MYANMAR

AGRICULTURAL SECTOR REVIEW INVESTMENT STRATEGY

VOLUME 1 – SECTOR REVIEW

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Currency Equivalents

(as of 14 January 2004)

Official Rate

Currency	=	Kyat (MYK)
US$1.00	=	K 6.90
MYK1	=	US$0.145

Parallel Market Rate

MYK 1.00	=	US$0.00119
US$1.00	=	MYK 840

Fiscal Year

April 1 – March 31

Abbreviations

AAC	Annual Allowable Cut
ASC	Agriculture Supervision Committee
AED	Agricultural Extension Division
AHD	Animal Health and Development
AHDL	Animal Health and Development Law
AMD	Agriculture Mechanization Department
AMD	Agricultural Mechanization Division
APB	Agricultural Project Board
APCPC	Applied Research Centre for Perennial Crops
ASC	Agriculture Supervision Committee
BOBP-LME	Bay of Bengal Project - Large Marine Ecosystems
BQ	Anthrax and Blackquarter
CARI	Central Agricultural Research Institute
CARTC	Central Agriculture Research and Training Centre
CBM	Central Bank of Myanmar
CBO	Community Based Organization
CCE	Central Crop Exchange
CIRDAP	Centre for Integrated Rural Development for Asia and the Pacific
CRDI	Credit for Rural Development Institution
CSO	Central Statistical Office
DOC	Day-old chicks
DOF	Department of Fisheries
DRMO	Delta Region Microfinance Organization
DZMO	Dry Zone Micro-Finance Organization
EDA	EDA Rural Systems

EEZ	Economic Exclusion Zone
EIA	Environmental Impact Assessment
ESA	Essential Supplies Act
ESCAP	Economic and Social Commission for Asia and the Pacific
FIVIMS	Food Insecurity and Vulnerability Information and Mapping Systems
FMD	Foot and Mouth Disease
GDP	Gross Domestic Product
GOM	Government of Myanmar
GRET	Group de Recherche et d'Echanges Technologiques
HDI	Human Development Initiative
HIES	Household Integrated Economic Survey
HS	Haemorrhagic Septicaemia
ICDP	Integrated Community Development Project
ID	Irrigation Department
IFPRI	International Food Policy Research Institute
IPM	Integrated Pest Management
IRRI	International Rice Research Institute
LBVD	Livestock Breeding and Veterinary Department
LFMPE	Livestock Feedstuff and Milk Products Enterprise
LUD	Land Use Division
MADB	Myanmar Agricultural Development Bank
MAPT	Myanmar Agriculture and Farm Produce Training
MAS	Myanma Agriculture Service
masl	metres above sea level
MCSE	Myanma Cotton and Sericulture Enterprise
MDG	Millennium Development Goal
MEB	Myanma Economic Bank
MFE	Myanmar Farm Enterprise
MFI	Micro-Finance Institution
MFR	Ministry of Finance and Revenue
MFTB	Mianma Foreign Trade Bank
MICB	Myanma Investment and Commercial Bank
MIDB	Myanma Industrial Development Bank
MIS	Management Information System
MJI	Myanma Jute Industries
MLBF	Ministry of Livestock Breeding and Fisheries
MLFDB	Myanma Livestock and Fisheries Development Bank
MMCWA	Myanma Maternal and Child Welfare Association
MOAI	Ministry of Agriculture and Irrigation
MOF	Ministry of Forestry
MOGE	Myanma Oil and Gas Enterprise
MOI	Ministry of Industry
MP	Milk Powder
MPCE	Myanma Perennial Crops Enterprise
MPE	Myanma Petro-chemical Enterprises
MRTLC	Myanmar Rice Training Leading Committee
MRTSC	Myanmar Rice Trade Sub-Committee
MSE	Myanma Sugarcane Enterprise

MSY	Maximum Sustainable Yield
MTE	Myanmar Timber Enterprises
MWEA	Myanma Women's Entrepreneurship Association
NCD	Newcastle Disease
NGO	Non-Government Organisation
NPK	Nitrogen, Phosphate, Potassium
ODA	Official Development Assistance
PACT	Private Agencies Collaborating Together
PDC	Peace and Development Council
PPD	Plant Protection Division
RDC	Research and Disease Control
SAA	State Administrative Agency
SAI	State Agricultural Institutes
SAMB	State Agricultural Marketing Board
SD	Seed Division
SEE	State Economic Enterprise
SHY	Special High Yielding
SLRD	Settlement and Land Records Department
SPDC	State Peace and Development Council
T&V	Training and Visit
TAD	Transboundary Animal Disease
UMFCCI	Union of Myanmar Federation of Chambers of Commerce and Industry
UNDP	United Nations Development Programme
UNHCS	United Nations Centre for Human Settlements
VA	Veterinary Assistant
VCS	Village Credit System
VFRDC	Vegetable and Fruit Research and Development Centre
VICO	Village Credit Organization
VO	Veterinary Officer
VTAC	Village Tract Advisory Committee
WFP	World Food Programme
WRUD	Water Resources Utilization Department
WTRPP	Whole Township Rice Production Programme
YAU	Yezin Agricultural University

1. INTRODUCTION

1.1 International experience has led to a renewed focus on the agriculture sector as the engine for broad-based economic growth. Compared to any other sector within an economy, growth in agriculture productivity has been recognized to be pro-poor; having a direct role in raising real incomes of the rural poor, and thus reducing poverty. This implies that in a sector such as agriculture, which requires relatively high public investments, strategically formulated interventions and policies conducive to growth could significantly contribute to the overall poverty alleviation of a country. This is especially true in a country such as Myanmar where a major proportion of the population is still rural.

1.2 Myanmar has not received any significant official development assistance for nearly one and a half decades and there is now a serious investment gap in the rural economy. National investments in agriculture and its sub-sectors have been limited by a scarcity of domestic resources and have not always been based on solid feasibility work nor underpinned by necessary policy changes. The result has been low productivity growth and increasing rural poverty in many rural areas.

1.3 Many observers believe that within the next few years the international donor community is likely to resume investment in the country. The availability of a comprehensive overview of the agricultural sector which, in addition, provides investment strategies to accelerate pro-poor sector development, would be of considerable assistance to donors at that time, eliminating the need for major preliminary studies that would delay concrete investment. At the same time, GOM would benefit from the preparation of investment strategies and prioritization that would make better use of its own resources.

1.4 In recognition of these factors, and at the request of the Government of Myanmar (GOM), the United Nations Development Programme (UNDP) agreed to provide financing to permit a wide ranging review of the agricultural sector of the Union of Myanmar with the intention of determining sector potentials and future investment strategies which would significantly impact upon rural poverty. As part of this agreement, it was decided that the United Nations Food and Agriculture Organization (FAO) would undertake the actual study on behalf of UNDP and GOM.

1.5 The agricultural sector was defined as including livestock and fisheries, but not forestry. A total of 11 sub-sectors were the subject of detailed reviews using both international and national experts, including: (a) rural social structure and poverty; (b) community development and local institutions crop production; (c) crop production; (d) livestock production and products; (e) marine and inland fisheries; (f) irrigation and water resource management; (g) agro-industry; (h) agricultural research, extension and education; (i) agricultural marketing; (j) rural financial services; and (k) horticulture. In addition, supplementary studies were undertaken with respect to seeds and water resources.

1.6 The initial agricultural sector review was largely undertaken over the period August 2003 to January 2004, and an initial draft (delivered in November 2003) was considered in detail at a two day workshop conducted in Yangon on 9-10 January 2004, which included participants from a wide variety of Government, non-Government and private sector organizations, as well as

a number of international agencies. Due to the amount of material assembled, an accompanying CD-ROM has been produced which contains not only all printed materials (Volumes 1-4), but also additional material related especially to agro-industry and water resources not available in printed form.

1.7 In both Volume 1 and Volume 2, the individual sub-sector analyses have then been used to derive sector-wide conclusions. As agreed between UNDP and GOM, however, the bulk of the work undertaken by FAO staff and consultants has been technical in nature with, for example, no specialist input on macro-economic issues or national policies. This does not mean that wider policy or economic issues have been ignored, but rather that the focus has been on deriving policy and economic recommendations from an analysis of the needs of specific sub-sectors, rather than considering them from a national perspective.

1.8 As part of the agricultural sector review process, an enormous amount of Geographic Information System (GIS) data has been acquired by study participants and this information is being released concurrently with the overall study in the form of a self-loading CD-ROM with more than 200 GIS-based maps covering a wide range of cropping, livestock and land use data. In addition, as many potentials users of such data in Myanmar do not have ready access to computer facilities, it has been agreed with UNDP and GOM to issue the most important of these maps in the form of an Agricultural Atlas of Myanmar, which should be available shortly after finalisation of the sector review.

2. THE NATIONAL CONTEXT

A. THE NATURAL SETTING

2.1 The Union of Myanmar covers a total area of 678,500 km^2 (261,789m^2) and has lengthy borders with Bangladesh, India, the People's Republic of China, the Lao People's Democratic Republic, and Thailand (see Map). A coastline of 1,900 km extends along the Bay of Bengal and the Andaman Sea, bordering an estimated 500,000 ha of coastal mangrove swamp and an extensive delta region fed by the Ayeyarwady and Sittoung rivers, among others. A narrow coastal strip backed by mountains forms a southern extension of the country reaching as far as 10^oN, where there is an approach to equatorial conditions.

2.2 The centre of the country comprises extensive alluvial lowlands, bisected by forested hills reaching 1,000 m asl or more, which stretch more than 800 km northwards from the delta region, reaching approximately 25^oN. Known as the 'dry zone', this central region of the country is characterised by a semi-arid climate with a lengthy dry season and is enclosed to the North, East and West by highlands and mountains which reach as much as 6,000 m asl towards the Indo-Chinese border in the North.

2.3 These surrounding mountain and upland areas receive higher precipitation levels than the central lowlands and are still largely covered with teak and hardwood forest, although a major plateau region in the East of the country (Shan State) offers suitable conditions for agriculture, and has been more extensively cleared for that purpose.

B. HISTORICAL SETTING

2.4 The emergence of Myanmar as a single political entity dates back to the 11th Century, with the establishment of a powerful Burmese Buddhist kingdom in central Myanmar, which for the first time achieved dominance over such important ethnic groups as the Mon to the South and the Shan to the East. Although destroyed by the Mongols in the 13th Century, a new Burmese kingdom re-emerged in the 16th Century and transferred the national capital to Yangon in 1758, reflecting the increasing economic and demographic importance of the rice-growing delta area.

2.5 Increasing British intrusion into Burma led to a series of military conflicts during the 19th Century, resulting in the complete colonisation of the country by Britain in 1885. Under British rule a major expansion of rice cultivation took place, and by 1938/39 Burma was the world's largest exporter of rice, with shipments of 3.3 million tonnes[1]. Prior to the Second World War, the British separated Burma from India and provided for limited national legislative powers, but a desire for independence led key nationalist figures to initially support, and later oppose, the Japanese invasion of the country.

2.6 Full independence for the then Burma was achieved in 1948, with considerable autonomy granted to States representing major ethnic populations (Shan, Kachin, Kayin, Kayah, Chin and Mon). Mounting civil disturbances during the 1950s led to the military taking control of

[1] Economic Survey of Burma 1964, Ministry of National Planning. Table 69. Quoted by U Myint.

the country, first in 1958 and then again in 1962, ushering in a strongly socialist approach to national development.

2.7 During the socialist period, which lasted until the late 1980s, extensive controls were established with respect to agricultural and other forms of production, with centralised planners dictating the choice of crops, procurement prices, and the availability of inputs, among other factors. Export controls were introduced for many commodities and, even where trade was permitted, only state enterprises were generally authorised to enter export markets. State economic enterprises (SEEs) were created through nationalisation of existing enterprises and most industrial activity passed under state control.

2.8 In 1989 the country was renamed Myanmar, and the first steps were taken towards a market economy. Within the agricultural sector, the first crop group to be liberalized were the beans and pulses, resulting in a more than tripling of acreage between 1990 and 2001. Exports grew from nothing to nearly one million tonnes in 2002/03.

2.9 This gradual liberalization process has continued until the present, with the Government announcing the liberalization of rice markets, and an end to compulsory paddy procurement, in April 2003. However, other important sectors remain to be fully liberalized, including many areas of industry and telecommunications, as well as exchange rates.

C. THE NATIONAL ECONOMY

2.10 Accurately portraying national macroeconomic performance is made difficult by a number of factors[1] but, the Myanmar economy shows some significant differences from those of its neighbours in S.E. Asia. In contrast to the rest of the region, it is characterised by a continuing dominance of the agricultural sector, higher Gross Domestic Product (GDP) growth rates, lower Government revenues and expenditures, and high and increasing levels of inflation.

[1] The Asian Development Bank Outlook for 2003 states: "An objective assessment of economic development in Myanmar is made difficult by poor quality data. Often information is available only with a long lag, is incomplete and is difficult to reconcile. Furthermore, many indicators are based on application of outdated statistical techniques. The use of an official parity for the domestic currency (the kyat), which carries a vast premium over the market rate, to value public sector foreign exchange transactions, including those of the state economic enterprises (SEEs), creates further interpretive difficulties".

Comparative Macroeconomic Structure and Performance of Myanmar and other S.E. Asian Nations

Economic Indicator	Year	Myanmar	Cambodia	Laos	Thailand	Vietnam
Share of Agriculture in GDP (%)	1980	46.5	-	-	23.2	50.0
	1990	57.3	55.6	61.2	12.5	38.7
	2002	57.2	35.6	50.4	9.0	23.0
Share of Industry in GDP (%)	1980	12.7	-	-	28.7	23.1
	1990	10.5	11.2	14.5	37.2	22.7
	2002	10.5	28.0	24.7	42.5	38.5
Share of Government Expenditure in GDP (%)	2000	3.5	17.9	18.4	17.4	17.9
Growth in Overall GDP (%)	1997	5.7	8.2	6.9	-1.4	8.2
	1999	10.9	4.8	7.3	4.4	4.8
	2001	11.1	6.9	5.8	1.9	6.9
Inflation	1992	21.9	96.1	9.8	4.2	-
	2002	56.8	3.3	13.0	0.7	-
Source: Asian Development Bank Key Indicators, 2003						

2.11 The importance of agriculture to the Myanmar economy has increased in recent decades, from approximately 48% of GDP in the 1980s and 1990s to 56% in 2001/02. Industrial production, by contrast, declined to just over 10%.

Percentage Composition of Myanmar Gross Domestic Product (GDP) - 1980/81–2000/01

Category	1980/81	1990/91	2000/01	2001/02
Crop Production	39.4	38.7	33.6	48.0
Livestock and Fisheries	7.0	7.2	8.3	7.8
Forestry	1.5	1.9	0.9	0.6
Total Agricultural Sector	**47.9%**	**47.8%**	**42.8%**	**56.4%**
Energy/Mining	0.9	0.9	2.4	0.9
Power	0.3	0.7	1.1	0.3
Manufacturing	9.6	11.5	10.1	8.2
Construction	1.5	2.5	4.2	2.8
TOTAL GOODS	**60.2%**	**60.9%**	**60.5%**	**68.6%**
TOTAL SERVICES	**14.4%**	**16.5%**	**18.7%**	**7.8%**
TOTAL TRADE	**25.4%**	**16.5%**	**20.9%**	**23.7%**
Source: Myanmar Data 2001, Central Statistical Organization.				

2.12 Official figures for GDP growth in Myanmar in recent years have been relatively strong, after a period of relatively slow growth in the second half of the 1990s. Growth has exceeded 10% in each of the last three fiscal years, and reaching 11.1% in fiscal year 2001/02, suggesting that agriculture – as a key sector in the economy - must have experienced considerable growth during this period.

2.13 Asian Development Bank data shows that in 2000, Government expenditures in Myanmar accounted for only 3.5% of total GDP, compared with approximately 18% for neighbouring countries, suggesting a much smaller role of the public sector in Myanmar than in the rest of the region.

2.14 The composition of exports from Myanmar has changed significantly over the last 20 years as the garment industry, gas and a more diversified export portfolio has gradually diminished the importance of agricultural exports. From over 80% of the total in 1981, agriculture's share of exports has dropped to only 34% in 2002.

Composition of Principal Exports by Value 1980/81 – 2000/01 (Current MYK)

Category	1980/81		1990/91		2001/02	
	MYK million	%	MYK million	%	MYK million	%
Crops	1,761	54.6	942	31.8	3,021	17.6
Animal Products	13	0.4	5	0.2	42	0.2
Marine Products	82	2.5	165	5.6	861	5.0
Forest Products	793	24.6	999	33.7	1,880	6.6
Total Agriculture	2,649	82.1	2,111	71.3	5,840	34.1
Minerals/Gems	295	9.1	158	5.3	415	2.4
Gas	0	0	0	0	4,247	24.8
Garments	0	0	8	0.3	2,970	17.3
Other	281	8.7	685	23.1	3,695	21.6
TOTAL EXPORTS	3,225		2,962		17,131	
Source: Myanmar Data 2001. Central Statistical Organization.						

2.15 Despite an apparent reduction in the fiscal deficit in recent years, declining from 8.4% of GDP in fiscal year 2000 to an estimated 6.6% in FY2001, inflation continues to be a serious problem for the economy. By the end of 2002, it had reached an estimated 57%.

D. SOCIAL AND DEMOGRAPHIC CONTEXT[1]

2.16 With the last national population census held some 20 years ago (1983), current demographic estimates for Myanmar vary significantly, with the World Bank placing 2002 population at 48.9 million and a growth rate of 1.2% per annum, while the Asian Development Bank estimates population in the same year as 52.2 million with a growth rate of 2% per annum. Official Government statistics estimate 51.1 million in 2001/02 and a growth rate of 2.02%.

2.17 The rural population is estimated to account for 78% of the national total, with an average population density of 79 persons/km^2, although this average masks significant variations, with densities exceeding 150 in the key delta areas, but declining in the drier central areas to levels of 75-125 or even lower, and below 30 persons/km^2 in the highland areas.

2.18 Ethnically, Myanmar is overwhelmingly Burmese (68% of the population) and Buddhist (89%). Christianity and Islam each account for less than 5% of the population. The key delta and dry zone regions are almost entirely Burmese. Ethnic minorities comprise almost 26%

[1] Unless otherwise stated, references in this section are to Asian Development Bank 'Key Indicators for 2003'.

of the population, and are concentrated in the highland and mountain areas. Among the most important ethnic groups are the Shan (9% of population) and the Karen (7%).

2.19 Illiteracy is estimated by the World Bank at 14.7% in 2002 with infant mortality in 2001 of 77 per 1,000 births (this is higher than Government estimates of 50.2 per 1,000 births in 2000). An estimated 28% of the population is below 15 years of age.

2.20 According to data from the 1989, 1997 and 2001 household surveys, average rural family size appears to have been increasing over the last decade or more, reaching almost 5.4 persons per household in 2001 nationally. Urban household sizes also appear to have increased to 5.3 persons/household after a decline in 1997.

2.21 Available average household income and expenditure data is presented in the table below. Only income data for 1997 is currently available, but data on expenditure exists for the years 1989, 1997 and 2001. It can be seen that in 1997, incomes averaged US$0.23/capita/day in rural areas and US$0.34/capita/day in urban areas at prevailing market rates of exchange. For 1997 at least, incomes were considerably lower than expenditures, suggesting that considerable decapitalization was occurring in that year[1], although whether through the disposal of assets or the assumption of debt can not be determined. In fact, in rural households, income accounted for only just over two thirds of expenditure. In urban households the difference was less marked, with income accounting for 85% of expenditure.

2.22 After rising in the 1990s in real terms following the move away from the socialist approach, household expenditures appear to have declined again in the four years from 1997 to 2001. In US$ terms (taking prevailing market rates of exchange), average daily household expenditures rose from US$1.40/household/day (US$0.27/capita) in 1989 to US$1.81/ household/day (US$0.34/capita) in 1997. The four years to 2001 produced a decline, however, leaving rural populations spending little more in US$ terms than in 1989. In constant Kyat, the decline is even steeper, showing 2001 expenditures falling below 1989 levels. Anecdotal evidence from the business and consumer sector would suggest that this decline has continued to the present, despite the apparently strong growth of the economy in recent years.

[1] Income is defined in the 1997 survey to include all sources, including entrepreneurial income (over 50% of total income in rural households) and product in kind

Year	Average Household Size[1]	Current MYK			Constant MYK[3]		US$[4]			Rural/Urban Proportion
		Monthly	Daily	Daily/capita[2]	Monthly	Daily	Monthly	Daily	Daily/capita[2]	
Expenditure										
Rural										
1989	5.27	1,743.90	58.13	11.03	679.17	22.64	42.00	1.40	0.27	0.86
1997	5.32	13,091.16	436.37	82.02	878.46	29.28	54.32	1.81	0.34	0.86
2001	5.39	27,606.61	920.22	170.73	612.18	20.41	44.53	1.48	0.28	0.82
Urban										
1989	5.27	1,947.80	64.93	12.32	679.17	22.64	48.98	1.63	0.31	
1997	5.22	15,266.42	508.88	97.49	878.46	29.28	63.35	2.11	0.40	
2001	5.32	33,561.49	1,118.72	210.29	612.18	20.41	54.13	1.80	0.34	
Income										**Inc/Exp Ratio**
Rural 1997		8,905.65	296.86	55.80			36.95	1.23	0.23	0.68
Urban 1997		13,005.76	433.53	82.26			53.97	1.80	0.34	0.85

1/ National only for 1989 2/ Using average household sizes 3/ Constant 1985/86 MYK 2/ US$ amounts for 1989 imputed from GDP deflator

Source: Household Income and Expenditure Survey, 1997 and 2001. Central Statistical Organization, Yangon

2.23 The changes from 1989 to 2001 appear to have had little impact on rural/urban differences in expenditure; rural household expenditures as a proportion of urban household expenditures remained unchanged from 1989 to 1997, and then dropped only marginally over the next four years.

E. POLITICAL ADMINISTRATION

2.24 Since 1997 the overall political control of Myanmar has rested with the State Peace and Development Council (SPDC), which appoints a Prime Minister and other senior officials and determines national policies. The principal administrative unit is the Region or State (the latter defining areas with majority indigenous populations and higher levels of autonomy), of which there are 14; seven regions and seven states. Each division or state is administered through a State/Division Peace and Development Council. These councils are headed by the Area Commander and supported by the Head of the Department of General Administration and Police. The Ministry of Agriculture and Irrigation (MOAI) is represented principally by the divisional or state managers of the Myanmar Agricultural Service (MAS) and the Settlement and Land Records Department (SLRD). Other departments of MOAI may also be present, according to the geographic focus of their activities.

2.25 Under the state or division is the district. There are 64 districts in total, or an average of five districts per state or division. Districts are managed in a manner analogous to divisions, with a Peace and Development Council, a District Commander and a Deputy Commissioner of General Administration and Police. Once again, MOAI will be represented through MAS, SLRD and other departments.

2.26 Below the district is the township. There are 324 townships in total, or approximately five per district. Each township is managed by a Peace and Development Council chaired by the Head of the Department of General Administration. Both MAS and SLRD will have a township manager. Each township comprises a number of village tracts (wards in urban areas), although the number of tracts per township varies widely, depending upon population density. In the densely settled delta region, there may be as many as 100 village tracts in a township, while in the lower density highland areas there may be fewer than 10. Each village tract has a Chairman and a PDC.

2.27 Finally, the smallest administrative unit is the village itself, of which there are typically from 3-7 per Tract.

3. THE AGRICULTURAL CONTEXT

A. THE ROLE AND PERFORMANCE OF AGRICULTURE

3.1 As described above, the agricultural sector continues to dominate the Myanmar economy and contributed 64% of total employment in 1995. In constant prices, the sector has increased its value by 75% over the last decade, after declining slightly during the 1980s. Official statistics show agricultural sector growth (including livestock) exceeding 10% per annum in the three years to 2002. There is limited commercial livestock activity in Myanmar, primarily located in peri-urban areas, and the livestock sub-sector is estimated to contribute only one fifth of total agricultural GDP.

3.2 Three crop groups dominate agronomic activity in Myanmar; cereals, oilcrops and pulses. Together they account for 12.2 million ha of a total sown area (including multiple cropping) of approximately 15.9 million ha in 2001/02, or 77% of national cultivated area. A more complete breakdown of sown and harvested area, production and yield of all major crops is given in the following table.

3.3 By far the most important agricultural activity in Myanmar is the production of paddy, which occupied more than 6.6 million ha in 2002, largely under irrigation in the delta region, although in excess of 2 million ha were sown in irrigated and upland areas elsewhere in the country. National paddy acreage has increased by approximately 25% over the last 25 years. Productivity increases have also occurred but were concentrated in the period 1975-1985 when yields almost doubled. Since 1985/86, by contrast, yields have increased by less than 5% in 15 years. According to FAO data, average national yields for paddy are lower than regional developing country averages, but appear to be higher than those in Cambodia and Thailand, for example.

3.4 Less important cereals include millet, with some 250,000 ha of sown area annually, and maize, with 217,000 ha. Wheat is a minor crop with only 80,000 ha per annum. As for paddy, the area and yield of millet and maize increased during the 1980s, but have stagnated since this time. Wheat has suffered an absolute decline in sown area over the last 20 years, although yields have remained largely unchanged. Yields for millet and maize are both substantially below regional developing country averages.

Sown Area 1974/75 to 2000/01 Including Key Crops

Crop	1974/75		1984/85		1994/95		2000/01	
	('000 ha)	%	('000 ha)	%	('000 ha)	%	('000 ha)	%
Paddy	5,319	54.5	5,052	46.8	6,089	48.8	6,362	40.1
Maize	171	1.8	310	2.9	255	2.0	217	1.4
Oilseeds	1,803	18.5	2,446	22.6	2,201	17.6	2,608	16.4
Cotton	196	2.0	252	2.3	210	1.7	325	2.1
Pulses	380	3.9	501	4.6	1,262	10.1	2,723	17.2
Sugarcane	37	0.3	62	0.6	54	0.4	139	0.9
Rubber	88	0.9	81	0.8	92	0.7	181	1.1
Tea	52	0.5	57	0.5	63	0.5	73	0.5
Other	1,694	17.4	2,043	18.9	2,250	18.0	3,246	20.4
Total	**9,761**		**10,804**		**12,476**		**15,874**	

Source: Ministry of Agriculture and Irrigation. **Note:** Sown areas include multiple cropping

3.5 Second in importance to cereals is the oilseed sector which, including cotton, accounted for nearly 3 million ha in 2002, largely in the dry zone of central Myanmar. Sesame accounts for nearly half of the area sown to oil crops, with a further 20% taken by groundnut and slightly less by sunflower. Soybean and niger are other significant oilseed crops. Cotton seed is also processed for edible oil, but cotton is usually listed with the fibre crops. Despite some significant increases in productivity in the 1980s and early 1990s, the oilseed sector as a whole has been largely stagnant over the last decade, with almost no increase in yields. Niger and mustard are exceptions to this trend, and have grown in importance in both sown area and yield. There has been a rapid increase in sunflower acreage (but not yields) at the expense of a slight decline in the two traditional oilseeds, sesame and groundnut.

3.6 Equal to oilseeds in importance are the pulses and beans. These together accounted for some 2.5 million ha sown in 2001/02, although this was a slight decline from 2.7 million ha in 2000/01. Green gram (mung bean), black gram and pigeon pea are the most important among this diverse group of crops. Pulses have seen an enormous increase in production since the liberalization of pulse export markets in 1990, with sown areas increasing threefold and production almost fourfold over the following 12 years. Pulses and beans have become important to the rural economy of Myanmar not only for their income earning potential, but also because of their dietary contribution and – as legumes – their contribution to crop rotations where little inorganic fertilizer is provided.

3.7 Other significant crop groups include the fibres crops, principally cotton but also including jute and kenaf, which accounted for over 370,000 ha sown in 2000/01. The traditional short staple varieties (Wagyi and Mahlaing) have declined in importance in the last 15 years, and have largely been replaced by the higher yielding long staple varieties. Production of long staple cotton has increased by more than 200% over the last 20 years. Under competition from artificial fibres, the area sown to jute has declined significantly over the same period.

