Tanai were food insecure[5/].

The Mission noted insufficient transportation infrastructure, lack of income opportunities, and a lack of access to healthcare facilities and schools. All these indicators of food insecurity are consistent with the results of the IHLCS, 2007 survey. This is exacerbated by an underperforming market system that constrains household access to commodities needed for a balanced diet.

Northern Shan State: Socio-political dynamics complicate efforts to summarize the food security situation at household level. There is political instability resulting from rival ethnic groups, recent wars, and efforts to eradicate poppy cultivation. This volatility is a threat to personal safety as well as household food security. The Mission found that households living in the mountain areas are more vulnerable to food and nutrition insecurity than those living in lowland areas. A recent WFP survey conducted in the Wa region (in publication), reports a large proportion of households frequently using extreme coping mechanisms in response to food insecurity. The same survey found household dietary diversity to be poor. The Mission also observed indicators of inadequate food utilization. Considering the unpredictable political situation and preliminary research suggesting high levels of malnutrition and improved access, further study is needed in this area.

Magwe Division: The Mission observed generally food secure households during its visit to Magwe Division. There is a more diversified job market, with an airport and growing oil business that generate non-agricultural revenue. In part of the Dry Zone area, there is greater diversity in the crops (millet, maize, sunflowers, chili, onions, and potatoes). While household access to food was adequate, the Mission observed signs of poverty and vulnerable populations. Small-scale farmers and landless labourers reported facing difficulty during parts of the year. The joint WFP/FAO/FIVIMS survey (2007) found that the number of Dry Zone small-scale farmers (those working less than 1 acre) had increased and the average size of land declined to 0.49 acre per household. A recent WFP study in the Dry Zone found that 60 percent of households interviewed were landless[6/].

Mandalay Division: The Mission observed generally food secure households during its visit to this Division. Mandalay is the second largest city in Myanmar and serves as a commercial centre for the country. Socio-economic indicators are as good as anywhere in the country. In areas surrounding the tourist destination of Bagan, improved transportation infrastructure and more diverse non-agricultural livelihood opportunities were observed. In those agricultural areas visited by the Mission, the general impression was one of relative food security. However, some small-scale farmers reported facing high transportation costs. Even in more remote areas, most households reported having enough food to eat. However, small-scale farmers and landless labourers reported problems finding jobs year-round and consequently experience problems with access to food at certain times of the year. The Mission observed functioning potable water supply and improved sanitation infrastructure, visible indicators of improved utilization.

Sagaing Division: Centrally located and a surplus rice producer, Sagaing Division is a hub for agricultural production, trade and transport. Within the division, household access to a balanced, diversified diet is steady, most children attend school, and the Mission noticed few visible signs of malnutrition. In the areas visited, household access to food was not observed to be a problem, as the villages were close to a road and farmed irrigated land. However, observed utilization practices lead the team to believe that in more remote areas, further from roads, healthcare facilities, and markets, higher levels of food and nutrition insecurity are possible.

[5/] Based on the HFIAS (FANTA), which classifies households more easily as “food insecure” compared to other indicators.
[6/] WFP survey in the Dry Zone (2008, in publication).

East Bago and West Bago Division: Bago East and Bago West benefit from proximity to Yangon City and its relatively developed market. There appeared to be adequate supply, and improved transportation infrastructure facilitated access to markets. Bago East and West have the highest percentage of landless farmers, after Yangon Division (UNDP, 2007). The average size of land per agricultural household is 6.9 acres (Bago East) and 4.9 acres (Bago West). However, in Bago West only 13.2 percent of the population has access to electricity.

Yangon Division: In rural areas, Yangon Division appears to be the most food secure of areas visited by the Mission. There is adequate supply, functioning transportation systems, and diverse opportunities to generate income. Areas of Yangon Division affected by Cyclone Nargis are recovering faster than those in Ayeyarwady Division. This Mission did not examine urban food insecurity, an area that is potentially problematic.

5.2 Vulnerability: Livelihoods, consumption patterns, and coping strategies and categories of food insecure households

Livelihoods

Landless and casual labourers are dependent on the demand for labour, local wage rates and market performance to earn money, factors that are highly volatile. States/divisions with higher proportions of landless labourers are Bago Division East (49 percent), Bago Division West (45 percent), Ayeyarwaddy Division (32 percent) and Rakhine State (30 percent)[7/]. The nationwide unemployment rate is estimated at approximately 2 percent (UNDP, 2007).

UNDP estimates (2007) that one quarter of the population are casual laborers. More than half of poor households work in the agricultural sector. Informal and daily employment opportunities are seasonal and vary between and within states/divisions. Most households interviewed by the Mission reported that work is not available throughout the year and that employment patterns vary according to geographical location. In Kyaiklat, Ayeyarwaday Division, the current wage for women is approximately MKK 800/day, while for men it is MKK 1 000/day. In Labutta Township, Ayeyarwaday Division, wages are higher at MKK 1 600/day for women and MKK 1 800/day for men. In Chin State, the average wage is MKK 1 500/day.

Table 25. Myanmar: Unemployment rate of population 15 years and over in a six month period during 2007 (percent)

State/Division	All	Rural	Urban
Rakhine	5.7	4.5	9.6
Yangong	5.0	0.8	6.5
Chin	3.1	2.7	4.7
Mon	2.2	2.2	2.4
Bago East	1.8	1.4	4.1
Sagaing	1.8	1.8	1.9
Kachin	1.5	1.5	1.5
Shan East	1.4	0.9	3.2
Mandalay	1.4	0.9	2.8
Tanintharyi	1.3	1.1	2.2
Ayeyarwaddy	1.1	0.9	1.8
Shan North	1.1	0.6	3.1
Magwe	1.0	0.9	1.9
Shan South	1.0	0.2	3.8
Bago West	0.9	0.6	3.0
Kayin	0.9	0.6	3.4
Kayah	0.0	0.0	0.0

Source: IHLCS 2007.