3.8 Among the other industrial crops, rubber and sugarcane are both of moderate importance, accounting for 181,000 ha and 139,000 ha respectively. Both have expanded rapidly in the last decade but yields are still well below the developing country average for the region (Table 2). Tea is of minor importance with some 73,000 ha and has been growing slowly in

established area. Coffee is still very little cultivated, but has expanded to nearly 8,000 ha by 20001.

3.9 The horticultural group, including fruits, is of some importance in Myanmar, accounting for almost one million ha. Among the most important individual crops are chillies, onions and plantains. Horticultural crops are of particular importance in the highland areas of Sagaing and Shan State, where higher precipitation levels renders intensive, year round production possible. On Inle Lake in South Shan an innovative system of horticultural production (particularly tomatoes) on floating islands has been developed from traditional practices.

3.10 The majority of large livestock (cattle and buffalo) held in Myanmar are for dual draught and milk purposes. However, there is limited commercial livestock activity in Myanmar, primarily located in peri-urban areas, focusing on dairy cattle and broiler and laying poultry, with limited commercial pig production. Much production of pigs, sheep and goats and poultry occurs on a small scale, and the livestock sub-sector is estimated to contribute only one fifth of total agricultural GDP. Due to the long interval since the last agricultural census in 1993, and the absence of annual surveys such as occur for crops, there is considerable uncertainty as to livestock numbers. At the time of the 1993 census, some 8 million cattle, 3 million ducks and 1.3 million pigs were identified. Water buffalo and sheep/goats accounted for less than one million each. Poultry estimates vary widely, with more than 15 million commercial birds out of a total population of around 50 million being likely.

3.11 The total area under irrigation has doubled over the last twenty years and although it still accounts for less than 3% of total land area, irrigation is of much greater importance in relation to cultivated and fallow lands. By 2001/02 one quarter of all agricultural lands were irrigated. More than three quarters of the total irrigated area is sown to rice, but vegetables, pulses and sesame are also grown under irrigation (see Table 3).

Major Agricultural Exports, 1980/81–2000/01

Commodity	1980/81		1990/91		2001/2002	
	MYK'000	**%**	**MYK'000**	**%**	**MYK'000**	**%**
Rice and rice products	1,355	42.0	172	5.8	754	4.4
Pulses	152	4.7	515	17.4	1,898	11.1
Maize	11	0.3	13	0.4	59	0.3
Oilcake	46	1.4	11	0.4	0	0
Rubber	82	2.5	3	0.1	76	0.4
Cotton	4	0.1	0	0	1	*
Jute	99	3.1	0	0	37	0.2
Other	12	0.4	228	7.7	196	1.1
Total Crops:	**1,761**	**54.6**	**942**	**31.8**	**3,021**	**17.6**
Livestock products	13	0.4	5	0.2	42	0.3
Fish	58	1.8	36	1.2	310	1.8
Prawns	24	0.7	114	3.9	519	3.0
Other marine products	0	0	15	0.5	32	0.2
Timber	793	24.6	999	33.7	1,880	11.0
Total primary sector:	**2,649**	**82.1**	**2,111**	**71.3**	**5,804**	**33.9**
Total exports – all sectors:	**3,225**		**2,962**		**17,131**	
Source: Myanmar Data 2001, Central Statistical Organization.						

3.12 Although the overall proportion of export earnings derived from the agricultural sector has declined steeply over the last two decades, certain products have grown in importance during this period, including pulses and marine products. However, rice, which accounted for 42% of total exports as recently as 1981, accounted for less than 5% in 2002. It is not believed to be a coincidence that those products which have done best in generating export earnings have been those least subject to state controls.

3.13 Imports of agricultural items are not significant in the context of total national imports. In aggregate, food and edible items, account for approximately 5% of all imports by value. More detailed breakdowns of agricultural exports and imports are provided in Table 4.

B. FORESTRY[1]

3.14 Practically all forest areas in Myanmar are natural, with almost no establishment of plantations until very recently. Forests are primarily deciduous broadleaf, with wide variety of constituent vegetation types including most notably teak. Official data suggests that forest area in Myanmar has increased over the last decade, rising from 50.8% in 1989 (85% of which was classified as closed forest and the rest as degraded) to 52.3% in 1999. Data compiled by FAO, however, while in agreement with the 52.3% total cover figure, indicates a decline in forest cover of 1.35% per annum for the period 1995-1998[2].

3.15 A further 23% of land is officially classified as forest affected by shifting cultivation, and is estimated to provide resources for as many as two million families. In total, therefore, almost 500,000 km^2, or nearly 74% of the country, was categorised as under some form of forest cover. In 2001, almost 130,000km^2 of forest cover was classified as fully protected, equivalent to 19% of total land area.

3.16 Growth rates for Myanmar forests are reported to be relatively low in comparison to many tropical or even North American forests. As a result, pressure on forest resources can easily exceed sustainable levels, especially where alternative energy supplies are unavailable or costly and few controls exist over access. In 2000, fuel wood consumption by local populations was estimated at 40.6 million m^3, well above calculated sustainable levels of 25 million m^3, resulting in long term degradation of forest areas in more densely populated areas.

3.17 In contrast to fuel wood utilisation, all timber extraction is under the direct control of Myanmar Timber Enterprises (MTE), which forms part of the Ministry of Forestry. Reported timber extraction levels for 1999/2000 were 520,000 m^3 of teak and 1,723,000 m^3 of other hardwoods. Over the last 20 years total timber extraction is estimated to have been 4.25% greater than the Annual Allowable Cut (AAC), determined on the basis of predicted growth rates. This figure may be an underestimate, however, as domestic sawmilling capacity in 2001, at more than 1.3 million m^3 per annum, was three times higher than the official distribution of logs for sawing of less than 450,000 m^3 per annum.

[1] The forestry sector did not comprise part of the terms of reference for the agricultural sector review. Unless otherwise noted, the material in this section is derived from "Review of Forestry and Related Legislation, Policies and Practices and their Impact/Implications on Sustainable Forest Management and on the Model Forest Approach to SFM in Myanmar" Dr. Kyaw Tint, FAO/Govt. of Japan. March 2002.

[2] FAO Forest Resources Assessment, 2000.

3.18 As the state owns all land, royalties are paid to the Ministry of Forestry for all extraction activities, but royalty rates are reported to be very low, especially for teak, where less than 0.15% of export log value is charged per ton. Most earnings come from export, which is also controlled by MTE. Over the nine year period 1992/93 to 2000/01 an average of 56% of all timber extracted was exported, 92% of it in the form of round logs. Despite increasing levels of exports over recent decades, the proportion of export earnings accounted for by timber has declined, reaching less than 7% in 2000/01.

3.19 The management and exploitation of national forest reserves is dictated by a National Forest Policy elaborated in 1995, and more recently in a National Forest Master Plan 2000/01-2030/31. The Forest Policy document focuses six key areas including: (a) forest protection; (b) sustainability; (c) basic needs (e.g. fuel wood supplies); (d) efficiency of operations; (e) participation; and (f) public awareness.

C. LAND DISTRIBUTION AND TENURE

3.20 Of the 67.7 million ha in Myanmar, only 10.6 million ha (less than 16%) were occupied during 2001/02, either being directly cultivated, or in fallow - although this latter category accounted for only 0.7 million ha. A further 6.7 million ha (8.5%) was classified as cultivatable, but unused. The remaining land area was accounted for by reserved forests (18%), other wood land (25%) and other (22%). Perhaps surprisingly, there has been limited change in this land use pattern over the last 20 years. In 1980/81, total occupied area was only 0.5 million ha less, accounting for 10.1 million ha (see Table 5).

3.21 Under Section 30(1) of the 1947 Fundamental Constitution, the state owns all land. Section 18 (a) of the 1974 Constitution amplified this right to include all above and below ground resources, whether in the ground, water or air.

3.22 Legal control and classification of land in Myanmar was initiated by the British in 1876 as part of their introduction of a revenue collection and taxation system. Cadastral surveys were commenced shortly afterwards, and all land was classified according to ownership and use. The Settlement and Land Records Department (SLRD) of the Ministry of Agriculture and Irrigation (MOAI) was established during this period.

3.23 With independence in 1948, a series of Land Nationalization acts were passed which abolished all lease, rental or sharecropping arrangements and established size limits on agricultural holdings according to their classification, use and the size of the family in possession. A basic limit of 50 acres (21 ha) was decreed for paddy and sugarcane, with smaller holding for other land types. These limits remained largely untouched through the socialist period and no further significant changes were made in land laws until the establishment of the Central Committee for the Management of Cultivatable Land, Fallow Land and Waste Land in 1991. This committee was able to authorise the operation and control of much larger holdings of land for specific purposes by State-owned enterprises, cooperatives and private enterprises.

3.24 For perennial crops, such as rubber, oil palm and coffee, the Committee is authorized to assign blocks of 5,000 acres (2,080 ha) which, if developed, can be augmented with further blocks of the same size up to a total possible land area of 50,000 acres. Lower limits of 3,000 acres and 1,000 acres were established for orchard crops and seasonal crops respectively.

Extensive land holdings are also possible for aquaculture and livestock operations. Non-citizens are permitted to apply for these land allocations where approved by the Myanmar Investment Commission. By 2001 more than one million acres were allocated according to this mechanism, involving nearly 100 enterprises and associations.

3.25 Not withstanding these various provisions, land holdings in Myanmar have remained generally small. According to the 1993 Agricultural Census (the most recent conducted), more than 80% of all land holdings are below 5 acres (2 ha) and only just over 3% were in excess of 20 acres (8.3 ha). As farmers in Myanmar have only cultivation rights to the land they occupy, there is no legal ability to sell, lease or otherwise dispose of land rights to other persons, and consolidation of holdings thus does not occur.

3.26 The basic colonial-era system of land records and taxation is still in operation, with detailed surveys of land use to coincide with major cultivation seasons. Land tax rates, however, date largely from the pre-independence era, and reach no more than Kyat 22.00/acre (US$0.05/ha) and may be as low as Kyat 0.25/acre (less than 1/10th of a cent/ha).

D. THE INSTITUTIONAL SETTING

3.27 There are two principal national agencies responsible for the agricultural sector in Myanmar[1]; the Ministry of Agriculture and Irrigation (MOAI) and the Ministry of Livestock Breeding and Fisheries (MLBF). Each of these is described below.

Ministry of Agriculture and Irrigation

3.28 The current MOAI structure dates from 1992 when responsibilities for forestry were allocated to a separate ministry. Livestock and fisheries had previously been separated in 1983. Excluding the Minister's Office, the MOAI comprises thirteen departments or enterprises with a total of approximately 75,000 staff as of August 2003 (Table 6a).

3.29 Six of the constituent units of MOAI are normal operating departments, including planning, water resources, irrigation, mechanization, settlement and land records, and Myanmar Agricultural Services (MAS). MAS is the largest unit within MOAI, with a staffing of more than 14,000, and itself is comprised of nine divisions responsible for a variety of field operations, including extension, research, seed multiplication, plant protection and land use. The agricultural research, seed and extension divisions of MAS operate 10 state farms, 20 research farms (including the Central Agricultural Research facility at Yezin), and 33 central and seed farms.

3.30 Almost as large as MAS is the Irrigation Department which, with thirteen divisions, covers all aspects of irrigation design, construction, operation and maintenance. Other major departments include Settlement and Land Records Department (SLRD), which is responsible for all land management and land taxes. As part of this responsibility, SLRD conducts national field surveys for each cropping period, at which time land use, sown area and harvested area is determined.

[1] Excluding the Ministry of Forestry.

3.31 A further six units of MOAI are the State Economic Enterprises (SEE), including the Myanmar Agricultural Development Bank (MADB). Other SEEs are responsible for cotton and sericulture, sugarcane, jute and perennial crops (rubber, oil palm and cashew). Myanmar Farm Enterprise (MFE) operates some 21 farms and six coffee estates with approximately 15,000 ha producing a wide variety of crops.

3.32 The final operating unit of MOAI is the Agricultural University at Yezin, which offers both B.Sc. and M.Sc. courses and is the only tertiary agricultural education institute in Myanmar.

3.33 At field level, MOAI operates both directly through those agencies with a presence in the area and through an Agriculture Supervision Committee (ASC). Both Myanmar Agricultural Services (MAS) and the Settlement and Land Records Department (SLRD) maintain staff at state/division, district, and township levels throughout the country. Other MOAI agencies may also be present according to need (e.g. MCSE in cotton growing areas). All MOAI agencies present within a state/division, district or township join to form the ASC which is responsible for coordination of all agricultural activities within its geographical area of responsibility.

Ministry of Livestock Breeding and Fisheries

3.34 The Ministry of Livestock Breeding and Fisheries employed some 717 professional and 7,100 other staff as of October 2003 and comprises seven organisational units, including the Myanmar Livestock and Fisheries Development Bank, the University of Veterinary Science, and the Livestock Feedstuff and Milk Products Enterprise (LFMPE), as well as four line divisions or departments. These latter comprise the Directorate of Livestock and Fisheries, the Livestock Breeding and Veterinary Department, the Department of Fisheries and the Beekeeping Division (see Table 6b).

3.35 The bulk of technical responsibilities lie with the two departments; the Livestock Breeding and Veterinary Department (LBVD) and the Fisheries Department (FD). The LBVD is responsible for all aspects related to animal health, disease control and breeding, including artificial insemination and livestock extension services in general. There are 147 veterinarians and 21 veterinary assistants (VA) in the central office of the LBVD and over two hundred non-professional staff manning the diagnostic, vaccine production, feed analysis laboratories, the technical sections, and the AI centre and demonstration farms.

3.36 The Fisheries Department covers both aquaculture and capture fisheries, including revenues from licensing, the production of fingerlings and fry, inspection and regulation of fisheries practices, and the collection of fisheries statistics.

3.37 The national DOF office in Yangon has a staff of about 1000, whilst the State and Divisional Fisheries Administrations vary according to with the importance of the local fisheries. Mandalay Division which is an important fish production centre for Upper Myanmar has two Fisheries Stations. There is typically one DOF officer per 34 townships (and this officer does not usually have a vehicle). The officers will check fishing gears, mesh sizes and licenses.

3.38 The LFMPE operates pig and dairy farms and milk and feed processing facilities, producing improved breeding stock for government run distribution programmes throughout the

country. It has six known feed mills in Yangon, Mandalay and Shan State, producing fish feed and feed to support its own pig and poultry production enterprises. LFMPE also has two units producing day-old-chicks and is engaged in a joint venture with the military in a milk condensing plant in Yangon city. LFMPE is also starting to produce from a 100 tonnes capacity feed mill in Yangon for direct supply to the local poultry market.

3.39 LFDB was established under MLBF in 1999 to finance investment in the livestock sector, but it has no effective role in generally providing funds to smallholders wishing to engage in small-scale livestock investment. The bank only finances larger scale livestock and fishery enterprises and supported 510 investment loans totalling MYK 4834.6 million for both fishery and livestock sectors in 2002.

E. AGRICULTURAL POLICY

3.40 There is no GOM document specifically addressing agriculture policy, although there are periodic policy pronouncements and statements of objectives. At the broadest level, the Four Economic Objectives of GOM are as follows:

- Development of agriculture as the base and all round development of the other sectors of the economy as well;
- Proper evolution of the market oriented economic system;
- Development of the economy inviting participation in terms of technical know-how and investments from inside the country and abroad; and
- The initiative to shape the national economy must be kept in the hands of the state and the national peoples.

3.41 It is not clear whether ‘agriculture’ mentioned above includes livestock and fisheries or not. However, within the framework of the ASR, activities of MOAI and MLBF are included. This section primarily examines policy in relation to agriculture. Forestry is not included in the terms of reference for the ASR although issues such as agro-forestry are relevant to agriculture.

3.42 The following are the main objectives espoused by GOM with relation to agriculture:

- to produce surplus paddy for domestic food security and for promotion of exports;
- to achieve self sufficiency in edible oils; and
- to expand production of beans and pulses and industrial crops for export.

3.43 The policies to achieve these objectives are stated as:

- to allow freedom of choice in agricultural production;
- to expand agricultural land and safeguard the rights of the farmers;

– to encourage the participation of private sector in the commercial production of seasonal crops and perennial crops and distribution of farm machineries and other inputs.

3.44 The strategies for the agriculture sector are enumerated below:

(i) Development of new agricultural land;

(ii) Provision of sufficient irrigation water;

(iii) Provision and support for agricultural mechanization;

(iv) Application of modern agricultural technologies; and

(v) Development and utilization of modern varieties.

The Historical Setting

3.45 Rice has long been the centrepiece of agricultural policy in Myanmar. During pre-colonial days, the kings controlled the rice trade and prohibited the export of rice. This restriction discouraged farmers from producing more rice than needed for their own use and tax payment. Under British colonial administration, new policies were adopted to promote higher production and exports, establish long term land tenure, and encourage migration from Upper Myanmar and India to the humid delta region of Lower Myanmar. Improvements were also made in river and rail transport inside the country, and safeguards provided to private money lenders engaged in financing land clearance and agricultural production.

3.46 After independence in 1948, the initial policy thrust was to re-establish rice areas abandoned during the Second World War. During the socialist regime, which commenced in 1962, a centrally planned economic model was followed and emphasis was put on production and productivity, with socialist style voluntary work brigades. Measures introduced during this period included extension methods such as the Whole Township Rice Production Program and the Special High Yielding varieties programme, which emphasized the introduction of new varieties. The WTRPP had five components: proven new technology; government support and leadership; selectivity and concentration; mass participation, and; demonstration and competition.

3.47 During the colonial period, the rice trade was handled by private traders and millers, among whom were many British and European companies. However, in 1945, the Agricultural Project Board was formed to organize and supervise rice production, processing and private sector marketing operations. In 1947, the APB was renamed the State Agricultural Marketing Board (SAMB), and it continued to manage the rice trade after independence. In 1963, with the advent of the socialist era, all rice related activities were centralized under a government corporation[1].

3.48 After the regime change in 1988-89, rice was liberalized as far as the domestic trade was concerned. However, many central planning measures continued, so the rice sub-sector continued to be subject to extensive controls. Area production targets were decreed in an attempt to ensure that each State/Division was self-sufficient in rice. Farmers were forced to cultivate rice

[1] A Century of Rice Improvement in Burma, U Khin Win, IRRI, 1991.

in designated areas (especially those with irrigation) as a condition of access to the land and inputs. Myanmar Agriculture and Farm Produce Trading (MAPT), a state agency under the Ministry of Commerce, was granted a monopoly on export of rice, and farmers were required to deliver a specified quantity of paddy per unit area cultivated to MAPT at a price often significantly lower than the market price. MAPT used rice obtained under compulsory procurement to supply low-income groups, GOM employees and military personnel, as well as to maintain buffer stocks. Such intervention in the market led to significant market distortions.

3.49 Soon after the partial rice liberalization, the market for pulses and beans was passed over completely to the private sector, including the right to export without State intervention (except in the establishment of exchange rates). This was the first crop category for which marketing was fully liberalized since the commencement of the socialist period, and its subsequent performance reflected that fact.

3.50 Pulses and beans responded to this stimulus, and the resulting growth in the sector has been rapid. In the ten years following liberalization, the total area sown to pulses and beans have expanded three-fold to more than 2.5 million ha, and total export shipments reached 938,000 tonnes in 2002/2003.

3.51 Not all recent policy changes have been towards liberalization, however. In October 1998 the private export of sesame seed was prohibited, and MAPT assumed the role of monopoly exporter. Private traders had to negotiate export sales as before, but then turn over all documentation and the seed to MAPT which finalised the sale, retained the foreign currency, paid the 10% export tax, and paid the trader the remaining amount in Kyat at a Government determined rate of exchange (generally lower than the market rate). As a result of this change, exports of sesame seed fell sharply, to less than half of the average of more than 50,000 tonnes/year that had been seen in previous years. Export volumes have continued to decline as exports of sesame seed at the granted rates of foreign exchange are now only profitable when domestic prices fall to below average levels.

Policies Regarding Rice

3.52 Rice area and production are targeted to increase by 21.4% and 83.4% respectively over 15 years from 2001-02 to 2015. This presupposes major improvements in productivity, with average yields increasing from about 3,300 kg/ha in 2000-01 to 4,851 kg/ha, a 45% increase. At the same time, GOM have been pursuing a policy of allocation of large areas, sometimes up to 4,000 ha to large private sector parties for agricultural production, mainly of rice. The production gains from this measure have not been quantified and its impact in socio-economic, technological and environmental terms in not known.

3.53 Although GOM statistics suggest significant gains were achieved in rice productivity as a result of these efforts, there were increasing doubts as to the validity of these numbers. The policies in force provided few incentives for such increased productivity, with no motivation to invest in land improvement, restrictions on farm-level financing, and distorted prices as a result of the continuing compulsory procurement programme.

3.54 In April, 2003 a new rice trading policy was introduced. No official GOM document or publication has been issued describing this policy and details have had to be obtained from

newspapers. The policy abandons compulsory procurement by MAPT, and eliminates the role of MAPT in rice exports. However, private traders will be permitted to export rice only under certain conditions related to national self-sufficiency. In order to continue to supply special target groups, MAPT will purchase paddy at market prices from traders, although the impact of this policy on Government budgets is still unclear.

3.55 The new rice trading policy will be implemented under the guidance and supervision of the Myanmar Rice Trading Leading Committee (MRTLC). Secretary II of SPDC is the chairman of the Committee, with Ministers of MOAI, Industry-1, Commerce, Energy, the Union of Myanmar Federation of Chambers of Commerce and Industry (UMFCCI), the Myanmar Rice Traders' Association, and the Myanmar Rice Millers' Association. The Committee's specific duties include the following:

(i) to grant permission for formation of rice trading bodies;

(ii) to formulate rules and regulations for rice trade, transport, milling and storage;

(iii) to decide the permitted volume of rice for export;

(iv) to coordinate the rice price if disparities arise in prices; and

(v) to make proposals and submissions for issuance of laws and principles with respect to the rice trade.

3.56 This very wide scope of action for the MRTLC leaves open the question as to the degree to which the rice market has indeed been liberalized.

3.57 A sub-committee has been formed under the chairmanship of the Secretary General of the UMFCCI called the Myanmar Rice Trade Sub Committee (MRTSC), with five members from the UMFCCI, and three each from the Myanmar Rice Traders' Association and the Myanmar Rice Millers' Association. This sub-committee has made available the procedures required for rice export under the new rice trading policy. In all, these procedures include 14 detailed steps. An abbreviated summary is given below:

(i) The rice exporter shall reach prior agreement with the foreign buyer on the quantity, quality, shipment period and price of the commodity.

(ii) The exporter shall submit to MRTSC and MAPT the proposed quantity, quality, and FOB price negotiated, as well as their own procurement and handling costs to FOB.

(iii) If the MRTSC approves the proposal, MAPT will assess the appropriateness of the FOB price and seller's costs, and if found to be reasonable, it will submit its findings to the MLRTC.

(iv) If permission is granted, the exporter will enter into a contract with the seller. After contract signing, the exporter will apply for export license to the Directorate of Trade, providing a copy of the MRTSC approval.

(v) Once the export license is granted, the exporter shall, within the time period stipulated, and in compliance with export procedures: (a) prepare all

documentation; (b) book vessel space and notify the buyer; (c) obtain the necessary customs pass; (d) conduct a pre-shipment inspection; (e) accept inspection along side the vessel; (f) monitor loading of the commodity, and; (g) obtain the mate's receipt from the vessel. All documents will then be forwarded to the department concerned within the permitted time.

(vi) The exporter shall take care that there is no discrepancy exists between export documents and the provision in the Letter of Credit (L/C) and shall send copies of the Bill of Lading and invoice to the MAPT to guarantee the actual quantity shipped.

(vii) The exporter shall send all the shipping documents to the advising bank, which will forward them to the issuing bank and verify that the full amount is received.

(viii) Upon receiving payment advice from the bank, the exporter will deduct the 10% Government export tax, and remit 50% of the remaining sum to the foreign currency account of the MAPT.

(ix) MAPT will then pay the exporter the local currency equivalent of the 50% foreign exchange submitted, less the difference between the exporter's costs and the amount received. Thus the exporter will receive 45% of the payment in foreign currency, and 45% less half of the net profit, in local currency at the Government determined exchange rate.

Other Crops

3.58 In order to increase foreign exchange earnings, concerted efforts are made to increase production of three Main Pillar Crops which, besides rice, are[1]:

(i) Pulses, main ones being soybean, chickpea, butter bean, green gram, pigeon pea, black gram, kidney bean, cow pea, lab lab bean, sultani and sultipya;

(ii) Cotton; and

(iii) Sugarcane.

3.59 Interestingly, oilseeds are not on the list of main pillar crops, despite their major role in agricultural production in Myanmar and although there is a shortage of edible oil, and the significant amounts of foreign exchange expended on importing palm oil. Groundnut, sesame, sunflower and niger are however in the list of main crops cultivated in Myanmar.

3.60 Cotton and Sugarcane are looked after by two special enterprises, Myanmar Cotton and Sericulture Enterprise (MCSE) and Myanmar Sugarcane Enterprise (MSE). Pulses, subjected to benign neglect with no special enterprise to look after them, have flourished best, with substantial increases in area and production (with marginal gains in productivity) as well as exports.

[1] Myanmar Agriculture in Brief, 2003, MOAI.

3.61 With a highly varied climate and topography, Myanmar is well positioned for the production of a wide range of field and tree crops including fruits and vegetables. While a small section of farmers have taken the initiative and are producing horticultural products, there is little policy or programme support for linking fruit and vegetable producers to effective post-harvest services, such as grading, temperature controlled storage, transport, and processing. The scope of increasing employment in these activities, particularly for landless and women, would appear to be considerable and needs to be taken note of.

Livestock and Fisheries Policies

3.62 According to Government announcements, the livestock sector in Myanmar is focused on the following priorities:

(i) integrated development in livestock sector;

(ii) self-sufficiency in livestock products and production of exports for surplus;

(iii) intensification of research and development activities; and

(iv) socio-economic development of householders in the livestock sector.

3.63 Although the above are supposed to be guidelines, no consistent and focused Government programmes on these lines are exhibited. There is little reliable information of livestock numbers and commercial herds/flocks still comprise a small minority of overall populations. These aspects are discussed in more detail in the livestock working paper.

3.64 Official policy appears to recognize that the operation of the fisheries sector in Myanmar is a private sector responsibility. Unfortunately, in practice this has also meant only a very limited Government role in fisheries management. As a consequence, marine fisheries have expanded and marine exports have gained prominence. However, there are concerns that maximum sustainable yield levels might already have been exceeded, even without taking into account the extent of possible unreported catches (see the Fisheries Working Paper). It is believed that coastal and inland aquaculture could contribute significantly but little support is provided for this area. More attention needs to be paid to conflicts of interest which may potentially arise between small fishers and commercial activities, in inland fisheries as well as artisanal fishing.

Other Policy Issues of Relevance to the Sector

3.65 In the absence of a specific policy position, the broad objectives and policies set out at the beginning of this section must be seen as constituting the current agriculture policy in Myanmar. Many other policy issues will be of relevance to the agricultural development of Myanmar, however. In addition to sub-sectoral issues raised in the summaries which constitute the majority of this document, one can enumerate the following:

- access to land and water, including land tenure;
- controls on the export and import of agricultural commodities, inputs and related products, and the application of multiple decreed exchange rates;
- the role of State Economic Enterprises (SEEs) in agricultural and input production, processing, marketing and Government budget allocation;

- controls on prices of agricultural inputs and outputs;
- agricultural mechanization policy; and
- agriculture financing and credit.

3.66 A number of these are discussed in the Working Papers contained in Volume 3 of this document, and their importance is analysed in the concluding chapter of this volume.

Policy Formulation, Dissemination and Implementation

3.67 Mission discussions with responsible officials of MOAI indicate the following:

Policy Formulation

(i) At Director General level, discussions are normally held among different relevant departments of the Ministry and their staff up to Director Planning level.

(ii) At the ministerial level, a short paper is prepared for Minister who briefs the Head of State, and then the matter goes to the cabinet. Discussions may now be held with the Prime Minister in place of the Head of State. At the same time, Secretary I and Secretary II on the SPDC side are also briefed. For Cabinet meetings, regular memoranda are prepared, copies of which are sent to all ministers.

(iii) For all trade related matters, there is a Trade Council chaired by General Maung Aye, Vice Chairman of the SPDC and Deputy Commander-in-Chief of all Armed Forces as well as Army Chief.

(iv) However, in regard to rice marketing, the newly established MRTLC formed specifically for this purpose, will deal with all matters and these need not go through the Trade Council.

Dissemination

3.68 For all important policy decisions, Secretary-I discusses the matters with concerned Ministers who will, in turn brief his Directors General. Media briefings are also usually given by Secretary-I. Meetings are usually followed by minutes which are circulated to all attendees.

Implementation

3.69 All Government departments of relevance to the implementation of a new policy will draw up targets and programmes designed to ensure its effective implementation. This is normally the responsibility of the Planning Division within each department. The Myanma Agriculture Service within the MOAI has personnel at the Division/ State, district, township, village tract and village levels. Other agencies such as the Myanma Cotton and Sericulture Enterprise, Myanma Sugar Enterprise have staff in specific regions where the mandate crop is largely grown. The bulk

of the MAS personnel are in the extension division. This substantial machinery is engaged in implementation of the plans and programmes drawn up centrally, intensively monitored not only by the field supervisors of the respective agencies under the ministry, but also under the supervision of the Peace and Development Councils at various levels.

3.70 As such implementation tends to be target and task oriented, the achievement of input and output targets tends to be of greater importance than impact. It is also worth noting that as the mobility of the field staff is often limited by the lack of transport and very poor per diem entitlements, realizing performance targets is often very difficult.

F. AGRICULTURAL INVESTMENT

3.71 Agricultural sector investment in most developing countries derives largely from three principal sources; (a) official development assistance (ODA), whether in the form of loans or grants; (b) public sector capital expenditures, including Ministries, state enterprises and parastatals, (c) private sector investment from both domestic and foreign sources, and; (d) non-governmental organizations (NGOs). Each of these sources is briefly discussed below.

Official Development Assistance

3.72 ODA to Myanmar declined sharply after 1989, and by 2000, total ODA provided by multilateral agencies amounted to just over US$47 million per annum[1]. Only a few multilateral agencies still maintain an active programme in the country, of which the largest is UNDP, which focuses upon community-based and poverty oriented programmes. The principal vehicle for UNDP assistance since 1994 has been the Human Development Initiative (HDI) which supports the mobilization and strengthening of community-based organizations in rural areas. Specific activities have included food security and environmental protection, primary health care and education, and water supply and sanitation. Agriculturally related components of HDI have involved input supply, provision of livestock to landless and the poor, community forestry land and water conservation and micro-credit[2]. Total UNDP disbursements in 2000 were US$17 million, of which a significant proportion will have been to agriculture and natural resources. UNICEF was the second largest ODA provider, with expenditures of US$13 million in the same year. Other multilateral agencies with activities in Myanmar include FAO, UNHCS and the OPEC Fund.

3.73 Bilateral ODA also declined since the beginning of the 1990s and amounted to only US$22 million in 2000, US$6 million of which was in the form of grants[3]. It does not appear possible to determine the sectoral distribution of these funds. Countries maintaining assistance programmes to Myanmar include Japan, the People's Republic of China, India, Singapore and Thailand.

[1] Asian Development Bank Myanmar Economic Update, 2001.
[2] Micro-credit activities under the HDI programme are discussed in detail in the Rural Finance Working Paper.
[3] Asian Development Bank, op cit.

Public Investment in Agriculture

3.74 Public investment to the agricultural sector in Myanmar has two components: capital expenditure budgets of state administrative agencies (SAAs), such as Ministries, and; capital expenditure allocations to state economic enterprises (SEEs).

State Administrative Agencies

3.75 For financial year 2002/03, the Ministry of Agriculture and Irrigation (MOAI) received a total capital budget of Kyat 14.2 billion (equal to approximately US$15 million at prevailing market exchange rates). In fact, capital expenditures were slightly higher than budgeted, at Kyat 14.6 billion (see Table 6a). Almost two thirds of this amount was accounted for by the two Departments related to water, the Water Resources Utilization Department (WRUD) and the Irrigation Department. Surprisingly, the Myanma Agricultural Service (MAS), which is responsible for all agricultural research and extension, seed multiplication and plant health services, among other tasks, received only 2.4% of the MOAI capital expenditure allocation. Yezin Agricultural University, the only tertiary agricultural education institute in Myanmar, received 0.2% of the budget, or less than US$26,000.

3.76 In nominal terms, MOAI capital expenditures have increased steadily since 1980/81 with the exception of a slight dip in the early 1990s (see Table 6b). Nevertheless, MOAI's share of all SAA capital spending has declined sharply, from nearly 40% in 1980/81 to only 14% two decades later, suggesting that other Government ministries have received even greater increases. In fact, MOAI's increases have not been very generous. When inflation is taken into account and expenditure is assessed in real, rather than nominal, terms[1], it can be seen that MOAI capital spending has seen a real decline of approximately one third over this period and its share of GDP has dropped from 1.3% to 0.4% (see Table 6c).

3.77 The same pattern, albeit on a much smaller scale, can be seen for the Ministry of Livestock Breeding and Fisheries (MLBF). MLBF's total capital allocation in 1999/00 was only MYK 93 million or approximately US$275,000 for the entire Ministry at prevailing rates of exchange. This is 1.1% of the allocation to MOAI. As for MOAI, the MLBF budget has increased in nominal terms over the last 20 years, but it has received a declining share of SAA capital expenditures (from 1.5% to 0.2%) and has suffered a decline of over 80% in real terms as well.

3.78 Within MLBF, more than half of total capital resources, or MYK 270 million (approximately US$280,000 at prevailing market rates of exchange) in 2002/03, are allocated to Myanma Livestock and Fisheries Bank (MLFB). The other major recipient is the Department of Fisheries (DOF) which received over 27% of the capital allocation. Nevertheless, this amounted to only MYK 144 million in 2002/03 (less than US$150,000). The Livestock Breeding and Veterinary Division (LBVD) received only 13%, or MYK 69 million.

3.79 By contrast the Ministry of Forestry (MOF) managed to obtain a one third increase in capital expenditures in real terms over the period in question, even though its total allocation in

[1] Constant 1985/86 Kyat.

1999/00, at Kyat 868 million (approximately US$2.5 million at prevailing market exchange rates), was still only one tenth that of MOAI.

3.80 Overall, the three natural resource ministries (excluding mineral extraction) received a total capital expenditure allocation of Kyat 9.5 billion in 1999/00 (US$27.8 million) or less than 16% of total SAA capital expenditures. This equated to a reduction of some 40% in real terms and a decline in share of GDP from 1.4% in 1980/81 to 0.4% two decades earlier. By contrast, total government allocation to all SAA capital expenditures increased by 64% in real terms, over the same period, indicating higher priority given to other sectors.

3.81 Although it is not the purpose of this section to review current expenditures of the natural resource ministries, it is worth noting that, in real terms, public natural resource agencies' current expenditures have declined less than capital expenditures, falling by only 25% over the same period. Surprisingly, perhaps, current expenditures of both MOAI and MOF are lower than capital expenditures, averaging about 80%. For MLBF, however, current expenditures are almost five times higher – reflecting the extremely low capital expenditures allocated to this Ministry.

State Economic Enterprises

3.82 Given that most state economic enterprises in the agricultural sector are units within MOAI or another ministry, the relationship between SAA and SEE investment is not entirely clear. Nevertheless, official data indicates that all non-mineral natural resource SEEs received Kyat 3.5 billion (approximately US$10.3 million at prevailing market exchange rates) in capital allocation in 1999/00, a substantial increase – even in real terms – over allocations 20 years before. This was still no more than 16% of total Government capital allocations to SEEs for that year, but was a marginal increase on the 14.2% received in 1980/81 (see Table 6d).

3.83 Nearly 80% of the 1999/00 natural resource allocation went to agriculture, with fisheries getting nothing and the Livestock Feed and Milk products enterprise (LFMPE) of MLBF receiving only Kyat 28 million (US$82,000). Myanma Timber Enterprise (MTE) received just over 10%.

3.84 Overall Government funding to SEE capital expenditures accounted for 10.6% of GDP in 1980/81, but this had fallen significantly, to only 1% by 1999/00. In this same year, the non-mineral natural resource SEEs capital expenditures contributed only 0.2% to GDP.

3.85 No figures are published for SEE current expenditures, although the aggregate cash trading losses of sector SEEs was given as Kyat 17.7 billion in 1999/00, equivalent to US$52 million at prevailing market rates of exchange, or approximately one third of all SEE trading losses in that year. SEE current expenditures in the natural resource sector appear to be much higher than this, however. By a comparison of SAA, SEE and total Government data, it appears that they reached MYK 58.6 billion or nearly US$172 million in 1999/00. This is more than 15 times higher than SEE capital expenditure and almost 6 times higher than SAA capital expenditure.

Total Government Capital Expenditures

3.86 Total Government capital expenditures are summarised in Table 6e and comprise the sum of SAA and SEE expenditures. For the year 1999/00, the most recent data available, Kyat 13 billion (US$38 million) was allocated to public capital spending in the natural resource sector; 90% of that to agriculture. This equated to nearly 16% of all Government capital expenditures, or less than 20% of the current expenditures for the natural resources sector. As a proportion of total government disbursements (capital and current) natural resource capital expenditures amounted to less than 2.5%.

3.87 All public spending on natural resources (agriculture, fisheries, livestock and forestry) in 1999/00 accounted for 15% of the state budget, with agriculture alone accounting for 12%. This contrasts sharply with the more than 40% of GDP and 64% of employment contributed by the broad agricultural sector and suggests a significant under funding by the State in the sector.

Private Sector Investment

3.88 No data is apparently available in Myanmar with respect to domestic private sector investment, such as on-farm and business spending on capital goods. However there is data on permitted foreign investment since 1990 when legislation first allowed such investment under the Foreign Investment Law.

3.89 In aggregate, such permitted foreign investment has not been significant for the agriculture and natural resource sector. From 1990 to March 2001, a total of four foreign investments have been made in agriculture, and a further 20 in fishery (see Table 6f). No mention is made of forestry. Agricultural investments have totalled Kyat 26 million in local currency (in current Kyat) and almost US$35 million, while fisheries investments have totalled Kyat 390 million and US$283 million.

3.90 Overall agriculture and fisheries have contributed only 4% of the foreign currency and 6% of the local currency of investments made under the Foreign Investment Law.

Non-Governmental Organizations

3.91 Myanmar possesses few national NGOs but there are several international NGOs operating in the country, principally in the areas of HIV/AIDS, primary health and maternal and child health care. According to the Asian Development Bank, their investment within the country amounted to US$7 million in 2000, but little of this flowed into agriculture or natural resources.

4. RURAL SOCIAL STRUCTURE AND POVERTY[1]

A. INTRODUCTION

4.1 The discussion in this section reflects mission reviews, observations, discussions with key informants, synthesis of data available from published and unpublished sources and interactive participatory discussion with rural poor communities in Myanmar. In addition, a rural socio-economic study using rapid rural appraisal method was undertaken. The main findings of the review were presented during the Final Workshop on Agricultural Sector Review and Investment Strategy Formulation held in Yangon in January 2004.

B. HUMAN DEVELOPMENT STATUS

4.2 Myanmar, a country of 52.1 million people (DAP, 2004) with a per capita GDP (PPP) of US$1,027, has an average life expectancy at birth of 57 years. In the global human development index (HDI) scale it occupied 131st place in a list of 175 countries in 2001 with a HDI value of 0.549 (UNDP, 2003). In regional grouping of ASEAN, Myanmar performed marginally better than Lao PDR (see table below). Myanmar's HDI score dipped slightly in 2001 compared to 2000. The GDP Index was lowest of all ASEAN countries despite of sizable stock of natural resources and growth potential of the country.

Human Development Index for ASEAN Countries in 2001

Country	Life Expectancy Index	Education Index	GDP Index	HDI Value	HDI Rank
Singapore	0.88	0.87	0.91	0.884	28
Brunei	0.85	0.89	0.88	0.872	31
Malaysia	0.80	0.83	0.75	0.790	58
Thailand	0.73	0.88	0.69	0.768	74
Philippines	0.70	0.90	0.61	0.751	85
Vietnam	0.73	0.83	0.51	0.688	109
Indonesia	0.69	0.80	0.56	0.682	112
Cambodia	0.54	0.64	0.49	0.556	130
Myanmar	0.53	0.72	0.39	0.549	131
Laos	0.48	0.63	0.49	0.525	135

Source: Human Development Report 2003, UNDP.

[1] The following section is a summary of Working Paper 1 "Rural Social Structure and Poverty" contained in Volume 3 of this study and prepared by Ganesh P. Rauniyar, Rural Sociologist for the Agricultural Sector Review.

C. RURAL SOCIAL STRUCTURE

Household Composition

4.3 Myanmar's last population Census was conducted in 1983 and annual population growth rate during 1998/1099 to 2002/2003 continues to be projected at 2.02% (CSO, 2003). In 1983, three-fourths of population lived in rural areas but in absence of other statistics it is estimated that share of rural in total population will decline to 63.3% by 2015 (UNDP, 2003). In aggregate terms, females marginally outnumber males but substantial divergence exists in relatively remote States/Divisions and townships in which males live off-farm for extended period of time. The under-15 population accounts for slightly less than one-third of the total and nearly three-fifths fall into the economically active age group (15-59). Regional population distribution is skewed towards more urbanized Divisions and 39% of people and 42% of households are located in the better-served Divisions of Yangon, Mandalay and Ayeyarwady where there is greater potential for employment and access to social services. This trend is likely to continue in the future as people from disadvantaged areas migrate to these areas. Myanmar is a multi-ethnic country but largely dominated by Bamars and nine out of ten people practice Buddhism. Ethnic minorities tend to concentrate in relatively more remote areas.

4.4 Rural household size tends to be higher than for urban areas. In 2003, one in ten rural households was headed by a females and female heads of households tended to be older women. Similarly, in aggregate terms 10% of all household heads and 30% of female heads of households had no formal education. Female school drop out rate was estimated to be higher than males because women tended to assume responsibility at relatively younger age and were less likely to return to schooling.

4.5 Landlessness was positively correlated with household size, and this relationship was particularly pronounced for the female headed households. The members of both larger households with land (indicating surplus labour) and landless households (indicating lack of livelihood options) were more likely to emigrate outside than the members from other households. The level of educational attainment was strongly correlated with land holding size. An average dependency ratio was 1.9 with substantial spatial variations, reflecting higher ratio for the relatively more remote and disadvantaged locations. Higher ratios were associated with lack of livelihood options and larger household size.

Access to Land

4.6 Nationally, 40% of households in Myanmar are landless, although this declines to only 30% of households in rural areas (see table below). Furthermore, a further 37% of households depend on small/marginal farms (cultivating less than 5 acres of land). Almost all households in Shan (East) have small/marginal farms. The proportion of households with medium size farm (5 to 10 acres) in 2003 was estimated to be around 15%, only 7.6% of households operating more than 10 acres of land. The share of small/marginal landholding households tended to be higher in relatively difficult and isolated State/Divisions.

4.7 The ownership of rural land is vested in the State and the right of cultivation can only be provided by village level land committee as per approval of higher level land committees. Under normal circumstances, land cannot be used as a collateral to access rural finance. In

addition, there is no legal basis for transfer of land ownership from one person to another. However, field findings show that rural land transactions are common all over Myanmar and particularly so in more densely populated areas like Ayeyarwaddy Division. It is common to informally mortgage land with the moneylenders or even to sell the land to meet immediate cash needs or repay high interest loans obtained by the households. There is a consistent pattern that indebtedness is driving a rising level of landlessness in many parts of the country.

Number of Households by State/Division and Landholding Distribution in Myanmar, 2003

State/Division	Total No. of HHs	Average Proportion of Households by Land holding Size in Myanmar (%)							Landless Households	
		HH Size	Under 5 Acres	5-10 Acres	10-20 Acres	20-50 Acres	50-100 Acres	Over 100 Acres	Total (%)	Rural (%)
Kayah	36,183	7.8	57.57	26.39	2.29	0.25	0.00	0.00	13.5	10.0
Kayin	191,990	7.8	63.03	16.43	5.67	1.18	0.02	0.01	13.7	10.1
Chin	78,855	6.3	71.97	7.06	0.33	0.01	0.00	0.00	20.6	17.6
Sagaing	787,081	7.0	35.10	21.30	10.20	3.10	0.11	0.00	30.2	26.0
Magwe	586,156	7.8	64.87	20.80	8.52	1.77	0.02	0.00	4.0	3.4
Tanintharyi	187,309	7.7	55.61	14.24	3.43	0.91	0.12	0.05	25.6	19.6
Mon	335,584	8.0	40.96	14.48	7.24	1.59	0.03	0.01	35.7	25.6
Rakhine	463,590	6.3	47.96	10.77	2.59	0.78	0.03	0.00	37.9	32.2
Ayeyarwady	1,108,770	6.3	37.44	18.88	9.13	1.90	0.06	0.02	32.6	27.7
Bago (East)	512,928	5.5	26.67	18.84	8.44	1.19	0.04	0.03	44.8	36.1
Bago (West)	579,677	5.3	27.90	14.80	5.47	0.33	0.00	0.00	53.3	42.9
Yangon	1,092,886	4.7	6.40	4.20	2.32	0.52	0.02	0.01	84.4	26.8
Mandalay	1,197,334	6.0	26.82	14.82	5.77	1.58	0.01	0.00	51.1	37.5
Shan (South)	338,667	5.8	49.57	13.12	3.80	1.00	0.01	0.00	32.5	25.6
Shan (North)	297,685	7.0	66.60	17.26	3.62	0.81	0.02	0.02	11.7	9.2
Shan (East)	121,525	7.7	96.50	3.10	0.33	0.03	0.01	0.01	0.0	0.0
Kachin	143,526	9.2	74.69	17.13	4.50	0.53	0.02	0.04	3.1	2.4
Total	**8,059,746**	**6.5**	**37.4**	**14.9**	**6.1**	**1.4**	**0.0***	**0.01**	**40.1**	**30.3**

Source: Mission calculations based on rural-uban proportion reported in the 1983 Census of Population using data provided by DAP (January 2004).

4.8 The field study undertaken for the mission indicated that nearly one-third of households inherited their land, while slightly over 20% purchased it. About 23% of the households also claimed to have title to the land they were cultivating. Two-thirds of the households with no cultivable land had only a homestead and less than half of those with cultivable land produced paddy.

Land Use

4.9 The total cropped area in Myanmar increased from 28.95 million acres in 1995/96 to 34.2 million acres in 2000/2001, an increase of about 15%. However, these increases varied substantially across States/Divisions (see table below). Increases in crop area may be accrued to expansion of cultivation on marginal lands, use of reclaimed land and/or increase in cropping intensity.

Change in Cropped Area and Per Capita Cropped Area by State/Division

State/Division	Cropped Area % Change 95/96-00/01	Cropped Area/ Capita (Acres) (2000/2001)	State/Division	Cropped Area % Change 95/96-00/01	Cropped Area/ Capita (Acres) (2000/2001)
Kachin	51	0.42	Magway	26	0.96
Kayah	17	0.57	Mandalay	18	0.57
Kayin	8	0.45	Mon	14	0.46
Chin	22	0.50	Rakhine	12	0.43
Sagaing	37	1.24	Yangon	-4	0.21
Tanintharyi	15	0.38	Shan	27	0.42
Bago	7	0.89	Ayeyarwady	7	0.97
			Union	**15**	**0.63**

Source: DAP, 2003.

4.10 For the country as a whole, the area under rice declined by about 10% during 1995/96-2000/01. The downward trend was also observed for area under cereal, oilseeds and fibre crops while area under tobacco and betel has remained little changed. An upward trend was seen for pulses, spices, beverages, vegetables and fruits, and miscellaneous crops. Some significant variations are noted if data is disaggregated by State/Division (refer Working Paper 1, Appendix 1). For example, Rakhine State shows a nearly doubling of the area under oilseed crops despite a downward national trend. Similarly, Shan State has witnessed more than 17% decline in area planted in rice, with a corresponding shift to pulses, spices, beverages and vegetables and fruits.

4.11 The government statistics indicates that the total area under forest has remained virtually unchanged in all States/Divisions. If this were correct then any expansion in cropped area would come from three sources: increase in cropping intensity, exploitation of marginal lands and reclamation of wasteland and/or unused land. However, this does not imply that the forest resources have remained stable over time. In addition, access to forest resources for common people has been increasingly difficult.

Access to Social Services

4.12 The adult literacy rate in Myanmar improved from 76% in 1980 to 85% in 2000 while the youth literacy rate (aged 15-24) has increased from 85% in 1980 to 91% in 2000 (ESCAP, 2003). These figures are slightly lower than more advanced ASEAN economies but higher than those for Cambodia, Laos, and Indonesia. The analysis suggests that for the country as a whole, the student to teacher ratio increased by 37%, 4% and 9% in 2001/2002 over the 197/1998 levels at the high, middle and primary school levels (information for rural schools is not available). This implies that the system is unable to respond to high demand for high school education in particular, resulting in substantially higher workload for teachers. A larger divergence in access to education particularly for rural children may result in varying capabilities which ultimately may become a critical impediment to national growth.

4.13 The population with access to health services in Myanmar increased from 33% in 1985/87 to 60% in 1990/95. The average life expectancy and infant mortality rates of Myanmar population are marginally better than of people in Cambodia and Laos. In general rural mortality rates, whether for infants under-5 or for mothers at birth, are higher than for equivalent urban populations. Males also suffer a higher mortality rate than their female siblings in most

States/Divisions. Higher mortality rates for rural areas are not surprising as the health services tend to be of relatively inferior quality, there are problems of timely access to health services, and home delivery is more common, with its associated lack of ideal sanitary conditions. In several States/Divisions the rates for maternal mortality in rural areas are more than double their urban counterparts. The urban rural divide is particularly apparent in relatively remote States/Divisions where substantially higher maternal mortality rates are the norm for rural areas (e.g. Chin, Kachin, Shan, Tanintharyi and Rakhine).

4.14 Overall, the number of hospital beds scheduled over the over 1995/096-2000/01 increased by only 5%. However, scheduling of beds does not reflect demand for health services. There is large variation across States/Divisions in terms of population coverage by medical service providers. More than four-fifths of the population relies on private health service providers, while public expenditure on social services (health, education, and other social services) has dropped substantially in proportion to GDP. In the ASEAN region, the percentage of public expenditure spent on education and health services was lowest for Myanmar with the exception of Indonesia (ESCAP, 2003).

D. THE STATE OF RURAL POVERTY AND FOOD INSECURITY

Poverty Estimates

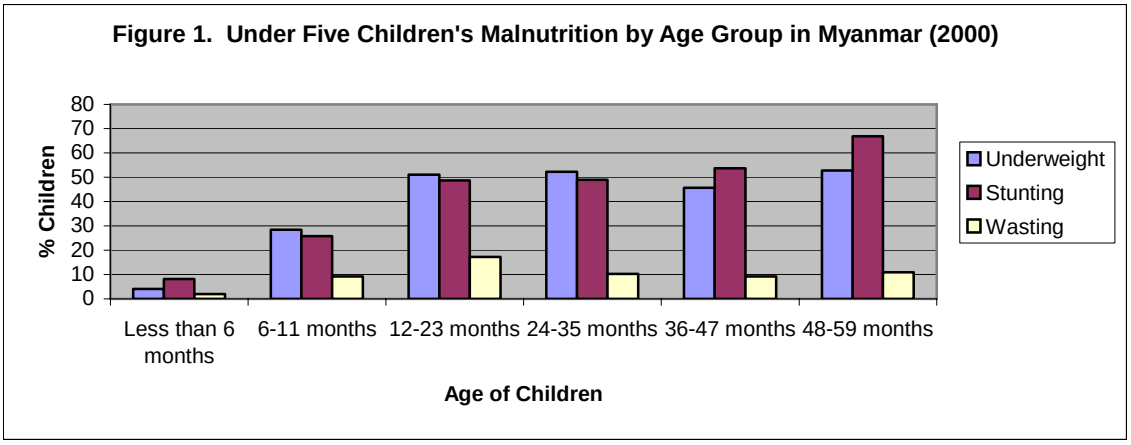
4.15 Myanmar has no official poverty line (World Bank, 1999) but estimates computed by the World Bank using 1997 HIES data are far lower than mission's findings from the field. However, one point noted by the World Bank study deserves attention. Although rural poverty was estimated to be similar to urban (22.4% vs. 23.9%), nearly 40% of the households were close to the poverty line and could easily fall into poverty. There are several reservations about the quality and reliability of HIES data both published for the 1997 in 1999 as well as partially published for 2001 in 2004. Thus, it may not be prudent to assign too much weight to these datasets.

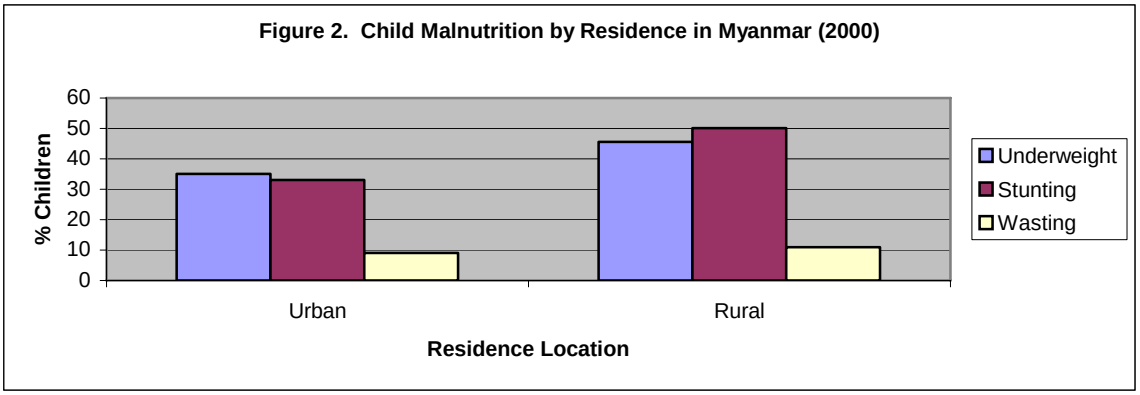
4.16 Participatory poverty analysis using PRA tools such as well-being ranking and wealth ranking provide more reliable estimates of extent of poverty in rural areas. Findings from both the ASR mission's study as well as evidence from the UNDP Human Development Initiative (HDI) project suggest considerably higher poverty levels across a range of different agro-ecological zones. For example, in 14 of 16 villages covered by ASR study half or more households belonged to poor or very poor category. In 17 of 24 HDI villages, 90% or more households were identified as poor or poorest-of-the-poor households.

4.17 The share of food in total household expenditure is quite alarming. The 1997 as well as 2001 HIES data indicate that food alone accounts for more than 70% of household expenditure. The mission's rural socio-economic study puts the figure somewhat lower but still food occupies 60% of total expenditure. This leaves very little disposable income for the households to meet other requirements.

Endemic Rural Poverty Rates Based on Child Malnutrition

4.18 Recent literature and research provides sufficient basis to use child malnutrition indicators as proxy variables for estimating endemic poverty in rural areas (refer to Working Paper 1 for conceptual discussion). Although limited in scope, the MICS findings reported by the Department of Health Planning are striking. Firstly, the study demonstrates that the level of child malnutrition (both stunting and underweight) increases with the age of children under five years old (Figure 1 below). This finding implies that, as children grow, food access (both in quality and quantity) deteriorates and adversely affects their health. Secondly, the level of child malnutrition is higher in rural areas compared to urban areas and the difference is more pronounced for the States/Divisions considered remote or less developed (Figure 2 below). The inter-State/Division variations of malnutrition for rural areas are quite large (26% in Shan North to 65% in Rakhine State). However, unlike other Asian countries, Myanmar does not exhibit significant gender differences in child malnutrition. Thirdly, results also indicate that the level of child malnutrition is strongly and positively correlated with maternal education. Thirteen of 16 States/Divisions had more than 40% of under-5 children stunted. Wasting ranged from 2.6% in Shan North to 18.1% in Rakhine State. The prevalence of child malnutrition is higher in relatively more remote States/Divisions than those with better services.