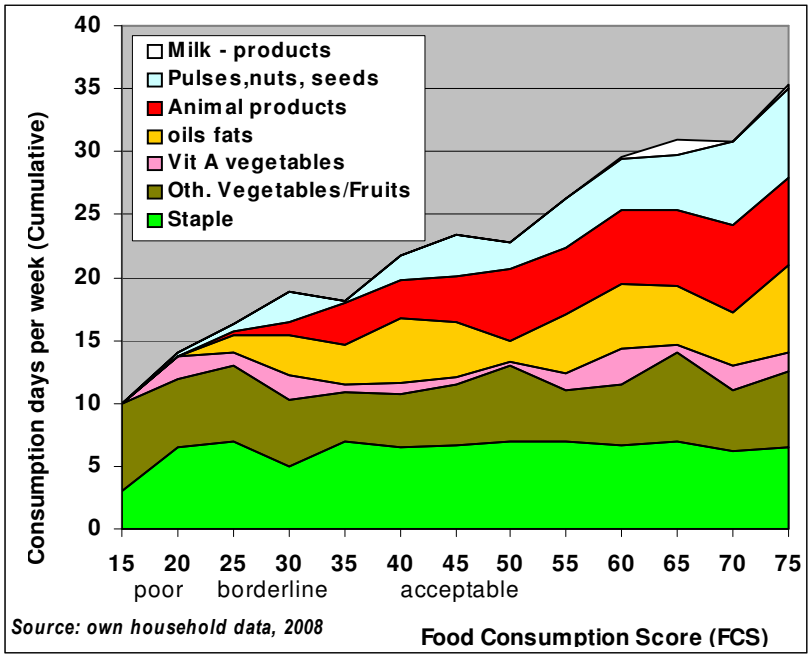
Consumption patterns

Households interviewed by the Mission members were asked about their dietary diversity and frequency, and the responses were evaluated using a Food Consumption Score. Households reported consuming rice seven days a week in almost every region visited. In mountainous areas, consumption of maize is of equal

7/ UNDP, 2007.

importance to rice. Various vegetables are frequently consumed, except in Yangon district. Fish consumption among interviewed households from coastal areas such as Ayeyarwady and Yangon Divisions is very important, the same was observed among households along the west coast of Rakhine State, causing the diet of most households in these states/divisions to be acceptable. The 1999 HIES found these same states to be the highest consumers of fish products (between 0.67 to 1.01 kg/person/month) and crustaceans (between 1.36 and 1.55 kg/person month), double that of most other states. The exception is Chin State where almost no fish or crustaceans are consumed. Nationwide, the monthly consumption of fish and crustaceans (1.35 kg) is much more important than the consumption of meat (0.35 kg). Consumption of pulses is most important in Sagaing Division, where they are consumed on an almost daily basis. On average, households reported consumption of three meals per day. The Mission visited Myanmar at the end of the lean season. During the seasons of relative abundance, it can be expected that more households would have acceptable food consumption.

Figure 4. Food consumption classification of households interviewed



Households were asked about their daily consumption over the preceding week from which the food consumption score[8/] was calculated - a proxy indicator for quantity and quality of the household diet. A low score (21 or below) signifies that households had poor food consumption during the preceding seven days, a slightly higher score (35 or below) indicates a borderline food consumption, and a score above 35 shows that households have an acceptable diet.

As seen in Figure 4, most households interviewed consume cereals and vegetables on an almost daily basis, even those with poor food consumption, representing about 20 percent. For households with borderline consumption (about 15 percent) oil is added and some pulses or animal products. The more balanced diets (above 70 percent) include more animal products (especially fish) and, gradually, also pulses. In most areas, fish was the primary animal protein source, fortifying diets that would otherwise be very poor. Some consumption of milk is only observed among households with the highest food consumption score.

According to FAOSTAT, food consumption was 2 912 Kcal/capita/day in 2003. The main staple food is rice (537 g/capita/day) which accounts for 66 percent of energy consumption (1,920 Kcal). The consumption of roots and tubers contributes a negligible amount to the average diet (1 percent of energy). Pulses (15 percent) and oil crops (5 percent) are important sources of protein. Fish (6 percent) is a more important source of protein than meat (4 percent). Most oil and fat (80 percent) comes from vegetable products. Because of its importance, rice is a key food item to monitor. As its price changes, one can predict the impact on household food security.

[8/] See WFP website http://vam.wfp.org/MATERIAL/FCS_Guidance for calculation method of the FCS and thresholds for categorization.

Coping strategies

Harsh, covariate shocks such as Cyclone Nargis, a spike in rat populations in Chin State, and sudden changes in export policies had severe negative impacts on food consumption at the household level. Community-level informal safety nets can mitigate food security caused by idiosyncratic shocks, such as family death or illness, but are overwhelmed by covariate shocks on the scale of Cyclone Nargis and the rat infestation in Chin State.