Poverty Rates on Small Farms

4.19 An economic analysis of small farms in selected townships of Myanmar suggests that small farms are relatively more efficient than large farms (DAP, 2003). However, small farms also tend to have higher rates of poverty[1], reflecting inadequate resources for household needs[2]. The following table provides poverty rate estimates as well as source of household income for these small farming households. The price adjusted poverty rate was found to be highest for small farms in Taungdwingyi (75%), followed by those in Magwe (67%) and Myeik (58%). Small farmers in Taungdwingyi also derive 25% of their household income from farm labour.

Poverty Rates on Small Agricultural Farms in Selected Townships of Myanmar

Township Area	Income Share from Different Sources				Poverty % (Nominal)	Poverty % (Price Adjusted)
	Paddy	Other Crops	Farm Labour	Non-Agric.		
Myanungmya	67.9	3.9	7.3	20.9	48.6	48.6
Nyaungshwe	5.9	50.9	11.4	31.7	38.5	38.5
Kalaw	-0.1	74.4	16.8	8.9	35.3	41.2
Kyaykse	22.4	31.4	8.0	38.3	35.3	47.1
Magwe	0.0	54.7	14.1	31.2	66.7	66.7
Taungdwingyi	3.9	62.9	25.6	7.6	91.7	75.0
Bago	58.8	23.4	8.0	9.8	29.0	25.8
Myeik	33.8	9.5	6.8	49.9	47.4	57.9
Source: Mission calculation based on DAP data (2003).						

4.20 The increasing pressure to generate extra income is felt by small farmers in all townships and as a result they seek other income opportunities, which typically tend to be low skill and low wage jobs. Overall for the eight townships (including both small and large farms), farming (rice and other crops) accounted for nearly three-fourths of household income for farming families, followed by slightly more than one-fifth from non-agricultural sources. However, farm labour accounted for only 5% of the household income. This suggests a limited demand for agricultural wage labour in the areas studied, or a reluctance on the part of landowners to undertake agricultural work for others. As casual labour on agricultural farms is believed to be a significant source of employment for landless households, the second possibility may well be correct. More than 43% of households are landless and thus have no other option but to seek wage employment.

Food Insecurity and Vulnerability

4.21 The results from a FIVIMS analysis in 2002 identified a total of 52 townships (18%) which were classified as being very highly vulnerable, 49 (17%) highly vulnerable, 62 (22%) moderately vulnerable and the remaining 122 (43%) having only a relatively low level of vulnerability. Twenty-nine of the 52 very highly vulnerable townships were located in Shan State alone. Similarly, 79% of the townships in Shan are either very highly or highly vulnerable. All

[1] Poverty rates in this study were defined differently and were based on the definition that if households spent more than half of their income on food they would be classified as poor households.

[2] The study focused only on farming households and excluded landless households.

townships in Chin and two-thirds of townships in Kachin are also very highly or highly vulnerable. At least half of the townships in Tanintharyi and Rakhine also fell into the same categories. On the other hand, Bago, Mon and Yangon townships were found to be least vulnerable of all townships. The results also confirms that townships which are well served in terms of infrastructure and services, are less likely to be vulnerable compared with townships distant from the major market and employment centres.

Coping and Enabling Strategies for the Poor Households

4.22 Majority of poor households and poor women manage their problems themselves and appear to explore a number of alternatives (learning by doing). Only 20% of the respondents indicated that they had sought help from outside to solve their problems. Major coping strategies adopted by poor households include sale of assets, physical labour for payment or food, the sale of crops when prices are low, reducing food intake, consuming inferior food items, and borrowing at substantially higher interest rates from informal sources. At times, they are compelled to beg food just to survive. Technical, market and price information within this group are transmitted largely by word of mouth. For equipment, poor households tend to borrow from others in exchange for labour.

4.23 In terms of enabling strategies the poor households tend to adopt various means. One strategy is to withdraw children from schools and have them participate in work. Members of poor households also tend to work longer hours in less than normal working conditions. For cash requirements, their savings (when they have any) tend to be in the form of gold jewellery. They also try to seek information from government department offices but their utility is very limited because most of the departments are under resourced and provide outdated information which is of little use.

E. POTENTIAL OPPORTUNITIES

Millennium Development Goal–1 (MDG-1)

4.24 It is apparent that poverty and social deprivation are widespread in rural Myanmar. The Government of Union of Myanmar (GOM) is a signatory to the Global Summit on Millennium Declaration and World Food Summit and there is a tremendous opportunity to meet these commitments and move decisively to reduce rural poverty and food insecurity. Agriculturally-related objectives are largely covered in the first Millennium Development Goal (MDG-1) which stipulates that the countries will halve the number of those in poverty and hunger by 2015. Many countries have already taken initiatives to set up their own goals and mechanisms for reaching them and in collaboration with the international community they have formulated policies and strategies that facilitate these steps. Ultimately, it should be remembered that although rural poverty is deeply rooted in Myanmar, the country possesses an unrivalled agro-ecological diversity and rich resource base (land, water, air) which offers the potential to achieve MDG-1 targets better than many other developing countries.

Livelihood Options for Rural Poor

4.25 Myanmar is well positioned in terms of resource endowments (including land, mineral and water) and has a comparative advantage in terms of low population base per unit area compared to other Asian counties. The country has more than 7 million acres of potentially cultivatable land, some of which could be developed for agricultural production. However, national benefits in aggregate terms would be substantially higher if access to land and water resources is improved for small/marginal, landless and ethnic minority households. With improved access to skills and technology along with capital, poor and destitute households could come out of the vicious cycle of poverty within a short period of time. There is also the opportunity to create improved and new opportunities for employment income opportunities for the rural population through better livestock production and management system, handicrafts, rural cottage industries, high value crops such as medicinal plants etc.

Increasing Household Income by Value-Added Approach

4.26 There are substantial opportunities for Myanmar in producing value-added goods and services which can generate better-paying employment opportunities for a large number of rural inhabitants. Effective and sustainable policies which support crop diversification in response to attractive market potentials and local social conditions, and which offer the potential for processing and other value-added activities could increase rural household incomes substantially. The country can benefit from local production of goods and services having comparative advantage over its neighbours. This process has additional scope to accelerate with fully market-oriented production system based on demand driven approach.

Better Quality of Rural Life

4.27 There is great scope to improve quality of life for rural people in Myanmar. Opportunities exist for improving access to food, nutrition, health, education, family planning, transport and other necessities. The country can attract a vast amount of infrastructure and human resource development though a private-public partnership programme.

Timely Reliable Rural Statistics and Studies

4.28 Agricultural and rural development strategies and policies that serve in national interest have a greater pay off if these are formulated based on a good understanding of local needs and priorities. The country will certainly be able to benefit from timely and reliable collection, analysis and release of rural statistics and participatory analytical studies. Better information base has also positive spin-off effects in monitoring and evaluating effectiveness of development interventions which would guide the country towards judicious allocation of resources in the interest of Myanmar people. Such statistics and studies will of tremendous benefit towards Myanmar's progress towards achieving MDG-1 Goal as well and on time.

F. ENABLING ENVIRONMENT

4.29 Rural people in Myanmar have a strong commitment and they tend to strive to improve their own lives and those of their children. They are highly enthusiastic individuals (both men and women alike). Local communities are closely knitted and they tend to help each other when needed and at times may go one step further to assist vulnerable people within their means.

4.30 Myanmar people in general have open minds and are receptive to improved or new ideas that would better their living conditions. As and when resources, along with technology and support services (including working capital), are available they do not hesitate to absorb some degree of risk in investment. However, such opportunities would have to be made available on equal footing, irrespective of landholding size.

4.31 As discussed earlier in this paper, 30% of rural households are landless and another 37% have small/marginal cultivable land. Many households traditionally dependent on marine fishing have been adversely affected by restricted access to the sea for fishing. Myanmar would need to allocate bulk of any newly developed land (subject to preservation of biodiversity and ecological balance) to small holders who would till their own land and generate a sense of pride of land ownership. This will encourage investment in agriculture over time, if property rights are clearly defined. A move towards initially leasing cultivable land for an extended period and subsequently providing tillers with land titles would further accelerate agricultural investment where it is long overdue. Long-term lease of land and water resources especially for marginal/landless/disadvantaged groups will also facilitate access to rural finance for willing rural households.

4.32 Inter-sectoral and inter-agency coordination are critical for welfare of rural people. At present, there tends to be 'patch protection' attitude among many government departments. Also, within a sector coordination among various departments is equally critical. For example, the Ministry of Agriculture and Irrigation should be able to play coordinating role at least for all agencies under its umbrella and beyond. This is lacking at present.

4.33 The rural population will benefit tremendously if services delivered by various government departments are adequately disseminated, resourced and made available to needy people on time. For example, schools need to be adequately resourced, with more teachers and up-to-date educational materials. Similarly, the public perception of "taxing" attitudes towards government servants need to be well managed so that general people are not threatened and are able to carry on their social and economic activities.

4.34 In a dynamic world, if Myanmar aspires to be on equal footing with other ASEAN economies in terms of economic development and standard of living, the country would need to formulate, test, implement and evaluate people-centred institutions and policies, based on regular monitoring and periodic evaluation with an aim to provide assistance to various interest groups. National policies and institutions need to change. For example, the current commodity focus within the national agricultural research system is of limited relevance to majority of the farmers. In reality, small and medium farmers tend to adopt a mixed farming system, combining crops with such activities as livestock, fishery and aquaculture, collection of natural resources, and off-farm income, depending upon geographical location.

4.35 Design of effective policies requires a good statistical foundation. At present, many rural statistics are not available. Only a limited amount of the statistics collected by various agencies/departments is published by CSO in its Statistical Yearbook. A core rural statistical database is vital in the national interest. Lot of data can be achieved from existing sources through transparent direction from the higher authorities and publication of statistical information (post-reliability test) on time and on a regular interval.

G. CONCLUSIONS AND RECOMMENDATIONS

4.36 **Rural Statistics**. Collection, management and analysis of reliable rural statistics on time and at regular intervals is crucial in understanding and dealing with rural social structure and poverty in Myanmar. This will benefit the GOUM in developing pro-poor policies, strategies and programmes/projects. Efforts are needed to develop a consolidated database based on data from various sources (currently available in fragmented form from different agencies).

4.37 **Poverty Profile**. Poverty is pervasive and tends to be concentrated in remote and inaccessible areas. Proper analysis and estimates of rural poverty rates will facilitate designing context specific interventions and judicious allocation and use of limited resources. Initiatives are needed to develop poverty profiles for all townships in the first instance. This would require timely release of statistics from relevant agencies and collection of additional information based on participatory rural appraisal exercise.

4.38 **Mainstreaming Landless Households**. Rural landless households have a strong will and commitment to translate opportunities into better lives for themselves and their household members. Access to land resource, skill development, working capital and sustainable income opportunities are required. An appropriate enabling environment is a pre-requisite to uplift the fate of these households. Pride in working on one's own land is considered better than tilling that of others. In Myanmar, the availability of land is not a constraint and with improved access to land the landless households would be able to boost their household level production and eventually to emerge out of vicious cycle of poverty.

4.39 **Property Rights**. Well-defined, tradable land use rights greatly facilitate medium or long-term investment in productive assets (crops, livestock and fishing). Current land tenure rights need to be reconsidered. Possible options include assigning user-rights to all landholders by providing them with land titles and/or permitting long-term lease coupled with options for land trading.

4.40 **Livelihood Options for Poor Households**. Locally preferred and potentially viable livelihood options for the rural poor (including landless and ethnic minorities) include small livestock development (e.g. poultry, duck, pig rearing) micro-enterprise development (e.g. handicrafts, small trading, prepared food items), and a sustainable fishery management plan. This would require access to skills and capital as well as to markets.

4.41 **Location-Specific Farming Systems**. Farming systems based on farmers' needs and technical/economic feasibility serves in national interest. Myanmar has a diverse agro-ecological environment. Efforts are required in developing viable farming system options and this is going to require redirection of research and extension focus (for crops, horticulture, livestock, fisheries and agro-forestry).

4.42 **Rural Infrastructure**. Rural infrastructure including roads, storage, electricity, processing facilities, and markets are important for enabling poor households to produce goods, add values and sale at appropriate time and at a fair price. This will require investment in such facilities and promotion of private sector.

4.43 **Rural Social Services**. Access to education and health services for the rural population needs to be substantially improved with further investment in primary and secondary education and primary and child/material health. This will assist Myanmar in achieving educated and healthy population for the benefit of national economy. Intervention programmes need to focus on breaking the cycle of dependency on larger family size for household income and raise awareness, adoption and follow-up of family planning measures.

4.44 **Millennium Development Goals (MDG)**. Myanmar is a signatory of the MDG Convention but the country's progress in attaining MDG is yet to be assessed. ***This would require a mechanism and operational plan to assess at the national level and report progress towards the achievement of the MDG***.

5. COMMUNITY DEVELOPMENT AND LOCAL INSTITUTIONS[1]

A. INTRODUCTION

5.1 In Myanmar more than 70% people live in villages and are dependent on agriculture. Most families in rural areas of Myanmar spend around 70% of their income for food alone, which compares unfavourably with the global benchmark of 50% as indicator of poverty. This is also true of many urban households.

5.2 The poor and vulnerable have few assets (land, livestock and financial capital) and as a consequence are heavily dependent on low skill wage labour. They also resort to different coping mechanisms including migration, indebtedness and dependence on natural resources. Women have an active role in income generation activities. Village society is cohesive and the houses in the villages are usually in single or double rows along the roads or rivers or edges of paddy fields or in multiple rows in suitable open land.

5.3 Cultural homogeneity, language, religion, community spirit and a tradition of helping each other and especially those under difficult circumstances are some of the major strengths of the society. But the society is hierarchical, and therefore social, economic and political powers are shared unequally. There are several indigenous socio-religious institutions in the villages like pagoda trustees committee, women's association, village elders group, young men's group etc., besides Parent-Teachers' Associations and Health committees organized as per government guidelines. Myanmar communities have great potential for community led growth for the social and economic development of the society as evinced by the various initiatives for the development of their villages with their own resources when external help is not available.

B. GOVERNMENT INSTITUTIONS AND SERVICES

Community Level Institutions and Services

5.4 In each village, every ten households and every hundred households have leaders (thus if there are hundred households in a village, there will be ten, 10-household leaders and one 100-household leader). The hundred household leaders will represent the village in the Village Tract Peace and Development Council (VTPDC). The Township Peace and Development Council select the village leaders and council members. The village leaders work under the guidance of VTPDC and provide assistance for implementation of Government programmes in the village.

5.5 **Education**. There is an average of three primary schools for every five villages. Every school has a Parent-Teachers' Association (PTA) to support the school. The PTA contributes to the repair and maintenance of school facilities and sometimes teachers' salaries when a Government teacher is not available for a school. The contribution of families and

[1] The following section is a summary of Annex 1 of Working Paper 1 "Community Development in Myanmar" contained in Volume 3 of this study and prepared by Asesh Lahiri, Community Development Specialist for the Agricultural Sector Review.

communities is estimated to represent up to three times the official government expenditure on education between 1994/95 and 1999/2000. (ADB, Country Economic Report, 2001).

5.6 **Health**. Most villages have Health Committees consisting of a health assistant, midwife and auxiliary midwife. The government provides a salary to the health assistant and midwife and some medicine as per availability from Township hospitals. Some villages have rural health centres, attended by a health assistant who will keep some health awareness materials, medicine etc. Access to quality health service varies widely from area to area. The vast majority of deaths and illnesses are due to inappropriate care and lack of knowledge, frequently stemming from insufficient public investment and resources at household level. There are a few NGOs and professional bodies such as the Myanmar Red Cross Society (MRCS), the Myanmar Medical Association (MMA) and Myanmar Maternal and Child Welfare Association (MMCWA) to implement programmes on behalf of Government in some villages. UNICEF, WHO, UNDP, UNFPA, and the Government of Japan are also involved in strengthening health services.

5.7 **Infrastructure**. At the community level there is no agency to support the development of village roads, bridges and culverts. Usually villagers take part in or contribute to the construction of essential infrastructure.

5.8 **Production Support Services**. Many villages have village level agriculture extension workers who work in collaboration with village leaders to support centrally planned targets for pillar crops and control land use (whether land is used for growing paddy or otherwise) The village leaders help to organize village meetings for agricultural demonstrations, selecting farmers for seed multiplication, land use control (whether land is used for growing a prescribed crop or not), distribution of irrigation water and farm machinery, make recommendations for credit etc. In general, the availability of extension services, quality seeds, inputs and credit is far less than the level of demand.

Village Tract Level Services and Institutions

5.9 The VTPDC consists of two members and a chairperson nominated by the Township Peace and Development Council (TPDC) out of village leaders of the villages of the tract. The chairperson remains in direct contact with TPDC and with village leaders of the tract. The office of VTPDC has a government official for collection of land and water tax, excise duty etc. Some of the village tracts have posts of Deputy Township Managers of Agriculture, Veterinary and Forests.

Township Services and Institutions

5.10 The TPDC consists of a Chairperson (an officer of the General Administrative Department), a Secretary (one of the officers of the township nominated by higher authority), and a Township Police officer. The Township officer is responsible for general administration and reports to the District Peace and Development Council. Every township has a Township Health Committee with one TPDC member as chairman, a TMO (Township Medical officer) as secretary, and Township heads of line departments as members. Similarly there is a Township Agriculture Supervisory Committee, Township Education Committee etc. The officers of the departments provide information about their programmes in the Township Committee meetings. The Agricultural Supervisory Committee comprising of the Township manager, Township level

officers of SLRD (Settlement and Land Records Department), Agriculture Mechanization Department, Irrigation, Water Resource etc. who are responsible for production of paddy or other particular pillar crops grown in the area. The Myanmar Agricultural Development Bank (MADB) was part of the supervisory committee in the past, but now works independently in respect of credit. All the departments implement centrally planned activities. Each township has an Executive Officer, Development Affairs Department who is responsible for construction of rural roads, bridges etc and implementation of programmes for model villages. In addition, a small fund is available to the Township Officer of General Administration.

Community Development Programmes

5.11 The Government's rural development programme covers health, education, water and sanitation, transportation and communication and economic development. The education and health departments support schools and health centres. The Executive Officer of the Development Affairs Department and the Township Officer of the General Administration Department implement the rural road and water supply projects. In productive sectors like agriculture, the MOAI provides limited inputs, irrigation and farm machinery as may be available, and extension service to achieve centrally determined goals of production of paddy and other crops. The Department of Livestock Breeding and Veterinary of the Ministry of Livestock and Fisheries is mostly involved in healthcare for livestock. The extension section within the department is small, focusing almost entirely on directing livestock vaccination a limited national artificial insemination programme. The Department of Fisheries has Township Officers in the areas important for fisheries but they provide no extension service. MADB has branches in about two-thirds of the townships. It has limited funds to provide loans, so loan sizes are small and reach only a minority of producers.

5.12 The rural development programmes of Border areas are coordinated by the Ministry of Progress of Border Areas and National Races and Development Affairs. The Ministry has several sub committees for various social and productive sectors headed by respective Deputy Ministers of line departments, Regional Work Committees headed by Military Commanders and Township Committees. The Ministry works under the guidance of a Work Committee composed of several Ministers of social and productive sectors, including Finance and Revenue, under the Chairmanship of the Prime Minister. The Work Committee was formed under the Central Committee for the Development Border Areas and National Races chaired by the Head of State.

C. UN PROJECT SUPPORT FOR STRENGTHENING COMMUNITY DEVELOPMENT

UNICEF

5.13 UNICEF's country programme includes three programmes:

(i) National level interventions consisting of policy analysis and capacity building to facilitate an enabling environment for positive change. The programme advocates the state parties to undertake such measures to the maximum extent of their available resources with regard to economic, social and cultural rights within the framework of international cooperation.

(ii) Nation wide interventions to cover all townships for achieving polio eradication, neonatal tetanus elimination and measles control, distribution of Vitamin A, iodized salt, providing sanitation to ensure hygienic practices, providing facts of life messages.

(iii) Area Focused Intervention to strengthen government programmes of health and education in 61 townships known as the Area Focused Township programme. Townships are selected after assessment of the current level of development and also the level of interventions currently supported by UNICEF. The states and divisions which have a higher "child risk measure" based on ten indicators are selected as most disadvantaged areas and provided more resources. UNICEF, DAD (Development Affairs Department) and the community share the budget for the interventions. DAD provides funds from their township budgets and in case of additional requirement they obtain funds from the central budget based on their proposal and negotiated by UNICEF at the central level. The UNICEF budget for the country programme for five years is US$63 million. The various NGOs participating in the implementation of the UNICEF programme are Community based Education Development Association (CEDA), Kachin Baptist Convention (KBC), Myanmar Baptist Convention (MBC), Myanmar Council of Churches (MCC), Myanmar Medical Association (MMA), Myanmar Maternal and Child Welfare Association (MMCWA), Youngmen's Buddhist Association (YMBA) Youngmen's Christian Association (YMCA), Young Women's Christian Association (YWCA).

UNDP

5.14 UNDP'S Programme of direct support to grassroots communities in the areas of public health care, community water supply and sanitation and improving access of children, women and men of poorest communities to primary education was initiated in 1994 under HDI and completed in 2001 as separate projects in eleven townships of the Dry zone, Southern Shan state and Delta area, along with Food Security Projects in these three zones. The total expenditure for all the projects for the eleven townships was US$79.76 million. The support provided by the projects to the communities was as follows:

5.15 The primary health sector project supported capacity building of communities through self-care at home, training of voluntary health workers, basic health staff, construction and renovation of village health centres, establishment of school health centres, establishment of referral mechanism, supply of medicine through township hospitals, establishment of community cost sharing scheme for medicine, IEC materials for public health and hygiene. The water sanitation project provided materials for water supply schemes, materials for sanitary installations and essential communication facilities for community support and IEC materials in the identified project villages. The education project supported the communities with school building construction materials, income generation opportunities for school funds, training of teachers, capacity building of PTAs, supply of text books, mobile libraries), teaching aids, school furniture, setting up of community learning centres including facilities for non formal education etc.

5.16 The scattering of project villages created problems of co ordination, integration and convergence. So, in HDI IV, all the social sector and food security projects have been integrated as one project.

5.17 Integrated Community Development Projects are being implemented in the target townships based on the lessons learned on Community Development model and sectoral projects model with a budget of US$10 million for target project villages of 11 townships. The ICDP model facilitates better integration and convergence of sectors when operated as integrated project.

5.18 UNDP has also been implementing a Community Development Project in remote townships of Chin, Kachin, Northern and Eastern Rakhine under HDI since 1994. Initially named Quick Impact Projects (QIPS), their title was changed in 1996 to Community Development in Remote Townships (CDRT). The total amount spent for the project till HDI III was US$8.39 million and under HDI IV the amount allotted is US$5 million. The Remote Townships Project has adopted the approach of supporting the formation of self-reliant groups of poor people for enhancement of livelihood opportunities and support to the community, with material inputs and technical advice to construct rural roads, bridges, drinking water supply, schools and health centres, as well as capacity building of health staff and village leaders in public health and hygiene, birth spacing etc. The self-reliant groups are supported by a land development facility for cultivation of waste land, technical advice for cultivation of appropriate crops, rearing of livestock etc.

Other UN Agencies and NGOs

5.19 A UNODC project for drug control in the Wa-Kokaung has been under implementation since 1998 with a community-based approach to the reduction and eventual elimination of the opium based economy in the area.

5.20 Support for an Agriculture and Natural Resources Management project in Northern Rakhine State was initiated with the support of UNHCR during 1999-2001 and continuing with EC funding, and is being executed by FAO. The project is providing technical assistance to the returnees from Bangladesh as well as the local poor for food security and training the trainers of NGOs (ACF, GRET and MRCS) along with local leaders and government staff and also providing inputs; assisting in seed multiplication and demonstration in farmers' plot.

5.21 Similar to UNDP a number of NGOs are involved in humanitarian assistance at the grassroots level in the rural areas, of which a few are specifically engaged in the agricultural sector. Combined assistance disbursed by all INGOs in 2001 was estimated at US$14.2 million.

D. EXPERIENCE OF THE HDI COMMUNITY-LED FOOD SECURITY AND ENVIRONMENT PROJECT

5.22 The communities of Myanmar villages traditionally carry out social development activities, but there is very little evidence of communities functioning together in the productive sector. UNDP assistance to Myanmar since 1994 has been provided within the framework of the Human Development Initiative Programme (HDI) under a special mandate, which stipulates that all operational activities are implemented directly targeting grassroots communities in five key

areas of basic human needs which necessitated adoption of a community led approach. The UNDP programme constitutes the most important experience of the application of community development approaches in Myanmar in recent years.

5.23 In particular, UNDP has used the community development approach as a means to increase food security for the poor and to expand and protect productive natural resources. The concept and strategy has been to use a participatory anti-poverty approach through which (a) environmentally sustainable options and opportunities for income generation of the poor are enlarged; and (b) the need for environmental protection is fully internalized by the beneficiaries as a mechanism for the protection of their incomes. The emphasis of the project was on providing the poorer segments of population of eleven townships with environmentally sustainable income earning opportunities in agriculture, livestock, and fishery and forestry sectors. This has involved developing community groups through social mobilization, participatory planning and the provision of inputs, as well as technical capacity building, providing community based extension services, credit and marketing opportunities.

Programme Activities

5.24 The HDI programme operates across three broad ecological zones comprising the central Dry Zone, the eastern plateau region of Southern Shan State, and the coastal Delta zone. Target village tracts were selected on the basis of poverty levels and environmental pressures, and specific communities within these tracts were chosen in participatory identification exercises. Target populations within communities, particularly landless and poor, were identified by wealth ranking through the use of Participatory Rapid Appraisal methodologies. The conditions and activities in each of these zones is described briefly below, as is the overall concept of village group formation and support.

Village Group Formation and Support

5.25 The community groups of poor promoted by the project have generally fallen into one of the following types: (a) groups with similar economic activities - e.g. small farmers' groups; (b) groups with similar socio-economic status but diversified occupations – e.g. landless families; (c) groups targeted at specific goals – e.g. forest users; and, (d) gender based groups – e.g. poor women. The groups provide a focus for activities in participating communities, a channel for extension support and a base for revolving fund establishment. Voluntary village level extension workers (one of each sex) are recruited and trained from each community. These meet monthly with project staff to discuss issues of importance to their village and to carry project messages to the villages. This system has not only helped the villagers to be in touch with the project but has also facilitated the linkages between project villages.

5.26 Groups formed to meet social objectives usually already exist in most communities in the form of PTAs, Health groups etc. In addition, however, the project created special WATSON groups for the management of water supply and sanitation. The project strengthened the capacities of social groups and introduced the culture of participatory decision-making. Most community households are members of one or more groups. Every group has an executive committee elected by members and develops it own modalities of operation.

Dry Zone Activities

5.27 With a total area of over 8 million, and covering the majority of Sagaing, Mandalay and Magwe Divisions, the Dry Zone includes both hilly areas with shallow, stony soils and sedimentary plateau areas. There is considerable gully and sheet erosion activity brought on by destruction of forest and vegetation cover and intense rainstorms during the monsoon season. Water run-off is high with little infiltration into the soil. The forest cover in the area has degraded due to collection of fuel by the local population and the rate of replacement is much lower than the annual removal of fuel wood (about one third of the forest area is open forest) Several small rivers and streams flowing in the area have become seasonal and the riverbeds have been rising due to deposition of silt.

5.28 HDI initiated two projects in the area in 1994 and in 1996 combined them into one project under food security environment cluster. Presently the Integrated Community Development Project (ICDP) of HDI IV is under implementation. In addition to HDI activities, reforestation programmes are underway under the control of the Greening Department of Ministry of Forests with support from JICA and FAO.

Southern Shan State

5.29 The watershed of Southern Shan State covers 17.6 million ha (26% of national land area). The area suffers from degradation of forests due to illicit logging, shifting cultivation, quarrying, and cultivation on steep slopes. The result has been accelerated soil erosion, deposition of silt in lakes, dams and reservoirs, and loss of fertility of soil and consequent poor socio-economic conditions of the people of the area. These factors have led to a decreasing capacity for water storage, affecting the hydrologic regime of the drainage system that supplies water to the dam and hydropower facilities located downstream. The situation of the famous Inle Lake is the worst example of continuing damage caused by sedimentation, shrinking from approximately 56 km to 15km in length and from 16 km to 6.4 km in width during the last 49 years.

5.30 In view of the importance of the Kinda Dam a UNDP/FAO pilot project for the conservation of the Kinda watershed was implemented from 1981-84. Subsequently, during HDI III (1994-2002) a number of poor villages in three critical areas selected for enhancement of food security and watershed conservation, including community forestry. Under HDI IV, these activities have continued. With international support a national NGO, FREDA, has also started a small project for catchment treatment demonstration work in the zone .

Delta Zone

5.31 The Ayeyarwady Delta has the highest population density in Myanmar (about 150 per km^2) and is the rice bowl of the country, but it also contains many isolated areas within the extensive coastal magrove system. After the banning of kerosene imports in early eighties, the pace of felling of mangrove forests for charcoal increased well beyond sustainable levels. Since 1994 mangrove felling in the area have been banned by the government.

5.32 A UNDP/FAO inventory project in early eighties provided information about the threatened condition of the mangrove ecosystem of the area. A pilot project was implemented during 1990-92. The HDI project (1994-2002) created community managed forests for

environmental conservation and income generation, and this has continued under the ICDP of HDI IV. FREDA, a national NGO, is also active in the area with the assistance of a Japanese NGO and JICA has initiated a pilot project to develop a programme of Integrated Development of the Mangroves.

Lessons Learned

Group Priorities

5.33 Since rural credit is a scarce commodity in Myanmar most of the members of the income generation groups mention credit from revolving fund as the most important benefit of working in groups. Other benefits which participants have mentioned in evaluation studies include: (a) mutual help in planting and harvesting paddy; (b) production and distribution of quality seeds among members; (c) sharing of ploughing equipment and irrigation pumps; (d) irrigation canal reconstruction in and distribution of water (Shan State); (e) establishment of water management and user charges for maintenance; (e) integrated pest management; (f) conservation of water through water harvesting and conservation structures (Dry zone); and, (g) paddy and transplanting and the making of rice thatch and mat (women's groups in the Delta zone).

Sustainable Income Generation for the Very Poor

5.34 Experience from HDI implementation has shown the importance of special programmes for very poor households which are focused on sustainable income generation. Very poor households often depend heavily on natural resources for their living and degradation of these resources can lead to increased poverty. At the same time, these groups often contribute to the degradation, particularly through their over-dependence on fuel wood and charcoal production as income sources. It is therefore very important to help generate sustainable approaches to natural resource management, targeted at this group, as well as providing associated technologies such as fuel-saving stoves. Many landless groups were trained also in fisheries-based income generation activities, such as artisanal fishery, crab fattening, cage culture and paddy-cum-fish culture.

Intensification and Diversification of Agricultural Activity

5.35 The three HDI food security projects have clearly demonstrated that small farmers in the various project areas can substantially increase their production of paddy, pulses, beans and pulses, groundnut etc. Increases of 30-50% have been seen where producers have access to sound extension and training, reliable agricultural credit, and required inputs of improved varieties of seed and fertilizers. The project also assisted in creating a community-based extension capacity capable of responding to community priorities through support for a range of technologies, including the production of fruits, vegetables, flowers, foliage, small animals and tree seedlings in hitherto unutilised or under-utilised land or on common land. It is worth noting that in many of the earliest participating project villages, the groups themselves are now multiplying improved seed, and operating pest and disease control programmes. The villagers universally mentioned the benefits realised and said they will continue to use these practices in the future. Women's groups were particular beneficiaries of diversification activities.

Sustainability of Benefits

5.36 Poverty reduction is not a uniform process and the degree of success varies from household to household. While many small farmers gained increasing income with project support, in some cases these gains have not proven sustainable, particularly where participants have had to depend on high interest loans from moneylenders for financing of crop production activities. Landless poor families carrying out fishery activities and livestock rearing appear to have had a better experience due to project support in the supply of nets, boats and livestock. Success appears also to have been more sustainable in the case of non-farm enterprises, such as weaving.

Multiplier Effects

5.37 One encouraging outcome of community development activities which has been observed is the increase in ancillary and service employment, arising from higher disposable incomes at community level. In a number of participating communities there has been an increase in such activities as wage labour, artisans and masons as well as a demand for locally produced snacks and grocery products.

Limitations of the Target Community Focus

5.38 Soil erosion and water loss from hillsides and cultivated lands are core problems affecting crop production and sustainable agriculture in the Dry Zone and watersheds of Shan State. As far as possible, the project addressed this problem within target villages by taking a watershed or catchment area approach. Soil conservation measures carried out in project villages included construction of spillways, bench terraces, soil sedimentation buns, soil sedimentation dams, check dams to protect village range land and farmland within project villages. However, as participating villages were selected on the basis of poverty status, adjoining villages located in the same catchment were often excluded. As a result, a comprehensive catchment-wide approach proved impossible in most areas. Similar problems were observed in relation to forest management.

Need for an Integrated Land Use Approach

5.39 The economic life of dams is closely connected with surrounding land use activities and the management of the catchment areas of such dams. With considerable dam construction underway in many regions of Myanmar, there is need to expand the current project approach to take into account the impact of shifting cultivation and fuel wood and charcoal extraction on reservoir management. The integrated approach requires community participation and the development of technically feasible and socially acceptable interventions and participatory monitoring. The HDI project has made a beginning in this direction by social mobilization and providing support for soil conservation within the scope of Food security project and the lessons learnt in this direction during the project need to be built upon.

E. OPPORTUNITIES AND CONSTRAINTS TO COMMUNITY-LED DEVELOPMENT

Opportunities

5.40 The cultural homogeneity, community spirit and tradition of helping each other which are widely encountered in Myanmar communities are major strengths for community development. Commonality of language and religion helps people to share common values and allows them to work together more readily. The existence of a number of social and welfare groups operating at community level also provides a background from which to build in the future.

5.41 Through the implementation of the HDI project over the last decade, many townships agriculture extension staff have gained experience in HDI Project Townships in methods of participatory planning and extension to farmers' groups, farmers' field schools and related approaches. These staff can constitute the seed for future training and growth in new areas.

5.42 The HDI project has also provided substantial information on the demand for different types of support services in three major areas of Myanmar, and the effectiveness of specific community-implemented technologies for soil and water conservation and management, community forestry, crop intensification, small livestock rearing and non-farm income-generating activities. Valuable experience has also been gained in social mobilization for health, sanitation and education. Not all experiences have been positive, and these difficulties provide guidance for the design of future interventions.

Constraints

5.43 The attitude of the Government of Myanmar to community-based development has been mixed. While acknowledging the benefits of mobilizing community efforts and resources for rural development and poverty alleviation, it is disappointing that the groups developed in the course of the HDI project have not been able to establish formal linkages with Government agencies such as the extension service. Nor is there an explicit policy of promoting community based planning and extension support in the government extension system.

5.44 As a result of the above, the existing extension system has only a limited responsiveness to the needs of farmers. With a history of production targets inherited from the socialist period, Government services place excessive focus on commodity production issues rather than farming system, rural livelihood or community issues and lack effective networks and access to information on relevant research results. Furthermore, the prevalence of a 'top down' approach to determining priorities and activities renders it difficult for community priorities to be adequately heard or responded to.

5.45 Significant resource limitations exist in relation to the financing and technical support of community development approaches. Current Government salary and benefit systems provide little incentive for field travel, and the pattern of investment in rural areas has traditionally favoured large scale investments such as dams and major irrigation schemes. Policy limitations imposed on MADB, combined with restrictions on private sector formal lending in rural areas, has greatly exacerbated the shortage of investment and working capital for rural farming populations and small entrepreneurs.

Recommendations

5.46 Rural communities in Myanmar possess great potential for locally-driven growth for pro-poor social and economic development of the rural areas of the country. In order to realize this potential it is recommended that:

- Within the context of a commitment to support community level development at the policy level, the capacity of officials of relevant line departments (e.g. MAS, Irrigation, WUD, MLBF, Forestry) should be upgraded to enable them to carry out participatory decentralized planning at the local level, as well as adapting line department activities to address the basic needs for community development;

- The social mobilization and capacity building of communities should be promoted and supported to enable them to carry out planning and management of a wide range of local-level tasks, including management of irrigation water supplies, pest and disease control, group marketing, saving and credit operations, watershed management, community forestry, community fisheries and other community-based activities for income generation, as well as the maintenance of social sector infrastructure;

- Efforts should be made to increase the integration of Government support services with the activities of rural communities, such that extension messages (and research) cease to be commodity based and adopt instead a more integrated approach, incorporating agriculture, livestock, fisheries, forestry and small-scale non-farm employment. Considerable human resource development for MAS extension staff and other rural Government staff will be required if such integration is to be effective;

- Government returns to earlier policies of favouring community-based licensing of inland fisheries in place of the commercial leasing of water rights as well as providing assistance to the development of small scale fisheries as a means to increased income generation and improved food security.

6. CROP PRODUCTION[1]

A. THE RESOURCE BASE[2]

6.1 The natural diversity of Myanmar, with its favourable soils and water resources, provides a wide range of tropical, sub-tropical and temperate cropping options with considerable opportunities for growth through intensification, expansion and diversification. It is estimated that 75% of the national population, or some 36 million, live in rural areas - most of which are directly or indirectly dependent upon agriculture, mainly crop production, for their livelihoods. Estimates of landless vary, but surveys in delta regions indicated that as much as 25-35% of the rural population were without land (probably somewhat less in dry zones). The Agricultural Census of 1992/93 estimates that there were at that time, 2.72 million agricultural land holdings, with an average farm size of 2.5 ha and an average household of 5.5 persons. The majority of holdings are small, 82% with less than 4 ha occupy 53% of cultivated lands, 54% with less than 2 ha occupy 21% of cultivated land.

6.2 The human resource devoted to farming both as landowners and landless labour represents a major national asset. Farmers met throughout the study period were competent, hard working and well informed on the costs and benefits of crop production. They were equally well informed of internal market prices and opportunities and responsive to price change. Almost all were mixed farmers with some draught oxen and small livestock, managing closely integrated crop and livestock systems. If provided with a policy environment conducive to intensive production and with good access to basic farm services, they have the capacity to significantly increase production and incomes. However, at present the full potential of the human resource asset involved in crop production is far from being realised.

B. THE RURAL POOR

6.3 This numerically large group fit into two broad categories as far as crop production is concerned. Firstly the small farm households - especially in non-irrigated upland areas of dry zones and some hilly tracts - with landholdings of less than 2.0 ha. Such holdings in high-risk rain-fed situations are particularly susceptible to crop failure and uncertain incomes. The fragility of livelihood is exacerbated by their reliance on sales of oilseeds and pulses to purchase staple rice needs. In bad rainfall years, when incomes are very low, this can significant food insecurity and necessitate borrowing from informal sources (e.g. village money lenders) at punitive interest rates. The second group of rural poor comprise landless households, widely distributed throughout the country, which rely primarily on income from agricultural labour and small-scale homestead activities. At present extension programmes do not target either of these groups, who are generally excluded from government and institutional support. The most significant means of improving landless incomes will be through crop intensification and increased crop production that stimulates demand for labour and increased wage rates

[1] The following section is a summary of Working Paper 2 “Crop Production” contained in Volume 3 of this study and prepared by Michael Macklin, Agronomist for the Agricultural Sector Review.

[2] All data based upon the 1983 population census.

C. AGRICULTURAL LAND USE

6.4 About 15.5 million ha is cropped annually at a cropping intensity of 140%. Agricultural land use statistics indicate the presence of over 7 million ha of cultivable wastelands, however it is not clear how much of this is suitable for conversion to sustained annual or perennial cropping. Quantification of the area suitable for crop expansion requires further survey and analysis.

6.5 The dominant crop groupings are cereals, oil seeds and pulses, which account for over 66% of total sowings. Culinary and perennial fruits cover a small area but are regionally important in Shan and other hill areas. Coconut, oil palm and rubber are similarly of local importance in coastal and high rainfall delta zones. Paddy is the major cereal, comprising 90% of cereals planted. Amongst the oilseeds, sesame, groundnut and sunflower are the most important constituting 93% of the total oilseed crop. Of the pulses Green and Black gram, Pigeon pea and Chick -pea are most important constituting 67% of the total pulse area.

D. PAST CROP PRODUCTION PERFORMANCE AND TRENDS

6.6 The accompanying Working Paper (Working Paper 2) reviews production trends and performance for principle crops over the past decade, comparing productivity levels with those of the region and neighbouring countries having similar production conditions. Essentially crop production performance has been limited or stagnant, while neighbouring economies have moved ahead. One success has been the experience with pulses, which have seen strong growth over the decade. The success of pulses can be attributed to: (a) un-restricted access to markets without compulsory procurement; (b) strong product demand; (c) reasonable returns; (d) flexibility to fit into a range of farming systems; and (e) relatively low nitrogen fertiliser dependence compared to other crops. Other small-scale success stories are entrepreneurial horticultural fruit and vegetable growers who have been able to import top quality seeds and self-finance vegetable and fruit production, selling freely onto the local market with good returns.

E. THE POLICY FRAMEWORK

6.7 The first National Economic Objective is the “development of agriculture as the base for national development and for other sectors of the economy”. Crop production is central to economic growth as agriculture contributes 45% of GDP, 18% of export earnings and employs 63% of the national labour force. The present crop sub-sector objectives are firstly to generate surplus paddy production, secondly to become self sufficient in edible oil production and thirdly to increase the production and export of pulses and industrial crops. The pursuit of increased paddy production is the most dominant theme and the one demanding most investment and effort of MOAI.

6.8 In pursuance of the above sector objectives GOM has identified priority crops (pillar crops). These are **paddy**; **pulses,** mainly green and black gram, pigeon pea, soy bean, cowpea and kidney bean, and **industrial crops**, cotton, sugar cane, jute, rubber and oil palm. The current strategy for crop production growth is through the stringent application of crop production and productivity targets – whereas improvement of farm- incomes and poverty alleviation, of paramount concern to the individual, are secondary to this national production drive**.** Although the evolution of a market oriented economic system is a national objective it remains elusive as far as

crop production is concerned. Marketing and trade is constrained by a plethora of government restrictions and red tape, by pervasive and difficult import and export licensing requirements, limited access to foreign exchange and even local currency, and restrictions on the export of certain commodities, such as edible oils. This situation is worsened by current international trade embargos making access to foreign markets more difficult and costly. **The transition towards a free market system is proving a very long and uncertain process and its' full adoption needs to be accelerated to reduce induced market uncertainties and production risks and increase access to foreign trade opportunities**.

6.9 **Required Changes to the Enabling Environment**. Farmers are the best judges of what crops can best be grown in any particular location and being economically astute and responsive to market prices, are capable of making sound economic choices. In a liberalised environment it is certain that farmers would respond quickly to economic opportunities and catalyse national growth in the sector. Economic comparative advantage of particular agro-ecologies would also be more optimally and efficiently exploited. The centrally planned, directed approach, which restricts choice, innovation and diversification should be therefore be transformed to a **"farmer first approach**" with emphasis given to improving individual farm incomes. Whilst performance targets can be useful management tools they should be planned and managed in a more bottom-up manner, be based on local priorities and needs and with especial emphasis given to needs of the poor members of rural society.

6.10 Such transformation would however require a major change in the ethos and approach of concerned government agencies in sector planning, implementation and monitoring. Under such a transformed scenario MOAI would become primarily a farmer support service organisation rather than, as is presently the case, one mostly devoted to achieving production targets and the management of commercial operations. Significant reform of the roles and functions of MOAI would thus be required with the role of the private sector significantly expanded, especially in farm input and seed supply, in marketing, farm mechanisation and commercial production and processing operations.

6.11 Sustained growth in crop production and of farm incomes cannot be expected without adjustment of the enabling policy environment under which farmers currently operate. This requires a new approach to agricultural planning and development, the full adoption of a market - oriented system and institutional reform of government services involved in the sector.

F. FARMER SUPPORT SERVICES FOR CROP PRODUCTION

6.12 To take advantage of a positive, liberalised crop production environment, farmers will require ready access to several key production services, including: (a) timely and sufficient seasonal credit to fund crop production; (b) a reliable supply of improved seed and planting materials; (c) an adequate supply of good quality farm inputs, fertilisers and sprays etc; (d) the ability to sell their crop in an open and competitive market place; and (e) access to relevant technologies to improve farm incomes in a sustainable and resource efficient manner.

6.13 Unfortunately none of the above key services are adequately accessible at this time. As a result, most farmers are unable to optimise returns to their land and labour**. In summary significant and sustained growth in crop production possible will not be realised, even under a transformed policy environment unless there is significant institutional reform and the**

establishment of effective support services to enable intensification, diversification and expansion of production.

6.14 **Agricultural Credit**. The majority of farmers in Myanmar have little or no recourse to agricultural credit for either seasonal or term loans. This is a major constraint to growth in crop production, diversification and to innovative farm business development. To rectify this, the following steps are proposed:

- Government should review current land policies to seek means of converting its ownership into a collateral form. Ideally freehold ownership would be given to the user farm households. If that proves impossible, a leasehold instrument should be developed that may be used as collateral;

- The size of the MADB lending portfolio should be determined by demand and risk, rather than arbitrary ceilings;

- Lending for all credit-worthy crop production and agribusiness operations should be considered; and

- The blanket crop seasonal loan-ceilings imposed should be abandoned and credit disbursed according to the merits of individual applications.

6.15 **Crop Nutrition**. The prevailing very low use of chemical fertilisers per hectare of gross cropped area in Myanmar as compared with neighbouring countries and the region is alarming. Chemical nutrient application in Myanmar is about 10% of the South Asia regional average and less than 7% of that of Viet Nam. At the current levels of added NPK the rice crop is removing far more than is being added through chemical and organic sources. The order of magnitude of the NPK deficit is of concern, and indicates soil nutrient mining with serious implications for long term soil fertility sustainability. Equally of concern is the imbalance in added nutrients, as phosphate and potash use is at such low levels. Such imbalance will tend to reduce the efficiency of nitrogen utilisation and likely to cause negative side effects such as trace element deficiencies. Farmers are well aware of the need and value of balanced fertiliser application but are unable to access adequate seasonal credit to fund fertiliser purchase and lack the confidence to invest in intensification given the history of compulsory procurement and low prices.

6.16 The crop nutrient issue is critical to growth in the crop sub-sector. Future supply must be competitive and through the private sector. To increase participation the private sector requires an incentive framework that minimises regulation and red tape and enables more ready access to foreign exchange. Government roles should be to monitor and control the quality of farm inputs and to promote balanced use of chemical and organic fertilisers for different farming systems through the extension service.

6.17 **Seed Quality and Availability**. With the exception of industrial crops the production of seeds and planting materials are almost the exclusive responsibility of MAS, through the central Agricultural Research Institute (CARI), the Seed Division and the Agricultural Extension Division. The only private sector intervention is in production of hybrid maize seed and through limited import of hybrid vegetable and fruit seeds by private individuals. Even within the MAS

operations, there is a degree of duplication and little coordination between the three agencies cited above.

6.18 Poor seed and planting material quality is a major and generic factor limiting growth of almost all crop yields. Seed supply is currently a government-dominated activity that only provides an inadequate seed supply for rice and maize and even smaller quantities for other crops. Registered rice seed produced by the Seeds Division is provided to contract farmers (through the Extension Division) for multiplication and subsequent farmer-to-farmer distribution. However, there is little attempt to ensure seed quality and no seed certification. Thus the amount and quality of improved seed reaching farmers is not known. The entire seed production and distribution sub-sector requires detailed review to develop a programme that encourages much greater involvement of the private sector. Specifically, rice seed replacement should be increased to at least 25% per annum from the current level of below 10%, a process of proper certification introduced and appropriate new varieties introduced into production. Equal emphasis must be given to pulse, oilseed, fibre and horticultural crops through introductions from neighbouring countries and their testing and appropriate multiplication.

6.19 **Technology Transfer**. The strong extension force of MAS is mostly occupied with achievement of central production targets for pillar crops and especially for rice. To have a more significant impact on improving farm incomes, crop production and the alleviation of rural poverty the service requires re-orientation within a new enabling environment for farm production. The main role of a reoriented extension system should be to improve farm incomes through the development of sustainable integrated farming systems. Extension should focus on key themes including: (a) adoption of quality seeds and planting materials of new high yielding varieties; (b) integrated balanced plant nutrition, capitalising on the already good work in the use of organics combined with increased use of chemical fertiliser; (c) integrated pest management techniques in pest and disease control; (d) water use efficiency in both rain-fed and irrigated conditions**;** and (e) farm enterprises especially relevant for the small and marginal farmers and the landless, such as kitchen gardening, horticulture, and livestock production.

6.20 **Efficient Water Use**. Although the scarcest factor of production in dry zones is water, water-use efficiency is given little attention under current programmes. Low cost rainfall conservation practices in un-irrigated uplands are important to improve crop yields and to reduce production risks and troughs. Under irrigated upland conditions priority should be given to the supplementary irrigation of low water demand crops such as groundnut, sesame, mustard etc. that will provide greater overall returns per unit of water and benefit many more rural households than a high water demand crop such as rice. In dry zones water-use efficiency should be a top extension priority and the following actions are suggested: (a) applied research and demonstration programmes be undertaken for in-situ soil moisture conservation on upland areas through conservation farming practices; (b) irrigation of high water demand crops such as paddy and sugar cane be discouraged in upland areas and irrigation provided to more households for the supplementary irrigation of low water duty crops; and (c) irrigation water charges be radically increased to cover full scheme operations and maintenance and to provide an incentive for careful water use.

6.21 **Farm Power**. In most areas there are adequate oxen in good condition to cope with cultivation demands, and in cases where farmers have mechanised it is has mainly been for convenience and speed rather than because of a lack of available power. With a significant landless population labour does not appear to be a constraint, except at certain peak demands such

as planting and harvesting. The impact of mechanisation on labour demand and thus on landless household income has not been considered under the farm mechanisation programme. This report does not consider the lack of farm power a major constraint at this time, and thus farm mechanisation not an issue of the highest priority. As the country evolves towards a market based economy one would expect the commercial activities of the Agricultural Mechanization Division (AMD) to be divested over time to the private sector. The long-term roles of AMD should therefore be to: (a) monitor and regulate the sub-sector; (b) provide an incentive framework for increased private sector involvement in manufacture and hire services; and (c) train and support private farmer operators and agricultural contractors in the technical aspects of mechanisation and in hire service management

G. KEY POTENTIALS FOR GROWTH IN CROP PRODUCTION

6.22 With a combination of ample agricultural land, abundant water resources and favourable agro-climatic zones, Myanmar possesses a tremendous potential for future growth in agricultural production. However, much of this potential is not currently being realized, as a result of inadequacies in policy, investment and institutions. All three of these areas will need to be tackled in order to change this situation.

6.23 There are three main potential avenues for growth in crop production. These are intensification of production, expansion of the cropped area, and diversification from a current cropping pattern to financially more rewarding combinations of crops**. Only intensification will give a significant boost to crop production and farm incomes in the short to medium term.** The production impacts of both area expansion and diversification on crop production and farm incomes will take longer to materialise.

6.24 **Intensification**. Given the generally low crop yields pertaining in Myanmar and availability of technical know-how to achieve significantly higher yields, substantial agricultural growth can be achieved from the existing cultivated area through modest increases in yields to levels well within current regional averages. Rough estimates indicate that incremental production of major crops through intensification in the medium term could amount to 3.3 million tonnes of cereals, 265,000 tonnes of pulses, 310,000 tonnes of oilseeds, 110,000 tonnes of seed cotton and 3.5 million tonnes of sugar cane. Particular potentials are believed to exist in expanding the output of sesame through intensification under appropriate policy conditions. Intensification will also increase demand for farm labour and thus contribute to improving landless household and small farm incomes.

6.25 Key areas of action for successful intensification would include; (a) liberalization of both domestic and export markets for cereals, oilseeds and perennial crops, so as to permit demand and cost considerations to move growers towards intensified production of crops in which there is a comparative advantage, as has been the case for pulses; (b) reorganization of extension service linkages to research and outreach to producers, so as to ensure the availability of information to growers which reflects optimal production practices according to agro-ecological zones and input/output price relationships; (c) improved production and investment credit availability to finance increased input usage, where economically justified; (d) the promotion of small-scale supplemental irrigation – possibly at the expense of major paddy-oriented irrigation schemes – to reduce risks to post-monsoon crop production; (e) improved water use efficiency in both irrigated and rain-fed situations; and (f)significant strengthening of the national capacity to

produce improved, preferably open-pollinating seed varieties for key cereal and oilseed crops (although for some crops, such as maize and sunflower, hybrid production will probably be essential). Such increased capacity would require legislative and institutional support for the emergence of a private sector seed production capability working in collaboration with MOAI agencies such as CARI, the Seed Division and the Extension Division.

6.26 **Expansion**. Whilst a significant part of the 7.2 million ha of the land classified as cultivatable waste land must have a sustainable cropping potential, this review does not have specific data on the total area suitable for conversion to crop production. Land clearing and preparation for cultivation is costly and beyond the means of most small farmers without access to special credit or capital grants. A survey of cultivable wastelands is required to identify environmentally suitable areas of high potential within reach of population centres that could be converted to permanent agriculture. GIS combined with ground-truth surveys could facilitate this process. With such information, a land clearance programme combined with re-distribution on a leasehold basis, especially to the small and marginal farmers and landless, would contribute to both production and poverty alleviation objectives.

6.27 If one assumes a very conservative 1,000 kg/ha average yield across a range of crops – a figure which would be much higher if a substantial proportion of rice, sugarcane or other high yielding crops were sown – the opening up of just 20% of this available land could yield a further 1.5 million tonnes of production. If undertaken in association with intensification efforts, it is likely that this figure would be much higher.

6.28 **Diversification**. Given the wide diversity of the agricultural natural resource base, good water resources and entrepreneurial farmers there is certainly scope for diversification from current crops to higher value and more remunerative alternatives. However diversification will not happen to any degree until the policy environment is liberalised to allow freedom of farmer choice within a market oriented system, backed by a more dynamic private sector involvement in the sector overall. Diversification will depend upon innovation by individual farmers responding to market opportunities. To be in a position to respond, access to the basic services of credit, seed and input supply etc. will be essential. The prerequisites for diversification are thus largely the same as those described above for intensification, and it is believed that the two processes are inevitably linked; intensification in certain crops in some areas will be accompanied by diversification into other crops in areas which prove less competitive. The pace of diversification will depend upon how quickly these are implemented and availability of market opportunities.

6.29 One area in which a considerable impact from diversification could be expected is in relation to irrigated crops. Current policy is to impose the cultivation of paddy as at least a first (monsoon) crop in all irrigated areas. However, rice is a heavy consumer of water, and a shift into crops requiring low levels of water input, or even only supplemental irrigation in certain months, could prove very advantageous, allowing farmers to greatly increase their area under irrigation with no corresponding increase in water supplies.

6.30 Diversification would favour those crops for which Myanmar possesses a comparative advantage within the region or which supply currently unmet needs of the national population (currently limited by income or other factors). Analytical work in this respect is currently underway as part of this review, but it would be likely to favour the following categories of crops:

- Oilseeds, especially soybean which could grow significantly in area if appropriate processing and utilization facilities exist for the oil and cake;

- Tree crops, where the extensive land availability and relatively low population density of Myanmar would offer major advantages;

- Horticultural crops, where domestic demand could be expected to rise as incomes rise, as well as meeting increased import needs from higher labour cost countries.