Households interviewed by the Mission were asked about strategies they had employed to cope with food insecurity. The Mission discriminated between coping strategies that threatened lives or livelihoods and those that did not. Severe coping mechanisms such as selling productive assets, skipping meals, and not eating for an entire day were uncommon. Less severe, sustainable coping mechanisms that were reported include:

- Shifting consumption from high- to low-quality rice.
- Selling of non-productive animals when encountering financial difficulty.
- Temporary migration of some household members to source work elsewhere in the country.
- Emigration to Malaysia and Thailand to work as illegal day labourers.
- Taking an advance, in the form of food, cash, or a combination of the two. Payback often comes in the form of labour to be performed during the next cropping season.
- Borrowing (interest rates vary) - some farmers and labourers are unable to repay the debt and must borrow from a different lender to pay the first loan, establishing a debt cycle.

Sometimes the livelihoods strategy of the household adjusts to deal with a new situation:

- More intensive use of organic fertilizer.
- In the delta, displaced fishermen who lost their boats shifted to small-scale fishing or crabbing as an income generating activity.
- In northern Shan State, farmers cultivate rice varieties preferred in China, sell the harvest across the border, and purchase cheaper, local varieties for consumption.

Categories of food insecure households

Landless labourers are more vulnerable than those with land, in every state or division visited by the Mission. Agricultural or casual landless labourers form an important part of the rural population: 25 percent (UNDP, 2007) of the rural population is landless. Some may have indirect access to land, but have to pay a fee or share the harvest. Dependent upon markets to access food, they are vulnerable to price increases of staple food. Among households interviewed, food consumption scores and other food security indicators were generally worse for the landless, than the farmers with land.

Small-scale farmers are vulnerable due to limited production potential; their status as net buyers makes them vulnerable to changes in market prices. Small-scale livestock, alternative income sources and fertile land conditions enhances food security.

Marginal livelihoods are households living from forest scavenging, cutting wood who may depend on local safety nets. They were encountered in the Delta and Chin and Kachin States. They are often households headed by women, widows, or handicapped people. This group is the worst-off and chronically food insecure.

Female-headed households are more often food insecure. Among households interviewed during the Mission, 11 percent were headed by women and these households were more likely to have a poor food consumption pattern or to apply severe coping strategies in response to food insecurity. Female-headed households are often single-headed and lack the possibility of alternative income generating activities, such as out-migration for work, because the single mother has to take care of the children.

Education levels in the household seem to be another important factor defining the vulnerability of a household, as understood from the focus group discussions. Most food insecure households lack sufficient education.

5.3 Nutritional status of vulnerable populations

At 34.4 percent, representing 16 million children, the nationwide prevalence of moderately underweight children is high (UNDP, 2007). There are important differences in prevalence of moderately underweight

children between states/divisions. Nine states/divisions have a prevalence rate of 30 percent or greater and all have a rate higher than 20 percent. The situation is particularly alarming in northern Rakhine State, where 60.5 percent of children under five years of age are moderately underweight (58.5 percent in rural areas and 80.2 percent in urban areas) and 27 percent are severely underweight.

Table 26. Myanmar: Prevalence of underweight children under five years of age (percent)

State/ Division	Moderately underweight			Severely underweight		
	All	Rural	Urban	All	Rural	Urban
Rakhine	61	59	80	27	25	41
Magwe	42	43	41	10	10	8
Ayeyarwady	36	36	38	10	10	10
Mon	35	34	39	10	10	14
Shan South	34	36	23	10	11	3
Mandalay	33	34	30	9	10	7
Bago East	32	31	34	10	10	11
Chin	32	31	38	5	4	7
Kayin	30	30	32	6	5	9
Tanintharyi	29	32	17	7	8	3
Sagaing	29	28	38	6	6	10
Kachin	28	29	24	9	9	8
Yangon	27	31	26	5	4	5
Shan North	27	27	27	5	5	10
Shan East	25	26	23	7	6	10
Bago West	24	23	37	6	6	10
Kayah	21	21	22	4	2	8

Source: IHLCS 2007, tables 2.63 and 2.64.

Access to potable water and improved sanitation

Within Myanmar, 78 percent of the population have access to safe drinking water, but there is a large disparity between urban and rural areas. In urban areas, 92 percent of residents have access to clean drinking water; in rural areas, 74 percent of the population have access to clean drinking water. In some remote areas, access to safe drinking water is as low as 40 percent (UNDP, 2007) (Table 26).

Table 27. Myanmar: Proportion of population with access to safe drinking water (percent)

State/Division	All	Rural	Urban
Kayah	88.5	83.5	97.0
Mon	86.6	84.7	94.7
Yangon	86.1	63.8	97.4
Kachin	83.9	79.0	97.2
Chin	77.0	74.9	84.7
Shan East	75.8	71.5	94.9
Mandalay	75.5	68.7	96.3
Shan North	74.4	69.3	94.3
Bago East	73.1	69.2	93.7
Sagaing	59.9	57.8	74.5
Magwe	56.8	53.7	94.1
Bago West	55.8	53.4	82.7
Kayin	55.4	53.1	70.7
Tanintharyi	53.5	49.2	79.4
Shan South	52.8	46.3	78.4
Rakhine	41.4	33.9	71.7
Ayeyarwady	36.1	30.1	76.4

Source: IHLCS 2007.

At the country level, 67.3 percent of Myanmar households have access to improved sanitation. This proportion is higher in urban (75.6 percent) than rural (64.4 percent) areas. Unsafe disposal of human waste often correlates with higher levels of diarrhoea and other communicable diseases that pose a particular threat to children and the elderly. Field observations recorded pit latrines and improved pit latrines as the primary methods of waste disposal, with a concentration of safer methods in urban areas.