H. SPECIFIC ACTIONS REQUIRED FOR SUB-SECTOR GROWTH

6.31 The most critical steps required to stimulate significant growth in crop production mainly involve policy, process and institutional reform to provide an improved production environment coupled with strengthened farm support services. Attempt is made below to identify some of the more critical of the many possible actions.

(i) undertake a review of the centrally planned crop development process with a view to agreeing and formulating a new "farmer first" approach based on improving farm incomes, with a poverty alleviation focus; developing a planning and monitoring process that is location specific relevant and need based;

(ii) review current land policies to develop firm proposals for reform, whereby a form of land ownership or leasing is introduced allowing agricultural land to be used as collateral;

(iii) undertake a review of the current status of the transition to a market oriented system as far as agriculture is concerned, identify steps required to complete the process and to agree a short-term action plan for implementation;

(iv) develop a programme for seed and planting material sourcing, testing, multiplication and distribution;

(v) develop a programme for reform of the agriculture finance sub-sector and future funding and management of farm credit;

(vi) develop a programme to reform and implement a private/public partnership for improved farm input, fertiliser, sprays, cultures etc. manufacture, supply and distribution;

(vii) review current functions and organisation of state institutions involved in crop production and formulate plans that transform involved state institutions into regulatory, monitoring and farm service providing institutions rather than central planners and commercial operators;

(viii) undertake analysis of cultivable wastelands to identify blocks suitable for conversion to sustained cropping by smallholders, and develop a clearance and land distribution programme with security of tenure;

(ix) review options for diversification into more high value crops for new markets, especially in the horticultural sub-sector where Myanmar has the resource base to grow a wide range of high value products for export; and

(x) develop a programme to improve soil and water conservation and management in dry and hilly rain-fed zones to improve food security, productivity and farm incomes of the more vulnerable high risk farming systems..

7. LIVESTOCK PRODUCTION AND PRODUCTS1

A. THE STATUS OF LIVESTOCK

7.1 The livestock sector in Myanmar is dominated by indigenous breeds kept primarily under traditional production and management systems. Herd or flock sizes are typically small, averaging only two for cattle, four for buffalo and pigs, and 17 and 30 respectively for poultry layers and broilers. Commercial livestock production, whether dairy, meat or laying poultry, is limited largely to the peripheries of Yangon and Mandalay. Of the almost three million holdings registered in 1993 as possessing livestock, less than 200,000 (6.6%) were recorded as predominantly livestock holdings.

7.2 Accurate data on current livestock numbers for Myanmar are unavailable, with the 1993 agricultural census providing the last accurate national livestock figures. Current estimates vary widely (see below) but differences between the growth shown in official statistics and LBVD field estimates relates to the latter's focus on commercial herds and flocks. whose animals are mainly held in small individual household numbers within the traditional sector.

Myanmar Livestock Inventory by Source of Data

Livestock Category	1993 Census Population	Myanmar Agricultural Statistics Data 2001	LBVD Field Staff Estimates 2003
Cattle	7.91	11.0	5.5
Buffalo	0.94	2.4	1.2[1]
Sheep and Goat	0.82[2]	1.7	1.1
Pig	1.34	4.0	1.3
Chickens	1.67	47.8	16.2[3]
Duck	3.2	6.6	n.a.

Note: (1) The LBVD buffalo estimates include both draft and dairy buffalo
(2) The 1993 Census figures mention only goats
(3) The LBVD poultry estimates are commercial birds only.
Source: Central Statistical Organization, Livestock Breeding and Veterinary Department, Yangon 2003

7.3 Cattle and buffalo do most of the cultivation in Myanmar and provide transportation on most small farms. They are also often milked and, in aggregate, produce significant volumes, some of which is collected and sold. Manure is particularly important and in the general absence of fertilizer, is used on most farms and traded locally. It is also sold and often trucked considerable distances for use on high value crops elsewhere.

7.4 Pigs and poultry are the species most widely held. Both are fast growing, quick to reproduce and easily disposed of. They are thus both a ready source of income and a cash reserve. They are particularly important among the landless, for whom they may be the only affordable

[1] The following section is a summary of Working Paper 3 "Livestock Production" contained in Volume 3 of this study and prepared by Roderick Kennard, Livestock Specialist for the Agricultural Sector Review.

livestock, and fattening a single pig and raising one or two native chickens may contribute as much as half of all household income in poor households.

7.5 Husbandry for traditional livestock is low-input and fairly basic. Herd and flock performance is therefore characterised by high mortality (poultry) and some production inefficiencies (cattle and buffalo) and slower growth and production (pigs). Only sheep and goat production appears to be highly resource-efficient.

7.6 The commercial livestock production sector is relatively small. There are some individual large holdings of between fifty and one hundred improved dairy-type cattle around Yangon and Mandalay and some smaller towns which are permanently housed and fed on a combination of gathered forages and concentrates. There are a few medium scale (*circa* 100 breeding sow) commercial piggeries, producing and raising high quality pigs. Some small-scale 'back yard' pig breeders and fatteners are in operation as well - these are commonly village rice millers who with access to cheap sources of rice by-products.

7.7 Large private sector companies are the main producers of improved feed and breeding stock for local producers and growers. The pigs, and layer/broiler day-old chicks (DOC) they produce and the compound feeds which support them, constitute the main production base for the commercial poultry and pig industry. These companies will be most influential in determining the rate and extent of commercial livestock production in future. There are cost/price limitations on commercial poultry and pig production at present, but few serious technical constraints in respect of the breeding material, feed used or the expertise and production systems supporting them. Industry expansion will therefore be determined by market forces, government policy, and the interaction between the two.

B. THE MAIN SYSTEMS OF LIVESTOCK PRODUCTION

Commercial Dairy Production

7.8 In spite of the considerable investment in productive assets, the commercial farms have no performance records and therefore no objective basis for either replacement calf retention (including bull calves) or performance-based feeding. The balance of the rations could also be improved. It also is evident that cattle on these farms with high levels of Friesian blood are significantly heat stressed, and crossbreeding with exotics needs to be better managed. There are opportunities for developing a better breeding policy based on a defined maximum exotic dairy content, and dairy production could be expanded in areas around milk processing plants which dairy type animals could supply. Such expansion would be based on higher levels of production through AI, and improved milk collection.

Pig Production

7.9 Little needs to be done to improve the traditional system. While the genetic material used grows more slowly than the improved pig breeds on offer, it is considerably more forgiving of poorer feed quality and quantity and low standards of housing and husbandry. Also, the larger hams and less fat of the improved breeds command no premium, so that in cash-poor households, raising the higher-demand, faster-growing, leaner improved pigs, has no advantage. In these circumstances, the only technical area in which the native pig could be improved is in its fertility.

Its small litter size is substantially less than half that of improved pigs whose 10–12 piglet litters is the norm. Better, more balanced rations could also be fed, but the strength of this system is its low cost, its flexibility and limited dependence on purchased feed, largely insulating the system from commercial pressures.

7.10 Commercial pig (breeder and fattener) production is increasingly in the hands of larger units[1]. They have economies of scale, reasonable performance efficiency and importantly, the capacity to feed the cheapest and most efficient feeds possible. Without the ability to prepare cheap feeds, commercial pig raising using high performance stock on feed at market prices is likely to be unprofitable.

Commercial Poultry

7.11 The proportion of broilers to layers has increased since 1999. By 2003, fewer than half of all 14 million day-old chicks (DOC) produced were layers. Several companies with substantial investment in commercial poultry now dominate DOC production for the sector, with the largest of these producing about 150,000 broilers DOC per week and two or three smaller producers supplying another 25,000.

7.12 **Broilers**. The broiler sector is characterized by increasing feed prices with costs of production exceeding returns every two to three batches. The within-year price for broilers fluctuates by as much as 12%, driven by the higher demand associated with ethnic and religious festivals. Market uncertainty, lower margins and strong competition between producers has lead to a declining number of smaller scale broiler raisers. The industry is therefore increasingly based on larger, more efficient circa 35,000 bird farms which have the resources to better withstand the recent market downturns

7.13 Broiler DOC producers are currently operating at only half of capacity due to limited demand. Poultry feed is more expensive in the north and northeast of Myanmar and broiler raising there is reported as unprofitable. The main opportunity for broiler production may lie with exports.

7.14 **Layers**. About 140,000 layers DOC are produced weekly. The main DOC producer operates at full capacity but any further investment depends on Mandalay municipal government giving a clearly defined period of tenure in respect of land in use for its breeder farm. Laying birds are raised in small units of 200 - 1,000 birds. Laying houses are simple, with dirt floors (or raised split bamboo floors in smaller units) and thatch roofs. Electricity is too unreliable for light-controlled laying. Such family-based operations are reportedly profitable, but complaints of increasing feed costs and lower returns are now common.

7.15 The domestic egg market is seemingly strong, with greater potential for expansion than for broilers. There may also be untapped opportunities for increasing the export of eggs, with considerable numbers of these already being trucked for sale in China. Supplying the egg market in Singapore is possible, and perhaps elsewhere in the region provided import requirements, which include freedom from *coliform* contamination in particular, can be overcome.

[1] There are reported to be ten such units of about 1,000 pigs in the Yangon area.

C. NATIONAL OFFTAKE AND ITS DETERMINANTS

7.16 LBVD has offtake figures only for the official slaughter houses and slaughter slabs. There are no official estimates of unofficial slaughter particularly of pigs, or the extensive and commonly reported unofficial export trade in both cattle and pigs. Total calculated offtake from the three main livestock classes (cattle/buffalo, pigs and small ruminants) is very low, suggesting the following possibilities either separately or in combination:

- offtake is being substantially under-reported;
- the national herd is increasing in number rapidly; and/or
- the national herd is significantly smaller than official census figures imply.

Livestock Disease

7.17 While livestock disease and internal parasitism have some effects on livestock production, Foot and Mouth Disease (FMD) outbreaks occur more than any other disease, followed in order, by Haemorrhagic Septicaemia (HS), Anthrax and Blackquarter (BQ). Livestock producers at a distance from veterinary offices have severely limited access to vaccination services. Coverage does not reach a significant proportion of the livestock population, and vaccinations against HS and BQ appear to have no discernible impact on reported incidence.

7.18 The diseases of greatest economic importance are probably FMD in all ruminants and pigs, swine fever in pigs and Newcastle disease (NCD) in chickens. Even if the 46,000 FMD vaccinations reported in 2002/2003 were effective, only 13% of the susceptible dairy cattle and buffalo population of approximately 341,000 will have been reached. It is not clear how many animals are involved in FMD outbreaks, but despite the fact that reported outbreaks over the last decade have declined tenfold, it still occurs regularly. Although FMD probably has little direct productive impact on local cattle, buffalo and pig populations, its presence (as well as that of swine fever) is significant in respect of restricting livestock exports.

7.19 NCD is an almost annual occurrence among village poultry. Almost 36 million doses of vaccine against NCD were reported as having been expended during 2002/3. The disease affects most birds on most farms in any village during outbreaks and probably accounts for the loss of more chickens than any other cause, once they have passed the first week or so of life.

Livestock Feed

7.20 For the traditional sector, both production methods and numbers of animals raised are determined mainly by obtainable feed, and by the amount of labour available after agricultural activity is done. Providing feed for dairy and draft/dairy types and in some cases pigs, has a high labour cost.

7.21 With respect to commercial producers, feed retailers report sharply rising feed costs over the last three years, matched by sharply declining compound feed sales, and significantly fewer commercial livestock raisers buying them. Feed prices have been driven by accelerating costs for common feed components such as fish meal, rice bran, and peanut and sesame cake.

However, information in respect of compound feed production, trade and pricing is incomplete and it is difficult to attribute a cause for the price increases reported.

7.22 National capacity for compound feed production may be in the order of 265,000–365,000 tonnes annually. Actual production is unknown. Importantly, some mills report a significantly increasing production of fish feed, but how much is produced and to what extent its production influences the price and availability of compound feedstuffs for livestock can not be determined. Estimated requirements for the fish ponds in Myanmar in 2002 were for 839,700 tonnes of rice bran and 209,900 tonnes of groundnut cake[1], representing 36% and 68% respectively, of the estimated national production of these items alone.

7.23 Were the national herd to entirely comprise animal units of 400 kg live weight (buffalo) requiring 2% of live weight as daily dry matter, the DM availability for 2002/3 would support some 16.5 million units. As official figures for ruminant livestock in Myanmar comprise 16 million heads of all species, most of which (sheep, goats and young buffalo and cattle) have live weights substantially lighter than 400kg, the national herd and roughage supply are in positive balance.

D. GOVERNMENT SUPPORT FOR THE SECTOR

7.24 **The Livestock Breeding and Veterinary Department (LBVD)**. The LBVD, headed by the Director General, is the institution most directly involved with livestock, and comprises the two technical divisions of Research and Disease Control (RDC) and Animal Health and Development (AHD). All of the state/division and field offices are headed by veterinary officers (VO). Each VO is responsible for an average of 4 townships and 30 village tracts, and each VA for about half this number. The staff at these sub-district levels is often too few for their work, they are also reportedly often assigned by the local authorities to tasks not related to livestock, they are usually without transportation, and their field allowances fail to cover the cost of extensive field work. They therefore have little capability or incentive to deliver useful field programmes. This is the most significant impediment to the effective delivery of state-provided animal health and production services.

7.25 **Livestock Feedstuff and Milk Products Enterprise (LFMPE)**. The LFMPE forms part of the ministry and is mandated with producing feed and feed supplements and the production and distribution of high quality breeding animals throughout the country. For this purpose it has livestock farms and feed mills throughout Myanmar and some involvement in commercial milk processing. LFMPE has six known feed mills in Yangon, Mandalay and Shan state, producing fish feed as well as feed for its own pig and poultry production enterprises. LFMPE also operates two units producing DOC (25,000 and 5,000 broilers and layers per week respectively) and is engaged in a joint venture with the military in a milk condensing plant in Yangon City.

7.26 **The Livestock and Fisheries Development Bank (LFDB)**. The LFDB was constituted to provide livestock production credit but has no effective role generally in providing funds to smallholders wishing to engage in small-scale livestock investment. The bank generally only finances larger scale livestock and fishery enterprises. However, under instructions from central authorities the LFDB has recently financed two small loan programmes providing

[1] Agro-based Industry in Myanmar – Prospects and Challenges (2003), Ch.6.

households with access to pigs and poultry and cattle, but these programmes are not part of any ongoing small-holder livestock lending. There are otherwise no formal lending institutions from which small scale livestock producers might borrow.

E. GOVERNMENT PROGRAMMES

Disease Diagnosis and Control, Animal Quarantine

7.27 The system for disease diagnosis and reporting does not work well at either field or central levels. Although field staffing constraints are important (see above), management factors are also crucial. Vaccination and disease control programmes should reflect the recommendations of the epidemiology section (ES). In practice, ES only collates information on disease outbreaks, while the vaccination programme is driven by a combination of centrally directed vaccination targets, budgetary constraints, and vaccine production and delivery capability.

7.28 An effective ES is crucial to overall disease control procedures and programmes in view of Myanmar's extended borders with five countries and a pressing need for regional collaboration in transboundary animal disease (TAD) control. The ES requires considerable strengthening, particularly with respect to training, some equipment and communications.

Vaccination Manufacture and Delivery

7.29 Other than small amounts of imported poultry and canine vaccines, LBVD manufactures almost all of the livestock vaccines used in Myanmar. The difficulty with vaccinating lies with the limited vaccine production targets, and with the difficulties the VO and VA have in conducting field operations in the townships and village tracts. The logistical problems associated with conducting large numbers of vaccinations with too few resources are profound. At best, and with the vaccine available, no more than ten to fifteen percent of target populations for any livestock, can actually be covered at present.

7.30 **Newcastle Disease Vaccination**. Enough I2 vaccine can be made to meet the annually determined national vaccination target and, if effectively applied, would significantly lift national poultry production and appreciably contribute to household incomes. However, the extension and application of the vaccine in the field is highly problematical, and the current approach of mobilizing poorly trained staff from local social organizations is considered inadequate. Experience elsewhere suggests that sustainable, broad-scale NCD vaccination of poultry requires poultry raiser organisation with poultry owning households doing the vaccinating themselves. If successful, this would also focus the LBVD on manufacturing and distributing the vaccine.

Livestock Extension

7.31 The Extension Section within the Animal Husbandry and Development Directorate is small, focusing almost entirely on directing the national artificial insemination programme and livestock vaccination. The livestock production industry badly needs an effective source of development and extension of messages relevant to animal health and production. MAS provides crop production extension programmes (albeit entirely top-down), through 12,000 extension

personnel organised at village level throughout the country. With appropriate targeting and a modified approach, MAS could offer a useful livestock extension capability by collaborating with and making use of the technical personnel of LBVD. Until LBVD is massively resourced or the MAS mandate is expanded to include livestock however, it is difficult to see how animal production extension in the country can develop.

Bio Assay

7.32 The biological assay laboratory in Yangon undertakes empirical livestock feed analysis including identifying the presence of aflatoxins, nitrofurans and other common trace feed contaminants. The laboratory also serves to register imported drugs and vaccines. It is nominally responsible for assaying livestock products and feedstuffs for export. However it requires much additional support in terms of equipment, facilities and staff training if it is to perform these functions effectively.

Artificial Insemination

7.33 LBVD has approximately 100 centres identified as target sites for AI delivery in the townships and village tracts between Yangon and Mandalay and around these cities. About 7,500 draft and dairy calves may have resulted from AI activities during 2002/3. The average number of calves from the approximately fifty AI locations is no more than two per week; very low by international standards.

7.34 The most important technical constraint to AI is the shortage of liquid nitrogen (LN2). Production from the LBVD plant in Yangon has declined drastically in recent years and has resulted in the AI programme being reduced from 100 to 60 townships. Furthermore township level AI technicians are often assigned other duties as well as being poorly equipped, and having little access to transport. As a result they are often unable to respond promptly to requests for AI services, rendering their presence of little value. Under these conditions, the current AI strategy and targeting would benefit from a more focused delivery based on supporting only the most efficient operators working in areas where AI is needed most and where it is most likely to be useful.

F. THE REGULATORY ENVIRONMENT AND POLICY

7.35 Policy for the sector is intended to improve the economic status of livestock and fishery producers and is all-encompassing. It supports the production of quality breeds of livestock, promotes integrated livestock and fisheries development and supports the development of both to meet local demand. At the same time, a primary objective is the development of an exportable surplus. Policy initiatives also call for livestock research and development to be expanded, and encourage investment by both local and foreign sources.

7.36 There are several laws whose prescriptions impinge on development in the sector, including the Essential Supplies Act (ESA) which has provisions relating to cattle exports and slaughter, and the Myanmar Investments Law which provides tax concessions as incentive for foreign investment in the livestock (and other) sectors. The most important law with specific reference to the sector is the Animal Health and Development Law (1993) (AHDL). It provides the legal basis for animal disease prevention and reporting and animal health and development

and provides for meat inspection at township level slaughter facilities. The specific orders issued by the Office of the Minister in respect of this law, constitute the primary regulatory environment for livestock production. In particular they provide for the control and prevention of contagious animal diseases including zoonoses, through vaccination, inspection and control of livestock movement.

7.37 Several key aspects of animal production are not adequately addressed by legislation, or intended orders based on the existing AHDL have not been issued for them. These include; (a) animal feeds standards (this order is pending); (b) food safety[1]; (c) import and export regulations for both livestock and livestock products, and; (d) the location, establishment and functioning of quarantine operations and facilities.

7.38 Import and export regulations covering livestock and livestock products in particular, are needed if Myanmar is to export livestock products. Moreover, once enacted, such controls also need the backing of accredited, relevant laboratories and trained personnel. No standards exist for meat and milk residues, nor for contaminants in livestock feed components. The FDA has access to effective laboratories for analysing human pharmaceuticals, however such facilities for veterinary drugs do not exist. There are also no livestock product processing facilities able to comply with any international requirements.

G. MILK AND MEAT PRODUCTS PROCESSING

Milk

7.39 Milk production and processing is characterised by an absence of formal producer or community-based milk marketing groups or associations, while the processing sector itself is without an industry association which could establish standards, regulate marketing and in particular, articulate overall industry concerns. It is difficult to determine the size, output, extent and efficiency of the industry or the relative roles of the private and public sectors in milk processing.

7.40 Informal processing comprises hundreds of units throughout the country each utilising circa 800 litres (500 viss) of raw milk per day (range 200 – 2400 litres). Formal processing plants reconstitute imported milk powder (MP) and generally mix it with locally collected raw milk. Production volumes from individual farms has always been small, and milk density in the collection areas remains thin, but the supply from small holders overall is significantly increasing in areas where its collection is encouraged.

7.41 Tin plate, milk powder and up-to-date processing equipment are essential import items for milk processors. MOT rules governing imports permit importation only to the value of items already exported and both the import and export items must relate to the same industry. Processors unable to achieve this balance are unable to freely obtain all of their production input requirements. Often forced to operate below capacity because of this, these plants are less efficient as a result and new investment is difficult.

[1] Despite this lack of an apparent legal basis, however, the Food Advisory committee is already active in foodstuffs screening.

7.42 Importantly also, a considerable illicit trade in milk powder from China has emerged. However, by drawing more heavily on local product, there are clear possibilities for processors to develop a strong local production base as an alternative to importing milk powder.

Meat

7.43 Official livestock slaughter takes place in the municipal government slaughterhouses in Yangon and Mandalay and at slaughter slabs in the smaller towns. Unofficial slaughter occurs also, wherever animals can be butchered and sold away from official view. Industry officials complain of a butcher monopoly in both cities, and the significant contribution the overall slaughter charges have on increasing the retail price of meat. Poultry slaughter is entirely done in private unofficial 'processing' facilities based on manual evisceration and automated pluckers and there are important human health and pollution implications in respect of this. There are no modern poultry processing plant in Myanmar, other than the 10,000 bird LFME plant which is operating at less than one tenth of capacity.

H. OPPORTUNITIES AND CONSTRAINTS

7.44 **Income Generation and Food Security for Landless and Marginal Producers**. A key potential within the livestock sector is that of increasing the income levels and food security of landless and marginal producers through an emphasis on livestock earnings. However, this target group does not currently receive the support which would be needed to enable the growth of small-scale livestock activity in Myanmar. Among the key areas requiring attention are the extension system, animal health services, and the provision of credit, although linkage to larger processing enterprises could be of importance (see below). Many production and management constraints could be effectively addressed through a village group-based extension approach, particularly one directed at women. Budgeting and staffing constraints, together with its weak extension orientation, make LBVD unable to perform the work well. MAS is the only agricultural agency in Myanmar with the resources necessary for such an undertaking. Expanding the MAS mandate to include livestock extension may be possible, however MLBF at its highest levels, would need to recognise the importance of such a change. To be effective also, a change in the top-down extension approach MAS uses currently would be needed.

7.45 Village-level vaccination groups offer the only real possibility for significantly expanded vaccination against FMD, NCD and other important animal diseases, and could be developed only as part of an expanded livestock extension focus. Not only would such vaccination programmes directly assist poor producers, it would also reduce reservoirs of disease infection which can reach large commercial producers.

7.46 A further problem is the lack of start-up and operating capital. A source of small scale livestock credit is needed to enable those without livestock to gain access to them and those owning livestock already, to expand numbers or buy the inputs for managing them more efficiently. Most landless households, in particular, are without the necessary capital or collateral for such socially important livestock productive purposes, and are unable to borrow relatively small amounts needed to finance such enterprises. Their ability to buy small stock (chickens and pigs) offers one of the main opportunities for them to reach food security and higher household incomes.

7.47 **Expansion of the Domestic Milk Industry**. Supply and demand are in balance domestically for most livestock products except milk. The potential exists to reduce or eliminate imports of milk powder. According to FAO data these are significant, amounting to some US$13-14 million p.a. However, substitution of imported milk powder with local product will occur only with increased production and collection of milk from the domestic cattle. The support for small-scale livestock production, including dairy production, discussed above would be strongly complementary to such efforts. For commercial, producers improved productivity and output will be achieved through targeted AI supplemented by on-farm performance records.

7.48 For smaller producers it will be necessary to tackle high collection costs arising from the small quantities generated per farm. A cooperative approach, based upon village dairy groups, has been successfully applied in a number of countries, including the Milk Vita programme in Bangladesh[1] and Amul in India and may well be worth considering in Myanmar. There are potential problems which must be addressed with regard to the seasonality of milk supply and with adulteration. Nevertheless, if specific areas with considerable milk production potential can be identified, resources could usefully be provided for dairy expansion, limited AI services, and possibly milk bulking centres. This approach also requires dialogue with, as well as a commitment on the part of the processors, to take small milk volumes from these farms and areas initially, and (in the absence of effective extension services) to train these producers in milk production and quality at the same time.

7.49 Given the limited potential for dairy exports, any attempt to significantly increase national milk production would also need to resolve the issue of import financing, as high quality dairy processing operations will require investment in imported capital equipment.

7.50 **Enabling Environment for Export Production**. With the exception of dairy, exports would appear to provide the sole significant opportunity for expansion in the livestock sector. Access to export markets for pig meat, frozen broilers and eggs is limited however, by a production and processing structure which is unable to produce to international standards, and an inadequate regulatory environment and government infrastructure needed to support the imposition of higher standards. Would-be exporters also require an open and facilitating environment in which to invest and operate, but the role of government and the effect of policy on land tenure with respect to production facilities, livestock feed movement, and government intervention in pricing arrangements between buyers and sellers in export contracts, are deterring such investment. In particular, producers face excessively complicated procedures for importing and exporting essential components and inputs (feed premixes, MP, tinplate, processing equipment) and they have no certainty as regards the exchange rates applicable to any export contracts.

7.51 The ability of LBVD to monitor and control livestock disease is limited and this constitutes a key constraint to export development. With the resources currently available to LBVD, policing livestock trade and the movement of livestock is difficult and made more so by Myanmar's exceptionally long border, the presence of only a few manned, official crossing points and by the provisions which make the slaughter of under-age draft cattle illegal. Considerable

[1] The Milk Vita programme has grown over a period of 30 years to collect milk from more than 40,000 households, through some 390 primary milk cooperatives and by the late 1990s handled over 30 million litres per year. See "Income Diversification in an Intensive Rice-based System – Milk Vita in Bangladesh" Dugdill, B.T and Bennet, A. Published electronically at www.fao.org/FarmingSystems/.

numbers of pigs are exported unofficially and the ESA is routinely defied in a considerable underground export trade in cattle.

7.52 It is also important that a sound regulatory environment is established to facilitate the development of livestock-based export markets. This will need to include the writing and speedy passage of orders covering quarantine and border control, import and export regulations on livestock and livestock products, food safety and feed standards. Provision will also need to be made for establishing and staffing suitable policing bodies, backed up by effective laboratory support, to render these regulations effective.

7.53 **Sectoral Information**. There is a dearth of readily available, accurate and relevant information on the livestock base, its offtake and production efficiency. Such information as is available is fragmented, often conflicting, and spread across multiple sources. Data regarding livestock product processing and the extent of unofficial processing and exports of livestock and livestock products is either incomplete or not available. It is not possible to determine production volumes in relation to market size without such information, or to identify key production and marketing constraints clearly. Importantly, without adequate information, the private sector is unable to plan and invest effectively and government cannot establish policy or provide constructive regulatory support.

8. IRRIGATION AND WATER RESOURCE MANAGEMENT[1]

A. THE STATUS AND PERFORMANCE OF AGRICULTURAL WATER UTILIZATION

8.1 Irrigated production is expected to make an important contribution to the overall development of the agricultural sector of Myanmar. According to the government's five-year plan (2001 to 2006) the irrigated area is expected to expand from 2.3 million ha currently to 3.0 million ha, an increase of 28% over five years. In addition, average crop yields are to be raised and cropping intensities increased.

8.2 With annual water withdrawals of 28.0 km^3 (22.68 million acre-feet), irrigated agriculture is the single most important water user in Myanmar, accounting for over 89% of total withdrawals. Given the importance of irrigated paddy in overall crop production, it can be assumed that this crop is taking by far the largest portion of water. The 2001/02 total sown area of paddy is reported to be 6.3 million ha, however this area includes both rain-fed and irrigated land. The net sown area occupied by irrigated paddy is about 2.55 million ha or about 40% of total, with the remainder of paddy area being either rainfed lowland rice (40%) or upland rice (20%). Total paddy production is given as 21,900,000 metric tonnes (tonnes). Theoretically, this is equivalent to an average crop yield of 3.5 tonnes/ha. The overall irrigated paddy production is in the order of 9.5 million tonnes, which is about 43% of the total production (see Table 9 of Working Paper 4).