Table 28. Myanmar: Proportion of population with access to improved sanitation (percent)

State/Division	All	Rural	Urban
Kachin	80.1	82.1	75.2
Kayah	79.0	78.7	79.6
Mon	79.0	77.5	85.4
Yangon	76.2	74.4	76.8
Ayeyarwady	74.8	73.8	79.3
Bago East	72.3	70.4	81.8
Sagaing	72.2	71.8	74.9
Mandalay	72.0	71.5	73.1
Shan South	68.4	67.1	72.6
Chin	66.3	63.5	76.3
Kayin	65.9	63.8	79.3
Shan North	59.9	55.8	74.8
Shan East	57.6	50.2	83.3
Magwe	56.0	53.9	75.2
Bago West	55.6	52.5	79.7
Tanintharyi	53.4	49.8	67.1
Rakhine	35.8	29.3	61.4

Source: IHLCS 2007.

Care practices

The most recent UNICEF Multiple Indicator Cluster Survey found that the percentage of children below four months, that are exclusively breastfed, was 14 percent in rural areas and 18 percent in urban areas (UNICEF 2003). Fewer than 60 percent of households use sufficiently iodized salt, a key component for brain development in children (UNICEF, 2003). Mission members observed that care practices depend largely on levels of education, understanding of nutrition practices, and household livelihood conditions. In some villages in Chin State, Rakhine State, and parts of the Delta, the Mission observed poor hygiene practices at household level, particularly where no village school or healthcare facility existed. In these same villages, reports of diarrhoea outbreaks and malaria were more common.

5.4 Estimates of population in need, emergency food assistance requirements and current food security interventions

Populations in need

The following are some of the issues in need of immediate attention:

- In areas of Ayeyarwady and Yangon Divisions severely affected by Cyclone Nargis, casual labourers are vulnerable due to the lack of employment opportunities. Fishermen and small-scale farmers in the Delta area will remain vulnerable until they can recover productive assets lost during the cyclone.
- People in Rohingya in northern Rakhine State, are highly vulnerable due to restricted mobility, inadequate access to land, and lack of casual labour opportunities.
- The population of Chin State is vulnerable due to the rat infestation and a general decline in agricultural productivity, shortage of employment opportunities, low-levels of education, poor water, poor sanitation and lack of road infrastructure.
- There are more than 5 million people below the food poverty line in Myanmar.

Emergency food assistance requirements

A total of 292 549 metric tonnes of emergency food assistance are needed in 2009 to provide each food insecure person with 40 kg of food assistance to sustain them during the two-month lean season. The food insecure of Ayerawaddy Division and Chin state require a longer period of food assistance, estimated at five and one-half months. As a surplus of food is anticipated for 2008/09, it is anticipated that most of the food commodities can be procured locally, with only a limited requirement for imported food aid.

States/divisions which the Mission found to be a priority for food assistance are: Cyclone-affected areas of Ayeyarwady Division (84 896 tonnes); Chin State (23 007 tonnes), particularly those areas affected by the rat infestation; Rakhine State (14 998 tonnes), particularly northern Rakhine State; Kachin State (8 307 tonnes); north Shan State (20 184 tonnes); east Shan State (6 972 tonnes) and Magwe Division (27 531 tonnes). To calculate the number of persons in need of food assistance, the estimated population of each state/division

was multiplied by the percentage of population below the food poverty line as reported by the IHLCS. To estimate the per capita food assistance requirement, the Mission used 235 kg of cereals per person per year as its estimate of food consumption, which is equivalent to 20 kg/person/month. The lean season lasts two months from October to November, during which households are most vulnerable to food insecurity.

Current food security interventions

Prior to Cyclone Nargis, WFP was the lead agency assisting potentially food insecure populations in the area. It is estimated that WFP distributed 23 331 tonnes of food aid to 1.23 million beneficiaries in 2007 and approximately 2.8 million beneficiaries with 11 539 tonnes in 2008. Table 8 illustrates different programmes, number of beneficiaries and quantities of food distributed. WFP currently works in northern and southern Shan State, northern Rakhine State, and Kachin State. It also provides food assistance in Magwe Division in the Central Dry Zone, and Chin State.

Table 29. Myanmar: Emergency food assistance requirements

State/ Division	Population estimate	Below food poverty line (Headcount Index)	Below food poverty line (population)	Food requirement per year (kg)	Food requirement per month (kg)	Months	Food requirement (tonnes)	Food requirement priority (tonnes)
Chin	534 000	40	213 600	235	20	5.5	23 007	23 007
Shan North	2 454 000	21	515 340	235	20	2	20 184	20 184
Shan East	890 000	20	178 000	235	20	2	6 972	6 972
Kachin	1 515 000	14	212 100	235	20	2	8 307	8 307
Kayah	337 000	13	43 810	235	20	2	1 716	
Magwe	5 407 000	13	702 910	235	20	2	27 531	12 939
Shan South	2 132 000	13	277 160	235	20	2	10 855	
Rakhine	3 191 000	12	382 920	235	20	2	14 998	14 998
Tanintharyi	1 637 000	11	180 070	235	20	2	7 053	
Mandalay	8 085 000	11	889 350	235	20	2	34 833	
Ayeyarwady	7 882 000	10	788 200	235	20	5.5	84 896	84 896
Sagaing	6 292 000	8	503 360	235	20	2	19 715	
Bago West	2 603 000	7	182 210	235	20	2	7 137	
Bago East	3 203 000	6	192 180	235	20	2	7 527	
Mon	3 007 000	5	150 350	235	20	2	5 889	
Yangon	6 743 000	4	269 720	235	20	2	10 564	
Kayin	1 745 000	2	34 900	235	20	2	1 367	
Total	**57 657 000**		**5 716 180**	**235**	**20**	**2**	**292 549**	**185 894**

Source: Mission's estimates.

Table 30. Myanmar: WFP activities since January 2008

Project/Activity	Rations (gm/person/day)	Beneficiaries	Food (tonnes)
PRRO 10066.3			
Food-for-Education	333/500	181 224	4 330
Food-for-Work	600	433 664	7 795
Protracted Relief	488	110 346	3 559
Food-for-Training	600	45 956	256
Mother and Child Nutrition (MCN) Support	305	20 040	841
TB/HIV Programme	488	10 119	1 070
Total		**801 349**	**17 852**
EMOP 10749.0			
General Food Distribution in the Delta	535	750 000	50 620
- of which:			
Supplementary Feeding	150	-78 000	301
General Food Distribution in Yangon	535	1 314 001	3 300
Total		**881 400**	**54 221**
PRRO 10066.3			
Food-for-Education	333/500	181 224	4 330
Food-for-Work	600	433 664	7 795
Protracted Relief	488	110 346	3 559
Food-for-Training	600	45 956	256

Source: WFP Country Office.

6. RECOMMENDATIONS

6.1 Recommendations on agricultural production and policies

Direct assistance (grant-in-kind) of inputs is more than necessary for the coming summer season and monsoon season 2009, to insure a return to profitable agriculture activities. Furthermore, setting-up adequate financial services and liberalized markets flows will be essential to sustain the growth of farm economy and provide an incentive for the intensification of agricultural production.

Needs on agricultural assistance for the 2009 summer and monsoon seasons

Facing increasing costs of fertilizers and other inputs (i.e. fuel) combined with a lack of adequate credit, while market prices fluctuate, farmers often cut-down on inputs and labour costs, increasing the share of family labour against paid labour, to maintain profit margins.

This is even more acute in the Delta area, where farmers have faced the negative impacts of Cyclone Nargis. In this region, humanitarian assistance has not restored the production capacity of small-medium farmers, most of them having invested the remaining capital they had accumulated from the former seasons, or contracted debt to cover their input needs for the 2008 cropping season. In addition, it has been assessed they will face a very mediocre harvest, that will not be sufficient to generate the required cash surplus to recover their investment capacity. Therefore, these farmers are likely to be unable to self-finance their needs for the coming cropping season (2009), thus entering into a spiral of pauperization that will negatively impact production in the Delta, and the employment of the landless population.

The recommendations to agricultural assistance in the Delta area are as follows: distribution of seeds for the coming summer and next monsoon planting seasons; distribution of draught animals adapted to Ayeyarwady climatic conditions; distribution of other livestock for more meat availability; distribution of hand tractors and training on their usage and maintenance; distribution of fishing gear; re-establishment of ice production plants; and training on boat-building, net-making and fishery laws.

Fertilizer and seeds

Soils were saturated before the cyclone, so the floods drained away within a few days and subsequent heavy rains washed out the remaining salinity. Therefore, salinity does not constitute a major issue for the coming cropping seasons in most areas. However, low-lying areas adjacent to saline, swampy soils still face difficulties with drainage. Reclamation will require long-term assistance.

Farmyard manure in the cyclone-affected areas was washed away by the floods and, given the losses of cattle and buffaloes, the availability of manure has significantly decreased. To address the fertilization needs that accompany HYV, farmers should use expensive chemical fertilizers. However, farmers tend to use limited quantities of fertilizers for economic reasons, as the assistance received under humanitarian aid was not sufficient to cover their entire needs.

Humanitarian assistance provided seeds of varying quality, which will not enable farmers to restore their initial stocks of quality seeds. Given the expected low yield and subsequent mediocre harvest, farmers are most likely to lack cash to buy high yielding and improved varieties of seed from the MAS or public sector suppliers. Between 75 and 85 percent of seed stocks from the cyclone-affected area were destroyed by flooding or subsequent wetting from rain.

The total requirement of seeds and fertilizers in the 2009 summer season for the Cyclone Nargis-affected townships is estimated as 21 437 tonnes of HYV paddy seeds, 4 647 tonnes of pulses seeds, 71 530 tonnes of Urea fertilizer, 30 228 tonnes of TSP fertilizer and 6 421 tonnes of Potash fertilizer (Appendix Table A6). The varieties needed for Cyclone Nargis-affected areas in monsoon season will be locally adapted local variety paddy seeds. The total requirement of seeds and fertilizers for 2008/09 monsoon paddy will be 82 526 tonnes of paddy seeds, 197 760 tonnes of Urea fertilizera, 98 880 tonnes of TSP fertilizer and 49 440 tonnes of muriate of potash fertilizer (Appendix Table A7).

Draught animals and other tools

The humanitarian response in the fisheries and aquaculture subsectors focused on the immediate restoration of at least partial, mainly subsistence fishing capacity. The replacement of key assets, such as draught animals has only to a small degree addressed the overall needs (e.g. replacement of around 4 percent of the lost draught animals[9/]), whereas almost all the lost power-tillers have been replaced. The lack of draught animals will remain a key issue and solutions have to be sought to re-stock the lost buffaloes in the lowest parts of the Delta where they are most adapted for land preparation, while mechanization is likely to address the needs for land preparation in the upper parts. The replacement of remaining lost key material assets, including farming tools, fishing gear, boats and processing equipment is ongoing and will likely take several more years to complete. Early- and medium-term recovery assistance would have to aim at the restoration of food security and livelihoods of farmers/fishers and landless labourers, and build on the initial interventions carried out during the emergency phase.