8.3 Notably, nearly 45% of all irrigated area is served by river-pumped systems. By comparison, reservoir and river diversion systems account for only 32% and private, village-based systems only around 12% of irrigated area. Groundwater production accounts for about 5% (table below)

Irrigated Area Expansion by Irrigation Type

Irrigation Type	1988-1999	1999-2000	2000-2001	2001-2002	
			in million hectares		
Dams / weirs	0.551	0.573	0.601	0.628	31.5%
Village ponds	0.183	0.201	0.232	0.245	12.3%
Well / borehole	0.066	0.081	0.089	0.093	4.7%
River pumping	0.754	0.840	0.830	0.890	44.6%
Wind mill	0.000	0.000	0.002	0.000	0.0%
Others	0.137	0.146	0.156	0.140	7.0%
Total	1.691	1.841	1.910	1.996	100.0%

Source: MOAI (2003). Water resources management in Myanmar.

[1] The following section is a summary of Working Paper 4 "Irrigation and Water Resource Management" contained in Volume 3 of this study and prepared by Wilfried Hundertmark, Water and Irrigation Management Specialist for the Agricultural Sector Review.

8.4 According to the Irrigation Department, there is a considerable variation in water supplies for the irrigation of summer paddy. According to data available for the period 1997/1998 the average irrigation supply rate for summer paddy was 1.73 l/s/ha, with a range from 0.77 at the Ngalaik dam, Mandalay to 2.64 l/s/ha at Mezail weir in Bago division.

B. NATIONAL WATER RESOURCES

8.5 The estimated overall water resource potential is in the order of 1.323 billion m^3. According to the agricultural water resource study in Myanmar, the total run-off generated from within Myanmar's ten basins is estimated to be 875 km^3 (708 million acre-feet). The potential renewable groundwater resources available in Alluvial and Irrawadian aquifers are estimated to be 28.3 km^3.[1] This is much less than the estimated overall groundwater potential of nearly 500 million m3 published by ESCAP, 1995[2]. The estimated overall potential for fresh groundwater development of 28.35 km^3 is only 1.3% of the annual groundwater storage capacity.

8.6 The four main river basins carry six times as much water than is currently extracted for irrigation and other uses. The largest is the Upper and Lower Ayeyarwady basin, which extend for over 2,500 km from the North to the South, by-passing the central mountain belt at its west side. The Chindwin River, which is a tributary of the Ayeyarwady River, forms a significant basin in the northwest of Myanmar. Adjacent to the Lower Ayeyarwady and east of the central belt is the Sittoung River basin. In the east and southeast the basins of Thanlin River and Tanintharyi are found. The streams of Rakhine form a significant basin in the west of Myanmar.

8.7 The bulk (89%) of all surface water resource withdrawals are used for irrigation with the remainder being used for domestic and industrial purposes. Groundwater resources are mainly used for domestic supplies (51.4%), with a share of 47% being extracted by irrigation and some 1.6% taken by industrial users.

8.8 There is evidence that the Ayeyarwady delta is underlain by a series of both deep and shallow freshwater aquifers. Among them is probably the "thickest artesian alluvial aquifer in the world"[3]. It extends across the delta from Pathein to Yangon at a depth of from 366 m to 1,890 m. If this artesian source could be developed, free-flowing water could be used to irrigate a large portion of land in this area especially during the dry season.

C. RECENT INVESTMENT IN THE IRRIGATION SUB-SECTOR

8.9 Irrigation works in Myanmar started in the 9th century with the construction of low diversion weirs across the tributaries of the main rivers. The development of Myanmar's water and irrigation sector took place over three periods: (1) from the ancient Myanmar Kingdom to the period of 1961/62; (2) from the year 1962/63 to 1988/89; (3) from the year 1988/89 to 2002/03.

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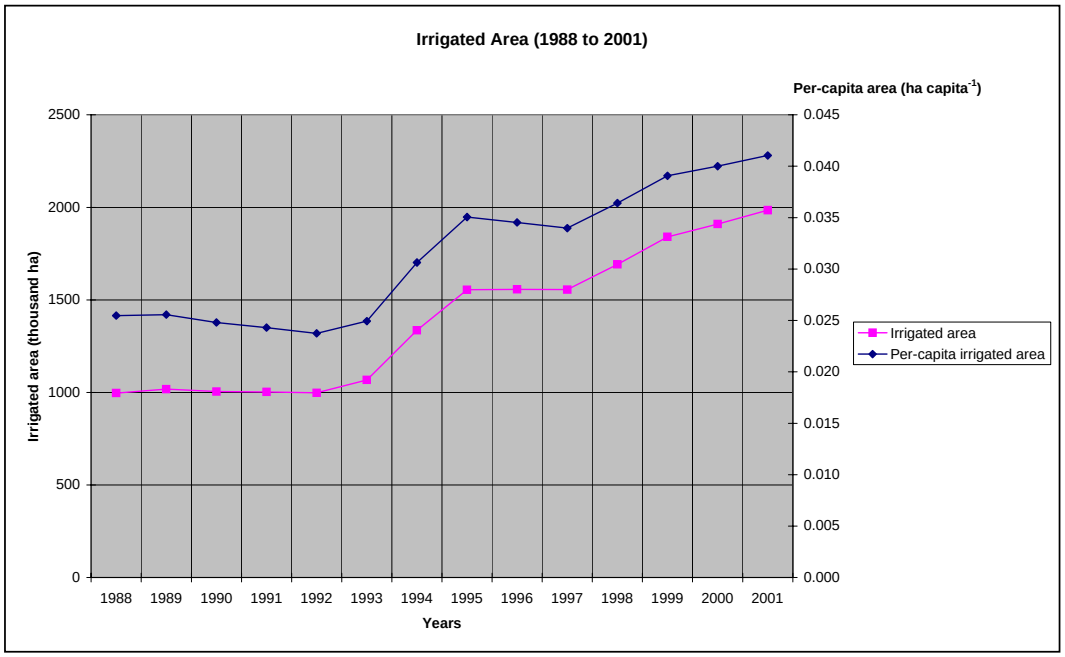
1 For the purpose of this study the assessment of groundwater resources has been restricted to renewable aquifers of the Alluvial and Irrawadian type. Renewable water resource means that only the recharge portion is considered for development. Water resources stored within aquifers have been excluded from the assessment. This is justified by the assumption that any extraction from groundwater resources that reaches beyond the renewable level would cause significant decline of the water tables.

2 ESCAP (1995). Water resources and water demand by user sector in Myanmar.

3 Economic and Social Commission for Asia and the Pacific (1995). Assessment of water resources and water demand by user sectors in Myanmar. United Nations, 1995.

8.10 Since the early 90s the government of Myanmar has embarked on an ambitious irrigation expansion and land reclamation programme. To date a total of 289 irrigation projects have been completed covering a physical area of nearly 1.4 million hectares. Substantial growth in irrigated area was achieved during the period 1993 to 1995, when the government initiated substantial irrigation works in the form of dams, weirs and canals. Subsequently, Myanmar's per-capita irrigated area has kept pace with the population growth rate. In fact, the area increased slightly from 0.035 ha per capita to 0.041 ha per capita (Figure 3).

Figure 3. Expansion of the Per-Capita Irrigated Area Compared Irrigated Area Expansion



8.11 The current irrigation expansion programme is based on a strategy comprising of six elements[1]:

1. the construction of new dams and reservoirs along the main rivers;
2. lifting of water from rivers and stream for irrigation;
3. lifting of groundwater for irrigation;
4. storage and utilization of run-off water from watersheds;
5. rehabilitation of existing reservoirs to increase storage capacity and efficient delivery of irrigation water; and
6. diversion of water from streams and rivulets during high water levels into adjacent ponds for storage with sluice gates.

[1] Ministry of Agriculture and Irrigation (2003). Outline of the Irrigation Department, Yangon, June 2003.

8.12 Grouped by type, it appears that the river pumping schemes take a 44% share of the overall irrigated area under the plan (0.9 million ha). Irrigation by means of dams and weirs is 31% (0.6 million ha), and that of private village ponds is 12% (0.25 million ha). The portion groundwater takes is still below 5%; others take a share of 7%.

8.13 Altogether, the estimated total investment required to realize this plan would be in the order of MYK 65 billion, equivalent to US$67 million at current market exchange rates, and higher if local inflation is taken into account as well.

D. INSTITUTIONAL SUPPORT

8.14 A number of institutions are involved in the water and irrigation sector, including several Ministry Departments, development committees and private users. The principal Government institutions are the Irrigation Department (ID) and the Water Resource Utilization Department (WRUD), both of Ministry of Agriculture and Irrigation (MOAI). ID is charged with four main tasks: (1) carrying out investigations and surveys for existing and currently implemented projects; (2) planning and construction of new projects; (3) perform operation and maintenance of existing irrigation, drainage and flood protection works; and (4) the provision of technical assistance to rural irrigation works and rural development. The Department is organised into its Head Office, and Divisions for Construction, Maintenance and Mechanical Engineering. There are also branches within ID responsible for geology, hydrology, survey and investigations, planning of works, design, procurement, and works inspections.

8.15 The Irrigation Technology Centre, based at Bago, is an important unit within ID. The objective of the Centre is to upgrade the irrigation technology and water management in Myanmar. In its first phase (1988 to 1999) the Centre concentrated on testing construction material, establishing improved design criteria, irrigation engineering, hydraulic modelling and training. In the second phase, emphasis is put on to Water Management of main and downstream facilities (off-farm), on-farm water management, system development, and the development of irrigation management information and the provision of training.

8.16 The Meteorology and Hydrology Division of ID runs a network of hydrological and meteorological stations that are distributed over the entire country. In addition to meteorology and hydrology, the Division is in charge of the provision of agro-meteorological services to the agricultural community as well as seismological monitoring for dams.

8.17 Responsibility for systems management lies with ID in the case of dam and river diversion systems and with WRUD in the case of river or groundwater pumping. ID allocates some MYK 4,000 million (US$4 million) in order to operate and maintain systems that fall under their responsibility. On average about MYK 1,000/ha/year (US$1.0/ha/year) are allocated to dam- and weir-based systems, much less is allocated for O&M of flood-protected land.

8.18 WRUD is responsible for rural water supply as well as pump irrigation. It is organized into three levels; the Head Office level, State/Division level, and district station level. There are six divisions within the department with a total of 6,500 staff. Divisions include: (1) Administration and Accounts Division, (2) Planning Division, (3) Water Pump Division, (4) Groundwater Division, (5) Gravity Flow and Civil Division, and (6) Procurement and Production Division.

8.19 The Land Use Division (LUD), within the Myanmar Agricultural Service (MAS), is responsible for the assessment and the proper use of the available land resource in the country. The Department runs ten large divisional offices in the country of ten to thirty staff members each. Each smaller office is regularly supported by visiting officers from headquarters.

E. MAJOR POTENTIALS AND CONSTRAINTS TO IRRIGATION DEVELOPMENT

Potential for Expansion

8.20 There is not a single written document on the subject of water resource and irrigation development in Myanmar that does not begin with a statement on the abundance of Myanmar's water resources and its huge potential for the development of the countries economy. However, out of a total number of 63 districts, four districts are found to be severely water-scarce and another seven fall into the category of medium to severely water-scarcity[1]. With a water scarcity indicator of some 106%, Mandalay district is the most stressed district among the severely water-scarce districts. Mandalay district must be regarded as a priority target area for improving water management strategies. Districts other than Mandalay, where severe water scarcity is identified, include Meiktila (74%) Kyaukse (51%) and Shwebo (46%). In order to keep the water scarcity indicators below 40% it is suggested that water management be improved, giving particular attention to improving the agricultural water use efficiency.

8.21 The utilization of groundwater resources at the Mandalay district has reached a level of 100% of the renewable resource base. Other districts identified as severely water-scarce include Eastern Yangon (99%), Western Yangon (98%), Sagaing (55%). With Lashio and Kyaungton two districts are found as severely water-scarce, which are located in mountainous areas of Shan State, outside of the dry zone. Within the dry zone most districts are classified as medium to severely water-scarce. Indicators range between 23 and 39%.

8.22 The potential additional area that could be irrigated from renewable fresh groundwater resources is estimated at nearly 718,200 ha (1.7 million acres). About one third of this area is located in the Divisions of Ayeyarwady and Sagaing (35%). The portions other states/division would take are as follows: Kayin (12.6%), Bago (11.5%) Magwe (10%) and Mon State (8.7%). Based on conservative assumptions, the study has identified a potential area of 718,201 ha (1.77 million acres).

8.23 Considerable land of agricultural potential also remains unexploited, providing a conjunction of both land and water resources. A preliminary suitability assessment adopted from LUD suggests that some 53.2 million hectares of land can been classified as suitable for cropping (see Table 16 of Working Paper 4). Of this area, 12.3 million hectares are identified as suitable for the cultivation of lowland paddy, and another 6.7 million hectares are suitable for upland rice cultivation. The area suitable for oil crops and pulses is 19 million hectares and 17.8 million hectares, respectively. The potentially suitable area for cotton is identified as 2.3 million hectares.

[1] A country is considered to be severely water scarce if the withdrawals exceed 40% of the total supply. Countries having the withdrawals from 20% to 40% are considered to be subjected to medium to severe scarcity. Countries with the withdrawals from 10% to 20% are considered to have moderate water scarcity and while those with less than 10% are categorized as to have little or no water scarcity.

8.24 The current expansion in water resource development is emphasizing the construction of new multi-purpose dams and the installation of pumping capacity from rivers, streams and wells. In addition to the 42 dam and weir construction projects that are currently implemented another 40 projects are being identified and proposed by the government. Altogether, by the year 2006, when the current five-year planning period ends, some 82 projects will have been accomplished. The additional irrigable area is programmed to be some 640,000 hectares: 338,000 ha currently under construction and 302,000 ha of proposed project areas. Strategic target areas include the Ayeyarwady delta, the dry zone, and sloped, mountainous non-forest land. Identified constraints to expansion include the following:

(i) insufficient funding;

(ii) insufficient access of heavy machinery and spare parts;

(iii) limited private sector involvement in construction works;

(iv) delayed downstream development;

(v) top down approach in downstream planning and development; and

(vi) limited technical capacity at ID and WRUD.

8.25 Assuming per-hectare development costs of MYK 500,000/ha the total addition capital requirement of the 40 proposed projects would amount to MYK 151,000 million (US$151 million). Current annual capital allocation by the government is MYK 14,025 million/year (US$14 million). If all projects would be implemented as planned, there would be a need for investments in the order of US$300 million. This estimate is based on average per-hectare investment costs of US$500/ha, which largely reflect Myanmar's internal costs. If investment costs from neighbouring countries are taken into account, the actual investment needs would be five to ten times as much.

8.26 The current technical capacity for the construction of large dams is restricted to priority projects. Although the Irrigation Department is in the possession of a fleet of some 970 heavy machines and some 1,429 other large machines and equipment, less than half (407) are allocated to projects, and 156 are dispatched to the States or Divisions. Some 377 are kept within the workshop waiting to be repaired.

Potential for Improved Irrigation Performance

8.27 A diagnostic model framework for irrigation systems analysis is used in order to assess the performance of agricultural water use. The framework allows the establishment of performance indicators for land and water resource utilization, productivity, water supply as well as the financial viability of a given system. Findings of three typical irrigation systems are as follows:

– The irrigation intensity ranges between 45 and 82%. For the Sedawgyi dam project, which represents large-scale schemes, it is assumed that the project runs at 61% of its total command area. The remaining area is either utilized as rain-fed area or irrigation is supplied supplementary.

- On irrigated land of all schemes investigated, two rice crops are harvested per year. Within the framework of "National Projects" cropping pattern decisions are made at the central level, irrespective of the specific soil conditions, water supply capacities or farmer's preferences. In order to fulfil the expected cropping programme, farmers tolerate supplies that are less than the irrigation needs.

- Crop diversification could generate considerable incremental benefits. For the Sedawgyi irrigation project the incremental gross margin per unit of water supplied is found to be MK8/m^3, which is equivalent to US$78/ha. Similar considerations assumed for the Let Pan Che Paw river pumping project suggest that the additional gross margin of a fully diversified cropping pattern would amount to US$154/ha.

- Obtained results of the relative water supply suggest that the irrigation efficiency is on the lower side (between 21 and 34%). This is particularly valid for river pumped schemes that are developed on alluvial sandy soils along the main riverbanks. If return flow to the river is taken into consideration, the overall efficiency appears to be as high as 52 to 68%. At each level water escapes, of which a part could be made available for consumptive use if the system was rehabilitated and modernised. However, part of the water returns to the source and is available one more time through pumping and/conjunctive use of groundwater. As a consequence, expensive lining of canals may not be the right choice for system rehabilitation and design. Alternative approaches such as the provision of groundwater wells and pump facilities must be considered as well.

- Substantial reduction of the electricity bill could be achieved through a change of cropping pattern from rice to a more diversified system, including oil crops such as sesame and vegetables such as onion.

Rehabilitation and Modernization of Existing Systems

8.28 Future rehabilitation and modernisation of the existing irrigation systems must be based on a comprehensive review and evaluation of the system design and assumptions against its future need. The objective is to upgrade an existing system to a state, which permits a much improved performance level in terms of productivity, irrigation and cropping intensity, equity and reliability in water supplies, financial viability, institutional arrangements, environmental soundness, and social acceptance.

8.29 The successes that were accomplished with land consolidation projects in various parts of the country are regarded as encouraging. Technically the project concept offers an enormous potential for much improved performance of rice-based irrigation systems. However, the project concept appears to be weak in terms of its socio-economic and institutional approach, which is top-down. If this approach is replaced by a farmer-driven approach that is based on participatory and service-oriented principles, then land consolidation and modernisation could become a real option for the modernisation of the existing irrigation schemes. Encouraging results in irrigation information technologies and systems were accomplished by ITC, which offer a great

opportunity for adoption in various irrigation schemes. Constraints to system rehabilitation and modernisation are identified as follows:

(i) budgetary constraints in scheme operation and management and cost recovery;

(ii) strict cropping pattern request on National Projects;

(iii) top-down approach in downstream planning and development; and

(iv) limited technical capacity at ID and WRUD in terms of staff and on-farm irrigation management.

Participatory Irrigation Management

8.30 There is a significant potential and scope for improving the system management arrangements by adopting participatory principles. This implies that farmers are formed into formal water user groups and associations, which are independent and autonomous in decision taking. Planning of seasonal cropping could be based on farmers' preferences and collaboration among scheme operators, water user groups and farmers. Responsibility for systems operation, maintenance and management including irrigation costs could be shared between water user associations and ID/WRUD. An important component of improved water user participation is capacity building and training of water user associations and farmers. Constraints identified to PIM include the following:

(i) absence of an enabling environment for the formation of strong water user associations;

(ii) absence of a sufficiently experienced technical and facilitating staff in participatory planning, management and training; and

(iii) inadequate financial capacity of farmer and water users to pay increased water charges and fees.

F. IMPORTANT POLICY ISSUES

8.31 Altogether there are three important policy issues that require careful attention on the part of the government.

Liberalisation of Cropping Restrictions

8.32 The liberalisation of cropping restrictions is seen as an important step towards the creation of more productive and water-use-efficient agricultural production systems. Cropping decisions must be made by farmers and/or water user associations autonomously. The current economic damage at the scheme level is estimated between MYK 8 and MYK 35 for each cubic meter of water depleted. This situation calls for immediate attention at the level of policy makers.

Review of the Current Water Charges

8.33 The current water tariff system is inadequate in order to compensate for the services provided by the government. A future cost recovery system is needed, in which investments into

the development of infrastructure and the provision of services and facilities for operation and maintenance are reflected more adequately. Water tariffs must also consider the payment capacity of the farm households that take advantage of the facilities and services. It is suggested that the current water tax system be reformed in order to meet the needs of a much developed and changed irrigation sector, and based on volumetric accounts.

Creation of an Enabling Environment for the Formation of Water User Associations

8.34 The formation of legally recognised and autonomous water user associations necessitates the existence of an enabling environment for water user associations. Normally, such an environment includes three components: (1) a stakeholder dialogue and consensus building process, in which the principles and needs, attitudes and aptitudes of all stakeholders are addressed and articulated; (2) an enabling legal framework for the formation of water users associations, in which the legal status, membership, the rights, and responsibilities of members are clearly stipulated; and (3) a water user association capacity building and support programme, targeting farmers, scheme operators and executive committee members of the water user association.

Establishment of a Basin-Wide Water Resource Management System

8.35 Future decisions in reservoir management must be based on relevant information and coordination. Management aspects of river pumping must be integrated with the management of dams, and portrayed together with flood protection works in the context of the basin. In the longer term, it is suggested that a basin-wide integrated water resource management approach be taken, which is based on clearly defined objectives, information and regulations, preferably managed and coordinated by a single inter-ministerial body.

9. MARINE AND INLAND FISHERIES[1]

A. INTRODUCTION

9.1 Myanmar has a coastline of 2,832 km along the upper eastern side of the Bay of Bengal, with abundant marine and riverine fisheries resources. Fishing plays a significant role in the national economy. Fisheries and aquaculture provide direct employment to at least 1.3 million people in the marine sector and 1.4 million people in inland fisheries, plus an estimated 0.3 million jobs in aquaculture, so that a total of 12-15 million people benefit from this sector. The fishing sector provides two thirds of the animal proteins in the diets of the people, of which the per capita consumption of fish and fisheries products is estimated at 23 kg/year. A significant amount of the marine fish produced is exported, thus providing considerable foreign exchange. The total national fish production almost doubled from 680,000 tonnes in 1985-1986 to 1,283,000 tonnes in 2000-2001. Marine catches form 60-75% of the total catch. Aquaculture statistics covering both inland and marine culture illustrate that production increased almost thirty fold from 6,000 tonnes in 1990-1991 to 176,000 tonnes in 2001-2002.

B. MARINE FISHERIES

9.2 Myanmar has an Economic Exclusion Zone (EEZ) of 486,000 km^2, of which the continental shelf covers 230,000 km^2. All fishing takes place inside this shelf area, consisting of three major natural zones: the northern, narrow Rakhine area, with its generally trawlable, narrow shelf; the Ayeyarwady (Irrawaddy) area: a shallow, wide shelf covered by sand and especially mud, and the Tanintharyi region, which is very heterogeneous, with coral reefs and rocky bottoms towards the South. This latter area has an archipelago of some 800 islands, and the continental slope beyond 200 m is the only trawlable deep water area of the country.

9.3 Two major types of marine fisheries are distinguished: the coastal or inshore fishery and the offshore fishery. Inshore fishing is practiced by a range of small-scale vessels up to 30 feet in length, using engines of up to 12 horse power. In 2001-2002, 28,240 such fishing boats were licensed. The total recorded annual fish catch was about 379,000 tonnes. This sub-sector is of great socio-economic importance. The offshore fishery operates outside these limits and uses larger vessels, from which active fishing gears, e.g. bottom trawls, purse seines, surrounding nets, drift nets, long lines are deployed. In 2001-2002 1921 offshore fishing vessels were operating. Their catches amounted to 646,000 tonnes.

The Fishing Industry

9.4 The numbers of installations along the shoreline are still relatively low. The emergence of industries is constrained by the lack of electricity, which is usually only available for a few hours in the evening, lack of water, and the lack of good roads. Fish and shrimp landed in one of these coastal sites may be processed locally (usually for export), transported on ice to Yangon, where it may be processed for export, or exported directly after inspection. This lack of

[1] The following section is a summary of Working Paper 5 "Marine and Inland Fisheries" contained in Volume 3 of this study and prepared by Frits Roest, Fisheries Specialist for the Agricultural Sector Review.

facilities also explains why fish is locally processed and/or preserved artisanally (dried, smoked and salted). There are four fish canneries. The by-catch from shrimp trawlers is brought ashore and processed according to local knowledge and tradition. Fish meal is an important component of livestock and poultry feeds. Crushed oyster shell collected from the marine environment is also used in the preparation of these feeds (37.4 tonnes was collected in 2001-2002). Myanmar Government has been promoting the export of surplus fish production. Practically all freshwater fish is consumed locally, and exports therefore concern marine fish and shrimp. Official statistics clearly show an acceleration of exports since 1994. The volume of fish exports rose from 7,000 tonnes in 1988-1989 to 138,000 in 2001-2002, for a value of 103.6 million US dollars. Shrimp exports increased tenfold from 2,131 tonnes in 1989-1990 to 21,454 tonnes in 2001-2002, and their annual value from 11 to 94 million dollars.

Marine Fisheries Potential and Present Exploitation Rate

9.5 In 1979 and 1980 the research vessel Dr Fridtjof Nansen executed an acoustic survey of the pelagic fish resources on the continental shelf of Myanmar. A full bottom trawl survey of the shelf area was made by a UNDP/FAO project in 1981-1983. The potentials of the pelagic and demersal stock from these two surveys were considered to be 500,000 for the pelagic and 550,000 for the demersal resources, totalling 1,050,000 tonnes. In 1999 the historical survey data were reappraised and former estimates revised downward by 33%, taking into account the deficiencies of the first generation echo integration system. A new correct estimate for the maximum sustainable yield (MSY) was considered to be 600,000 tonnes. Unfortunately no further surveys had been done to investigate the present status of the resource.

9.6 Total catches of marine fish have since 1996-1997 been superior to the new MSY estimate of 600,000 tonnes and have since then increased rapidly to 1,025,000 tonnes in 2001-2002. The resources should therefore be considered to be in a state of overexploitation. Although Government has been informed of the revised MSY estimates on the basis of the surveys in the early 1980s, this information has not yet led to renewed thinking on appropriate resource exploitation levels.

9.7 As reported catches have exceeded the one million tonnes mark, however, it has been accepted that, taking into account unreported catches (e.g. from poaching), the marine resources are now being fully exploited and that the emphasis should in future be on increased production of the aquaculture sector. Interviews with persons involved in the fishing industry revealed that the shrimp catch rates on the Rakhine coast have declined to a third of their original values, suggesting that the resource has suffered the same fate and that former high value species have now become rare; in addition, interviews with artisanal fishermen show that the inshore Hilsa resource, which traditionally plays an important role in the small-scale fisheries has dwindled to a mere fraction of its original size. The degradation of the coastal habitats has no doubt contributed to the decline in marine resources, as well as the great numbers of tidal shrimp ponds in Rakhine State. These findings indicate that there is a strong need for resource management. Statistical data collection as practiced by DOF generates information on catch and export volumes and values, but does not contribute to resource monitoring. Clearly, a change of approach is required.

C. INLAND FISHERIES AND AQUACULTURE[1]

9.8 Myanmar's inland fisheries are practiced on and along the major rivers: Ayeyarwady and its tributaries Chindwin and Sittoung River, as well as the Thanlwin River, and in other open waters and floodplains. For management purposes, Myanmar divides its inland capture fisheries into leasable fisheries and open fisheries. Most fisheries are nowadays culture based, i.e. fingerlings have been introduced to enhance natural fish production and recruitment. The area of fish ponds in the country doubled in the 1990s from 15,000 to about 30,000 hectares. Unfortunately, the total production of these ponds is unknown, since their production statistics are combined with those of the shrimp ponds.

Leasable and Open Fisheries

9.9 Leasable fisheries are almost exclusively key fishing grounds on floodplains which are primarily fished through the erection of barrage fences around the lease area with fish collected in various collection pens or traps. The peak season involves capturing fishes migrating off the floodplain at the beginning of river draw-down. There are currently 3,722 leasable fisheries in Myanmar of which 3,490 are still exploitable. Leases have been auctioned every year, but DOF are extending the lease period to up to 9 years to promote improved long-term production.