Buffaloes and cattle

The humanitarian response in the livestock subsector did not provide sufficient re-stocking of lost animals including poultry and small animals (i.e. pigs). In Ayeyarwady Division alone, 220 697 buffaloes and cattle (49 percent) were dead or lost after the disaster. As of 29 October 2008, only 3 859 buffaloes and cattle were distributed to affected families in Ayeyarwady and Yangon Divisions[10/] (1.7 percent of lost animals). In Ayeyarwady Division, 1 614 880 chicken and ducks (47 percent) and 67 724 (28 percent) were dead and lost after the cyclone struck the Delta. Exact data on the re-stocking of poultry and small animals are not available, but one can assume the needs are still significant for the landless households.

Agricultural policies

The Government of Myanmar has recognized the private sector's participation in agriculture and its vital role to the development of the country's economy. The Ministry of Commerce attaches great importance to the improvement of functional support services to the private sector and accordingly measures were taken to facilitate foreign trading and related procedures.

There has been increased use of distorted macroeconomic, trade and sectoral policies, which has resulted in huge losses to the tax payer and corruption, and may have negative long-term impacts on Myanmar's agriculture sector. To implement market-oriented agricultural trade it is necessary to; have strong policies that allow domestic prices to reflect world prices; redirect Government intervention programmes toward tackling market failures and providing sufficient public goods/services; create appropriate institutions that complement the market; remove regional (state/division) protectionism on agricultural produce, which will be the key to food security for consumers in food deficit areas and farmers in the food surplus regions of the country.

[9/] Total recovery aggregating Government, NGOs and UN agencies.
[10/] FAO-ERCU distributed animals.

6.2 Recommendations on food security interventions

Food security assessments

Delta Region: Although communities affected by Cyclone Nargis are gradually recovering, pockets of food insecurity remain throughout the Delta region. Assessment and monitoring of food security should continue to identify vulnerable households and determine appropriate assistance during the recovery phase.

Northern Rakhine State: There is an urgent need for a joint UNICEF/WFP food security and nutrition survey in northern Rakhine State, to quantify the level of malnutrition among inhabitants and to plan appropriate interventions.

Baseline studies

In states/divisions with substantial percentages of population living below the food poverty line, statistically valid baseline food security and vulnerability studies must be initiated. First priority are Chin and Rakhine States. Second priority are Kachin and Shan States (north, south and east). Tertiary priorities are Magwe Division and Bago Division (west) and states/divisions not visited by the CFSAM, such as Kayah State, Kayin State, Mon State and Thanintharyi Division. Therefore, a nationwide comprehensive food security and vulnerability analysis, representative at state/division level, is recommended.

Local procurement ('Purchase for Progress')

Opportunities for local purchase of food commodities from food surplus states/divisions need to be explored to reduce commodity costs, increase efficiency, and provide a market for small- and medium-scale farmers:

- Local purchases from Rakhine State to support programme activities in northern Rakhine State and areas of Chin State and Magwe Division;
- Local purchases from Sagaing Division to support programme activities in Chin State, Kachin State and Magwe Division; and
- In mountain areas, where maize is also a staple food, it should be included in the basket of commodities provided to beneficiaries, as well as rice.

Local purchases may also serve to stimulate market efficiency, assist in moving in-country food commodities, and thereby address one of the root causes of lack of access to food in Myanmar.

Food aid interventions

'Food-for-Education' activities can both encourage households to send their children to school and provide additional food for the household. 'Food-for-Education' activities need to be aimed at areas with both food insecurity and low attendance rates for primary and secondary schools.

'Food-for-Work' activities can create both community or household assets and provide additional food for the household. 'Food-for-Work' activities need to be aimed at areas with:

- Reduced access to markets, including areas with poor infrastructure;
- High unemployment and underemployment rates; and/or
- High temporary migration rates.

APPENDIX

Appendix Table A1. Myanmar: Agro-climatic zones

Name	Geographical description	Administrative units	Main agricultural practices
A. Bago, Kachin River-side Land	Upper Delta, Kachin plain, flat plain along the side of river Ayeyarwady and Sittaung, moderate rainfall (1000 - 2500 mm)	Ayeyarwady Division, Kachin State, Sagaing Division, Mandalay Division, and Bago Division	Rice, pulses, oilseeds, sugarcane, tobacco and Kaing/Kyun cultivation
B. Central Dry Zone	Central dry zone, rainfall less than 1000 mm, highest temperature in summer, flat plain, some areas with uneven topography	Magwe Division, Mandalay Division, and Sagaing Division	Upland crops, oilseeds, pulses, rice, cotton, irrigated agriculture and Kaing/ Kyun cultivation
C. Delta and Coastal Lowland	Delta, lowland and mouth of rivers in coastal area, heavy rainfall (more than 2500 mm)	Ayeyarwady Division, Yangon Division, Bago Division, Mon State, Kahyin State, Taninitharyi Division and Rakhine State	Rice, pulses, oilseeds and nipa palm
D. Kachin and Coastal Upland	Mountainous, slope land, heavy rainfall (more than 2500 mm)	Kachin State, Rakhine State, Tanintharyi Division, Mon State, Kayin State, Kayah State, Yangon Division, and Bago Division	Orchard, plantation crops, fruit trees and upland agriculture
E. North, East and West Hills	Hilly areas, uneven topography, moderate to heavy rainfall, slope land	Kachin State, Chin State, and Shan State	Upland crops, shifting cultivation and fruit trees
F. Upper, Lower Myanmar and Shan Plain	Plain, upper and lower parts outside of central dry zone, plateau	Sagaing Division, Kachin State, Shan State, Bago Division, Magwe Division, Mandalay Division, and Yangon Division	Upland crops, oilseeds, pulses, vegetable and wheat

Source: MAS.

Appendix Table A2. Myanmar: Areas of HYV, HQV and hybrids sown in monsoon paddy, 2007/08

State/ Division	HYV (ha)	HYV (%)	HQV (ha)	HQV (%)	Local (ha)	Local (%)	Hybrid (ha)	Hybrid (%)	Total (ha)
Kachin	21 784	9.6	139 881	61.8	63 939	28.3	608	0.3	226 212
Kayah	15 665	38.5	171	0.4	24 822	61.1	0	0.0	40 659
Kayin	150 950	72.1	2 934	1.4	55 367	26.5	15	0.0	209 266
Chin	21 594	39.3	62	0.1	33 329	60.6	0	0.0	54 985
Sagaing	529 512	70.7	180 144	24.0	39 424	5.3	0	0.0	749 080
Tanninthary i	74 934	41.7	2 785	1.5	101 962	56.7	37	0.0	179 717
Bago (east)	529 696	74.1	50 540	7.1	134 683	18.8	0	0.0	714 919
Bago (west)	367 095	72.8	105 451	20.9	31 565	6.3	0	0.0	504 111
Magwe	292 767	91.8	12 826	4.0	13 045	4.1	327	0.1	318 965
Mandalay	336 780	84.1	31 194	7.8	32 292	8.1	30	0.0	400 296
Mon	222 039	62.3	21 394	6.0	113 120	31.7	0	0.0	356 553
Rakhine	369 989	75.3	16 918	3.4	104 553	21.3	0	0.0	491 460
Yangon	292 942	60.0	43 123	8.8	152 061	31.1	33	0.0	488 159
Shan (south)	97 024	39.3	421	0.2	149 291	60.5	0	0.0	246 736
Shan (north)	27 776	14.6	8 266	4.3	94 576	49.7	59 602	31.3	190 220
Shan (east)	28 998	18.8	27 483	17.8	96 194	62.5	1316	0.9	153 989
Ayeyarway	783 077	52.3	265 296	17.7	449 612	30.0	0	0.0	1497 986
Myanmar	**4 162 623**	**61.0**	**908 889**	**13.3**	**1 689 835**	**24.8**	**61 967**	**0.9**	**6 823 314**

Source: MAS.

Appendix Table A3. Chin State: Rodent-affected paddy and maize areas in monsoon season, 2007/08

Township	Rodents affected		Sown areas (ha)		Affected upland rice		Affected maize	
	Village tracts	Villages	Upland rice	Maize	Ha	(%)	Ha	(%)
Teetain	1	2	3 327	8 768	82.15	2.47	30.55	0.35
Toonzan	0	0	1 297	1 985	0.00	0.00	0.00	0.00
Kyikha	4	10	1 290	604	66.92	5.19	43.57	7.21
Htantalan	7	12	7 664	3 986	165.12	2.15	0.00	0.00
Phalum	5	7	3 440	6 868	48.28	1.40	68.29	0.99
Yeed	0	0	644	416	0.00	0.00	0.00	0.00
Hakha	4	9	2 382	5 940	192.63	8.09	204.67	3.45
Phalum District Total	**21**	**40**	**20 044**	**28 566**	**555.10**	**2.77**	**347.09**	**1.22**
Kanpaclatt	1	4	2 539	2 186	0.00	0.00	52.61	2.41
Palatwa	25	77	11 515	0	129.50	1.12	0.00	0.00
Matupe	0	0	6 466	1 791	0.00	0.00	0.00	0.00
Yaezor	0	0	735	2 016	0.00	0.00	0.00	0.00
Minntutt	0	0	3 112	2 448	0.00	0.00	0.00	0.00
Minntutt District Total	**26**	**81**	**24 367**	**8 440**	**129.50**	**0.53**	**52.61**	**0.62**
Chin State Total	**47**	**121**	**44 412**	**37 006**	**684.60**	**1.54**	**399.70**	**1.08**

Source: MAS.

Appendix Table A4. Myanmar: Production of meat from livestock by state/division, 2002/03-2007/08 (tonnes)

State/Division	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08
Kachin	26 328	36 604	39 260	47 012	52 727	60 237
Kayah	7 216	9 239	9 889	11 964	13 424	14 939
Kayin	16 354	18 206	21 473	26 640	30 070	33 158
Chin	13 794	17 922	18 795	22 194	24 891	27 659
Sagaing	72 251	96 686	120 423	147 949	166 171	187 182
Tanintharyi	16 119	20 467	22 436	27 571	30 878	34 428
Bago	77 894	104 909	120 026	141 675	168 557	183 399
Magwe	55 125	68 459	89 264	103 958	132 767	146 552
Mandalay	57 894	58 602	82 224	101 913	115 277	127 040
Mon	19 816	23 825	26 495	32 034	37 267	41 716
Rakhine	24 691	33 352	36 713	45 938	51 012	56 725
Yangon	63 141	75 969	87 744	108 965	122 738	135 905
Shan	57 984	76 470	98 674	119 745	132 831	145 863
Ayeyarwady	81 487	116 358	133 453	166 282	184 446	208 060
Total	**590 095**	**757 068**	**906 869**	**1 103 842**	**1 263 056**	**1 402 862**

Source: Livestock Breeding and Veterinary Department.

Appendix Table A5. Myanmar: Production of fish by state/division, 2002/03-2007/08 (tonnes)

State/Division	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08
Kachin	8 511	14 335	14 859	19 171	20 052	22 220
Kayah	155	415	542	669	749	833
Kayin	3 976	7 660	8 168	9 409	10 511	11 649
Chin	121	534	645	746	828	921
Sagaing	29 682	43 234	52 811	56 944	68 769	77 432
Tanintharyi	556 150	608 751	671 900	769 881	843 789	925 624
Bago	81 249	161 669	181 154	213 899	235 722	264 328
Magwe	3 899	7 081	7 744	8 931	9 806	11 278
Mandalay	28 085	39 422	40 950	45 411	50 485	56 766
Mon	65 853	101 239	103 752	147 221	160 028	178 366
Rakhine	121 223	143 737	146 741	157 856	174 851	186 149
Yangon	108 994	191 739	210 919	244 276	259 208	269 432
Shan	3 301	4 395	4 945	5 631	6 503	6 420
Ayeyarwady	583 367	661 187	770 524	899 631	1018 563	1 156 678
Total	**1 594 565**	**1 985 398**	**2 215 656**	**2 579 675**	**2 859 864**	**3 168 095**

Source: Ministry of Livestock and Fisheries and Department of Fisheries.

Appendix Table A6. Myanmar: Summer and winter crop plan and seed requirements in Cyclone Nargis-affected areas, 2008/09

	Sown area (hectares)		Seeds requirement (tonnes)[2/]		Fertilizer requirement (tonnes)[3/]			
	Paddy	Pulses[1/]	Paddy	Pulses	Urea	T-super	Potash	Total fertilizer
Ayeyarwady	191 077	86 048	19 703	3 376	64 335	46 043	5 902	116 279
Ngaputaw	263	3 830	27	150	318	522	8	848
Laputta	8 325	36 057	858	1 414	4 799	5 079	257	10 135
Mawlamyinggun	36 058	32 102	3 718	1 259	13 121	6 671	1 114	20 905
Pyapon	25 427	3 925	2 622	154	8 096	2 392	785	11 274
Bogale	39 261	1 649	4 048	65	12 229	3 148	1 213	16 590
Kyaiklatt	48 033	6 659	4 953	261	15 248	4 425	1 484	21 156
Dedaye	33 710	1 826	3 476	72	10 525	2 754	1 041	14 320
Yangon	16 813	32 415	1 734	1 272	7 196	5 266	519	12 981
Kyauktan	83	32 054	9	1 257	2 006	3 966	3	5 975
Kawmu	8 094	158	835	6	2 510	627	250	3 386
Kungyangone	8 636	203	891	8	2 680	673	267	3 620
Total	**207 890**	**118 463**	**21 437**	**4 647**	**71 530**	**30 228**	**6 421**	**108 179**

Source: Mission's estimates.
(Units: fertilizer 1 bag=50 kg, paddy 1 basket= 46 lbs, pulses 1bsk =70lbs, 1 bag=50 kg; and a basket= 46 lbs).
1/ Including Mung Bean, Green Gram, Bocate, and Pelun.
2/ Seed requirements: 2 baskets/acre for paddy and 8 pyi/acre for pulses.
3/ Fertilizer requirement for paddy: Urea 2.5 bags/acre, t-super 1.5 bags/acre, potash 0.25 bags/acre; for pulses: Urea 0.5 bags/acre and t-super 1 bag/acre.

Appendix Table A7. Myanmar: Monsoon paddy planting area and input requirements in Cyclone Nargis-affected areas, 2009/10

	Sown area (ha)	Seeds requirement[1/] (tonnes)	Fertilizer requirement[2/] (tonnes)			
			Urea	TSP	Muriate of potash	Total fertilizer
Ayeyarwady	659 924	68 049	163 067	81 534	40 767	285 367
Ngaputaw	43 651	4 501	10 786	5 393	2 697	18 876
Laputta	185 653	19 144	45 875	22 937	11 469	80 281
Mawlamyinggun	90 193	9 300	22 287	11 143	5 572	39 002
Pyapon	86 536	8 923	21 383	10 692	5 346	37 420
Bogale	128 269	13 227	31 695	15 848	7 924	55 466
Kyaiklatt	55 957	5 770	13 827	6 913	3 457	24 197
Dedaye	73 712	7 601	18 214	9 107	4 554	31 875
Yangon	140 399	14 477	34 693	17 346	8 673	60 712
Kyauktan	45 403	4 682	11 219	5 610	2 805	19 633
Kawmu	35 720	3 683	8 827	4 413	2 207	15 447
Kungyangone	63 323	6 530	15 647	7 824	3 912	27 382
Total	**800 323**	**82 526**	**197 760**	**98 880**	**49 440**	**346 080**

Source: Mission's estimates based on 2008-09 annual plan.
1/ 2 baskets/acre.
2/ Urea 2 bags/acre, TSP 1 bag/acre, and Muriate of potash 0.5 bags/acre (1 basket of paddy = 46 lbs, 1 bag of fertilizer = 50 kg).