9.10 Improvements made to the culture-based fishery practices of the leasable fisheries have been rather limited, with some notable exceptions. Typically, the lessee has been complacent with the production levels, and very few, if any, trial and error changes have been made to improve the production. Changes that have been made are mostly physical/structural. In this respect there appears to be considerable scope for further enhancement of these fisheries through stocking of advanced large sized fingerlings, using appropriate stocking rates and possibly strategic feeding in some of the smaller leases.

9.11 Open fisheries are fisheries in all other areas including all types of fishing operations. These are of paramount importance to local populations, particularly the landless, for which fishing represents a last resort activity requiring very little investment. Catches reported from open fisheries were 159,000 tonnes in 2001-2002 and have been 40–60% higher than those of the leasable fisheries.

Reservoirs

9.12 Reservoirs are rarely built for fishery purposes. However, fisheries are a significant user of reservoir water resources. Since 1995 fisheries activities have been banned through a decree by the Department of Irrigation. The Department of Fisheries nevertheless continues with a reservoir stocking programme of Indian and Chinese major carps, for conservation purposes. Even if an annual production level as low as 50 kg/ha is used, the reservoir fishery resources of Myanmar should yield about 90,000 tonnes, and also provide employment opportunities in the rural areas to at least 20,000-30,000 persons.

[1] Section C is largely based on the findings of the *Myanmar Aquaculture and Inland Fisheries Mission* which took place in December 2002 (FAO, Bangkok) and of which the draft document was made available to the ASR team.

Freshwater Capture Fisheries Potential

9.13 It is uncertain whether freshwater capture fisheries have still expansion potential, although recent reviews have suggested that the inland fisheries potential is far greater than the 235,000 tonnes reported (possibly as much as 600,000–900,000 based on revised estimates from the Mekong system). The entire fishery is closed from June through August (to allow spawning and recruitment).

Aquaculture

9.14 The production of fish fingerlings and stocking into aquaculture ponds is the typical form of aquaculture and is currently practiced for a range of species. The strict control by the agriculture department regarding the conversion of rice lands into other uses (especially aquaculture) is one of the strongest restraints to more widespread development of aquaculture in freshwater areas. Aquaculture is one of the few activities that are profitable enough to repay the cost of conversion of paddy (through raising earth walls and excavation into ponds). In areas where the profitability of rice farming is quite marginal, fish pond aquaculture can be an attractive alternative. Rice-fish culture is being tested. The success of rice fish culture is extremely variable and relates to the reliability of water supply, control of theft, prevention of flooding or escape of the fish and the availability of large sized fingerlings at the start of the paddy culture season. In a country such as Myanmar, where the wild fisheries resources are still very extensive, the presence of large numbers of carnivorous fish in the paddy fields is another cause of poor return from stocked fish.

9.15 The Government of the Union of Myanmar has formed a State level committee whose goal is to increase the total fishpond area up to 100,000 acres. There appear to be very few small (less than 400 m^2) fish pond operations. This is unusual relative to other countries of South East Asia, where small ponds are quite popular. Currently there are 16 DOF fish hatcheries. These produce fingerlings for both stocking out in aquaculture and for sale. DOF estimated hatchery production is approximately 398 million fry (size unspecified). Private sector production is considered far higher with 700 million reported from 3 major hatcheries and a total of about 54 private hatcheries operating nationally.

9.16 It is also important to note that as demand expands for improved fingerlings for stocking into aquaculture ponds or for release to water bodies, a greater need for better quality feeds will emerge. There is a period during which the leasable fisheries are closed (April to June) and at this time the price of fish rises. Cultured fish have a window of opportunity to exploit the shortage of fish and some operators may schedule harvests to exploit this advantage.

Shrimp Culture

9.17 Promulgation of the Law relating to Aquaculture paved the way for an accelerated development of inland aquaculture, with gradually increasing areas under cultivation. Likewise, traditional extensive, low-productive shrimp farming of the black tiger shrimp, *Penaeus monodon*, had been going on at a slow pace since 1975.

9.18 Recently, the Government has launched a special three year plan to raise the shrimp pond area from some 28,000 ha to about 49,000 ha and to promote environmentally friendly semi-

intensive shrimp farming. In the development of shrimp farming, Myanmar is lagging behind its South East Asian neighbours, particularly Thailand which is the leading world exporter of cultured shrimp. For such an expansion to occur successfully, there will be a need for careful environmental planning, including: (a) the introduction of zoning supported by multi-disciplinary environmental impact assessments instead of the currently practiced individual site selection; (b) the adoption of integrated coastal zone management; (c) the institution of new policies, and implementation of existing and recommended guidelines, and (d) economic studies to ascertain the feasibility of semi-intensive shrimp farming in a geographical area where possibly only one crop per year can be obtained. Hopefully, the present rapid conversion of unoccupied land into shrimp ponds will permit time for an effective application of these wide-ranging and very fundamental recommendations, which touch on organizational and educational skills not currently available in Myanmar.

D. FISHERIES AND AQUACULTURE RESEARCH

9.19 There is little tradition of commissioning and executing research to support fisheries management or aquaculture planning, development and execution. Research in this context has mostly consisted of either the controlled collection and interpretation of relevant data in order to enable the formulation of advice to the fisheries manager, or of setting up relatively simple aquaculture installations to test new methods and experiment with new species according to the wishes of the aquaculture planner. This limited research tradition and capacity needs to be expanded and revitalized. There is great need for monitoring key environmental parameters in order to measure the environmental effect of new developments and particularly the intensification of shrimp culture.

9.20 Priority research should focus on the present status of marine fish stocks - both inshore and offshore - and the impact of policies developed to improve biomass levels. There is an urgent need to develop a capacity to monitor the effects of possible management measures, both on the fish stocks and on the local communities whose livelihood and/or food security depend on the resource. Such monitoring requires both biological and socio-economic research. In addition to this, the planning of the enhancement of natural waters and ponds requires good data on adequate stocking densities under local circumstances, information on the effect of introducing larger-sized fingerlings, the (supposedly negative) effects of fishing on reservoirs, improvements on artificial propagation of the species that are currently cultured and/ or stocked into perennial water bodies. The international context in which Myanmar presently participates (SEAFDEC, NACA, BOBP-LME) will hopefully help prioritize the research to be undertaken.

E. INSTITUTIONAL SUPPORT TO THE FISHERIES SECTOR

Structure and Tasks of the Department of Fisheries

9.21 The Department of Fisheries in Myanmar constitutes a part of the Ministry of Livestock and Fisheries, and its key is to manage exploitation of national fisheries and aquaculture operations. The Department was reorganized in April 2002 to better address the increasing importance of aquaculture in Myanmar. The new administrative structure has four directorates dealing with capture fisheries, aquaculture, research and development and

administration. Some roles are cross-cutting whilst others relate to fisheries or aquaculture administration.

9.22 The Department is grossly under-funded, and ill equipped for its crucial tasks. According to the Myanma Marine Fisheries Law of 1989, article 53, "the Department is entitled to appropriate only the amount necessary for research, development and conservation of species of fish for the fishery, out of the fund not exceeding five per cent of the duties and fees collected from the fishery". In reality, however, it receives so little budget that only an absolute minimum of tasks can be adequately performed, and elementary office equipment like computers are lacking. Furthermore, its training and research centres lack equipment and transport, and it cannot operate its laboratories for lack of reagents.

9.23 Fisheries officers and staff lack the respect they require to fulfil their duties, particularly with respect to the enforcement of laws and regulations such as the ban on prohibited fishing gear. A system of fisheries data books was introduced for the offshore fleet, the use of which is obligatory under the fisheries legislation, but had to be discontinued for lack of compliance. Being of comparable importance to the agricultural sector as a primary food producing sector, it is high time that the status, and therefore the performance of the fisheries department be upgraded.

9.24 Among the key roles performed by the Fisheries Department are:

- **Revenue and Statistical Data Collection**. The *Supervision and Revenue Division* is organizationally divided into a marine and a freshwater division. Here, licensing of fishing vessels, gears, leases of fishing areas, aquaculture installations, rented installations and facilities etc. is based as well as authorization of exports, registration and verification of the value of fisheries products to be exported. Available statistical information is broken down by species only for shrimp, and is therefore only potentially useful for shrimp resource monitoring. Quantities of mud crab, live freshwater eels and some other fisheries products exported by road to China from the Rakhine and Ayeyarwady areas, and transiting through Mandalay, are recorded by agents of the Fisheries Department but are not included in monitoring reports. FAO has attempted to provide assistance for the improvement of the statistical system, but the resources provided and counterpart capabilities proved insufficient.

- **Marine Fisheries Management**. The current apparent overexploitation of the marine resources indicates that data collecting systems as originally foreseen in the fisheries legislation are not functioning adequately, and that the role of the Department of Fisheries in data collection and fisheries management needs to be reconsidered. Research into fisheries resources should be initiated, using the expected SEAFDEC joint research vessel and an adequate budget should be made available for this purpose. Training will be required in all aspects of fisheries management, including resources research (stock assessment software), and above all participatory fisheries management.

- **Fisheries Legislation and Regulations**. DOF has been instrumental in drafting new fisheries legislation. In the late 1980s and early 1990s, various laws and procedures relating to fishing rights, marine fisheries, aquaculture and fresh

water fisheries were enacted so as to allow wider fishing rights to private individuals, both local and foreign, and also to form joint ventures. In addition, the Department of Fisheries has issued a number of regulations and directives for the management of the fishery, export quality control, inland fisheries and aquaculture development.

– **Fisheries Development Policy**. Policy development for sustainable production of the marine and freshwater sectors and aquaculture is a major task for the Department. A 30 Year Plan for sector development, covering the period 2001-2031, was formulated in 2001. This planning document needs to be rethought to reflect the new insights in the resource situation.

– **Aquaculture Development and Stock Enhancement Planning**. Implementation procedure for the current 3-year national 'plan for aquaculture' involves: (i) upgrading fish farming methods; (ii) looking at feasible methods in relation to conditions; (iii) monitoring effectiveness; (iv) supporting access to electricity and fuel, and; (v) safeguarding fish farmers. In future the likely emphasis of management policy will require consideration of enhancement, sustainability, and maintenance of bio-diversity and possibly an effort to selectively reduce fishing pressure in some fisheries, with promotion of alternative employment especially in coastal areas. The Government has the intention to develop sea bass and grouper culture, but experiments have so far not been very successful. The exchange of experience through the various regional mechanisms (SEAFDEC, NACA) will doubtlessly lead to an improved approach.

– **Extension and Communication**. There is an increasing recognition within South East Asia of the benefit of increased communications, and of sharing lessons with other fisheries line agencies which face common issues. This would be likely to include not only technologies, but also strategies (including communications) as well as ways of working (incentive structures, monitoring systems). It is strongly recommended that Myanmar Department of Fisheries increase its formal and informal networking with other line agencies and organizations within Myanmar and also with similar national networks in other countries. It is recommended that Myanmar contact the NACA secretariat to investigate playing a role in the STREAM Initiative in this regard.

– **Fish Quality Control**. The Quality Control Laboratory established in Yangon performs "end product inspections", and is in the process of extending its activities towards other areas. The laboratory currently performs microbiology and virus tests, but has no funds for service chemicals, which can hopefully be purchased in the near future from the income generated through such inspections. There is a need for a private sector laboratory to provide services to the fisheries sector.

– **Myanmar Livestock and Fisheries Development Bank**. The Ministry of Livestock and Fisheries has established the Myanmar Livestock and Fisheries Development Bank in order to assist farmers who actually require financial

investment for the expansion of fisheries-related business. In June 2002, the bank had loaned MYK 480.6 million to 195 fish farmers from Yangon, Mandalay, Ayeyarwady and Sagaing Divisions.

F. MAJOR POTENTIALS AND CONSTRAINTS TO FISHERIES DEVELOPMENT

9.25 The role of fisheries in income and employment generation and food security cannot be overestimated in Myanmar. Nonetheless, the reduction of the marine resources by over-fishing and coastal habitat degradation illustrates the urgent need for active fisheries management in order to ascertain the sustainability of the exploitation, both by the small-scale inshore and the larger-scale offshore fisheries. In the inland waters, the generalized poor rural populations have only very limited access to the aquatic resources because of the ancient system still in use of auctioning off fishing rights for the main fishing grounds. There is a need to modernize this lease system and replace it with a system of community-based fisheries management, which is being applied successfully elsewhere in the S.E. Asian region. This will provide poor rural communities directly with significant, more equitable, development prospects, based on the concept that natural resources are common property. In addition, policy changes are recommended that would permit the re-emergence of an organized reservoir fishery.

9.26 The major potential for increased production from the fisheries sub-sector in Myanmar lies primarily in the more effective utilization of inland and coastal aquaculture resources. Three principal initiatives would appear to offer significant potential:

(a) development of small-scale inland aquaculture for food security and income generation;

(b) coastal development of sustainably managed semi-intensive shrimp operations; and

(c) coastal development of aquaculture of high value fish species in net cages.

9.27 Inland fisheries management and the three options mentioned for the development of aquaculture are briefly considered below, and the constraints to their effective execution considered. At the end of this section, requirements are listed for the institutional strengthening of the Department of Fisheries

Modernization of Lease System, Introduction of Community-Based Fisheries Management

9.28 The current system of leasing rights to prime inland fishing grounds to the highest bidder implies that rural communities have very limited access to fishing in waters within their reach and that fisheries contributes only marginally to the alleviation of rural poverty. Fishing by the rural poor is done either through subleases requiring cash payment for which money is usually not available, thus creating or perpetuating dependency (payment through sales of future catches), or in the so-called “open waters” which are frequently rather far away.

9.29 There is an urgent need to modernize the lease system, and to provide rural communities with permanent access to near fishing grounds, allowing them to participate in the planning and management of the resource. An attractive alternative, successfully implemented in a number of situations in countries like Bangladesh (semi-closed lakes; community rice-fish

farming), India (culture-based fisheries in reservoirs and lakes), Cambodia (community fisheries), Laos (capture inland fisheries and aquaculture), The Philippines (marine reserves), is the introduction of so-called "community-based fisheries management". According to this concept, fisheries resources are a common property resource to which a group of people have common user rights. Common property resources are not open-access, but are subject to rules and conventions of local communities.

9.30 Implementation of Common Property Resource Management in the fisheries of Myanmar would be new to both Government and fishing communities, and would therefore need to be introduced in a phased approach. Activities required before it can be successfully implemented include: help people to organize themselves for collective action, involve the community in planning and development as they are stakeholders, develop clear guidelines on user rights and responsibilities of each person, develop supportive policy and governmental regulatory mechanisms, help minimize conflicts between and within communities and with Government, define boundaries around the area for local management and legitimize community control through legislation, and follow an interdisciplinary and systems approach to addressing management issues.

9.31 In addition, it requires Government at the central and local (State, township) levels to assume an active leading, stimulating and facilitating role during the implementation of a pilot phase. As considerable experience has already been gained elsewhere, it is important to mobilize this experience for the introduction of community-based fisheries management in Myanmar.

Small-Scale Aquaculture Development for Food Security and Income Generation

9.32 Although Myanmar possesses a relatively rich resource base and low population density, rural poverty is believed to be significant and opportunities for income diversification in many rural areas are limited. Experience from other South and South-Eastern Asian nations has shown that small-scale aquaculture can make a significant contribution to food security and income generation among small-scale farmers and land holders. Despite a programme that has seen the doubling of fish pond areas from 15,000 ha in the early 1990s to as estimated 30,000 ha a decade later, these new ponds are typically medium to large sized, and hence unsuitable for low-income group adoption, for which pond sizes of less than 400m^2 are more feasible. This existing programme should be re-targeted and expanded to provide a major stimulus for small-scale aquaculture production in Myanmar.

9.33 Key measures involved in this approach would be to provide targeted rural populations (those with appropriate land resources and low income levels) with assistance to create and manage small-scale productive aquaculture ponds. These could be new ponds, or they could comprise modifications to existing paddy fields, either as part of rice/fish cultivation or as a conversion to purely aquaculture operations.

9.34 There are several advantages that can be derived from integrating aquaculture with other smallholder farming system components: (a) the diversification of farming systems to include aquaculture diminishes the risks associated with small-scale farming. This is because pond water not only yields fish, an edible and tradable commodity, but can also contribute to crop irrigation and livestock watering in the dry season, thereby increasing the viability of year-round production. (b) The extra production from aquaculture can imply an increased availability of

protein for household consumption. Alternatively, aquaculture products can be treated as a commodity which can be traded for cash or essential household items. Both strategies increase household economic security.

9.35 The effective implementation of a scheme of this nature, however, would require a substantial modification of the approach and capacity of the aquaculture division of the Department of Fisheries, including the creation of an effective extension service, an expanded fingerling production capacity, access to some form of financing for infrastructure development (preferably on a reimbursable basis to participant farmers) and the ability to supervise and monitor private sector contractors providing pond excavation services. It would also require significant policy changes in some areas, including greater flexibility in permitting paddy farmers to make the transition to aquaculture on some or all of their land.

Sustainable Semi-Intensive Shrimp Cultivation for Export Markets

9.36 Although a rapid expansion in area and intensification of shrimp cultivation has resulted in significant environmental damage in most countries, this does not have to be the case under effective sustainable management, and given the strong export market for shrimp, the impact on foreign exchange earnings can be considerable. In 2000, an FAO supported plan was developed to increase shrimp cultivation in Myanmar from 28,000 ha to 49,000 ha. Further development is foreseen to 72,000 ha in 2030-2031.

9.37 It is suggested that the pace of transformation of the farms under extensive cultivation into semi-intensive cultivation be slackened in order to allow for better and more robust planning, taking into account the present weak environmental capabilities and institutional deficiency. Further such developments should be supported by major investment in areas such as: (a) institutional and human resource capacity of the DOF to participate in the development, implementation and monitoring of an integrated coastal zone development plan with a focus on shrimp farming; (b) the development and testing of appropriate water and pollution management procedures and technologies suitable particularly for smaller-scale producers; (c) the development of an effective extension programme to support smaller-scale producers, including training and long-term support of participants; (d) the expansion of both state and small-scale commercial hatcheries for shrimp larvae or gravid females; (e) appropriate testing laboratories for environmental impact monitoring and assessment and disease control, and (f) reimbursable financing to support infrastructure development, particularly among smaller-scale producers.

Coastal Aquaculture of High Value Fish Species in Net Cages

9.38 Despite some unsuccessful experiments to date by DOF staff, there should be a considerable potential for the culture in net cages in the coastal environment of fish species like sea bass and grouper, which can contribute significantly to increased export earnings from the fisheries sector. These methods are practiced successfully elsewhere in the South East Asian region, and it is supposed that appropriate technologies can be transferred to Myanmar through the SEAFDEC and/or NACA networks. Private development of this aquaculture should then follow, while environmental effects are monitored by DOF.

Reintroduction of Reservoir Fisheries

9.39 Experience in other Asian countries has demonstrated that no inherent conflict exists between the creation of reservoirs for irrigation purposes, and the utilisation of those bodies of water for fish production. Under its current development plan, Vietnam is expecting to generate 250,000 tonnes of fish annually from its reservoir areas. Nevertheless, such dual use has been prohibited in Myanmar since 1995, and this potential resource has been effectively abandoned. Any remaining exploitation has been disorganized, unmonitored and is of a very low intensity.

9.40 Although the key step involved is one of reversing the existing policy position, it is clear that the re-introduction of reservoir fisheries should be accompanied by a monitoring and supervision programme that determines the economic value of the catch, ensures appropriate licensing income for the Government, and ensures a minimal environmental impact. A unit could be created within the DOF specifically to manage these responsibilities.

Overall Institutional Strengthening of the Department of Fisheries

9.41 In addition to responding to the specific needs of the above potential projects, there is a need to upgrade the capabilities, status and authority of the Department of Fisheries, and to establish new profiles and tasks for Fisheries Officers. More funds are required if the Department is to fulfil the important task of accompanying and facilitating the important new developments and challenges that have been defined.

- **New Challenges in Fisheries and Aquaculture Management, Planning, Economics**. A new resources survey is required, designed in such a manner that results can be compared to earlier surveys of the 1980s. The current apparent resource situation suggests that a period of intensive fisheries management is now required, and that institutionally DOF needs to be realigned to become a more effective instrument for fisheries management. Training, both long-term and short-term, is required at all levels. There is a need for an educational strategy to upgrade the capabilities of the relevant division of the Department of Fisheries, based on a complete analysis of the educational backgrounds of the officers. Requirement for further training of course also applies to many other disciplines within the perimeter of the fisheries, e.g. aquaculture planning and execution. Economic skills are required for those involved in planning and policy development. It is recommended that DOF senior staff be trained in Community-based resource management, so that new ideas emerge about how local communities can actively participate in the management of their resources and the environment.

- **Environmental Planning and Monitoring Capabilities**. Institutional arrangements concerning the creation of a Ministry of the Environment in Myanmar do not appear to have crystallized. Nevertheless, accelerated development of environmentally sensitive issues like aquaculture and particularly shrimp culture carry great environmental risk and need to be carefully planned and monitored. It is of paramount importance that DOF assumes its responsibility by participating in environmental planning and monitoring, based on a sound knowledge of the technical issues at stake. A unit

should be established within DOF to establish shrimp culture zones, supervise and coordinate EIA and zone development. An Interdepartmental committee, fisheries, forestry, environment would review zone EIAs and make recommendations for modifications. Human health risks associated with bathing, swimming and fishing in fish ponds and installations receiving raw sewage should be properly evaluated and measures taken. The uncontrolled effect of the use of pesticides (e.g. "floating gardens") and fertilizers on the aquatic environment merits not just attention, but immediate action. It is proposed as a matter of urgency that water samples be taken and analyzed and that fish flesh be analyzed for pesticide residues.

– **Biodiversity Impact Assessment**. The indiscriminate release of fingerlings (and fry) into all natural water bodies undoubtedly has negative effects on the natural biodiversity, which need to be researched and if possible remedied.

– **Development of the Fishing Industry**. The enabling environment created by the policies of the Department of Fisheries and the overall economic policy of the Government has allowed a blossoming of the fishing industry, particularly the catch and export sectors, but relatively little attention has gone into the generation of added value of the fish caught. Some successful examples are quoted. This should be promoted, in collaboration with MFF.

10. AGRO-INDUSTRY AND THE TRANSFORMATION OF AGRICULTURAL PRODUCTS[1]

A. INTRODUCTION

10.1 Over half a century since gaining independence, Myanmar still remains an agricultural based economy. Using the latest statistical information available (2000-2001), the agriculture sector contributed 57.2 percent of GDP at current prices while manufacturing contributed 7.2 percent of GDP. Compared with almost all of her neighbours, who have achieved a significant level of industrialization and structural change, Myanmar's share of industry in total GDP remains more or less constant at or around 12 percent; indicating no significant structural change in the economy over the five decades since independence. Agriculture itself has remained relatively stagnant, averaging around 37.5 percent of GDP over the last 15 years.

10.2 The main agricultural policies of the government revolve around the expansion of cropping and industrial crops, both within SOEs as well as through private sector involvement, and increasing the involvement of the private sector in agricultural input provision. The increasing mechanization of agriculture and the expansion of irrigation are important measures being used to increase production and productivity of agriculture, as well as increasing the area of land under cultivation. Of interest to agro-industry is the emphasis on private sector involvement in agricultural input and machinery distribution, and the absence of explicit policies outlining private sector involvement in the production of inputs or the trading in agricultural outputs.

10.3 The Myanmar Government's national economic objectives highlight the role of agriculture as the driver of economic growth, but fail to explicitly identify agro-industrialization as a mechanism by which this can be achieved. Industrial policies and strategies that were implemented were mainly orientated towards import-substitution, and subsequently failed to achieve any meaningful growth in the industrial sector.

10.4 Despite this, the economic, social and environmental features of Myanmar are very favourable for agro-industrial development. There are abundant resources of industrial raw materials such as coal, iron and tin, a large potential for hydroelectric power, a domestic market of 50 million people with a relatively low population density, and a large potential regional and international export market. Coupled with a long-term deterioration in the terms of trade for raw, unprocessed primary products on the international market, this implies that the continued reliance on exports of primary products for foreign exchange is unsustainable. The experience of neighbouring countries shows that the solution to this dilemma is through the promotion and expansion of exports of value-added commodities produced by industries.

[1] The following section is a summary of Working Paper 6 “Agro-Industry and the Transformation of Agricultural Products” contained in Volume 3 of this study and prepared by Tim Purcell, Agro-Industry Specialist for the Agricultural Sector Review.

B. RICE MILLING AND PROCESSING

10.5 Rice production is the major agricultural activity in Myanmar. Just over 6.4 million hectares of paddy was harvested in 2001-2002, yielding 3.4 tonnes per hectare, or almost 22 million tonnes of paddy. The majority of paddy is grown in the delta and central region of Myanmar. Exports of rice are currently around 0.9 million tonnes (2001-2002), but averages since 1988-89 have been around 0.3 million tonnes.

10.6 With changes in government rice polices, the area and production of rice have increased along with increases in yields. These increases in yields have occurred with increasing usage of chemical fertilizers; although the actual rates of fertilizer use are extremely low (often 1 bag/acre). The low rate of fertilizer usage is a direct result of the high price of fertilizer, insufficient domestic production and difficulties in importing fertilizer.

10.7 Paddy is sold by farmers to primary collectors or commercial mills and the resultant rice is distributed to consumers through a wholesale network. Paddy destined for own consumption is milled in village mills, where millers get to keep the bran and husk as payment for milling services; for use in their livestock fattening enterprise or for sale to livestock producers.

10.8 Until the 2003 harvest the state procured paddy from farmers at a rate around half of the normal market price. From April to December 2003, the government policy intention was that MAPT was to procure paddy directly from traders and millers, at the prevailing market price. The private sector was allowed to export rice under license, with MAPT no longer involved in the export trade. The policy for MAPT to procure paddy and rice directly from traders was never actually implemented, and the government announced a new policy in December 2003 involving the complete liberalization of the domestic market for rice and the elimination of subsidized rations for government staff and other target groups. Exports of rice were subsequently banned, in an attempt to reduce the income effect on government staff by lowering prices and securing sufficient supplies of rice for the domestic market.

10.9 Most millers buy paddy from farmers and collectors and sell the milled rice. Average milling recovery ranges from 45-65 percent, depending on the type of mill and quality of paddy. The very low recovery rates apply to the smaller mills in the private sector, with larger mills and SEE milling being able to afford newer equipment. Overall, MAS statistics indicate that recovery rates average at nearly 60 percent.

10.10 MAPT estimates that in 1994 there were 2,189 registered mills, with an estimated milling capacity of 50,000 tonnes per day. Around 97% of capacity is in private ownership, and 54 percent is for small scale milling. Given MAPT milled 80.8 million baskets of paddy in 2000-01 and 105.6 million baskets in 2001-02, this would equate to a 71.4% and 54.6% capacity utilization for 2000-01 and 2001-02 respectively, assuming a 250 day per year operation (or 49% and 37% respectively for the full 365 days).

10.11 While small-scale mills are manufactured locally and some of the state owned mills have been upgraded and are reasonably modern and efficient, the bulk of the milling sector is operating below their rated capacity and their machines are obsolete. The main cause of this has been capital and credit constraints, a lack of spare parts, and inefficient management. While the state rice milling sector has benefited from ongoing budgetary support and capital investments, the private sector is constrained in its ability to modernize.

10.12 Private millers note that the cost and the reliability of electricity is a major constraint, with some mills unable to operate at efficient levels due to frequent power shortages.

C. COTTON GINNING AND PROCESSING

10.13 The largest area of cotton is devoted to long staple varieties (some 230-250,000 ha) followed by short staple varieties (some 90,000 hectares). The area under long staple has been increasing over the past decade at the expense of other varieties. Yields for all but long staple varieties have been stagnant or slowly increasing, but the long staple varieties have shown declining yields over the past decade, as fertilizer and irrigation use has not kept up with the expansion of areas under production. However, the increase in sown areas has been sufficient to result in an overall increase in production.

10.14 The cotton industry in Myanmar has been dominated by the existence of compulsory procurement of cotton by MCSE, until last year 50 viss per acre for long staple cotton and 25 viss per acre for short staple. In 1980-81 MCSE procured over 52 percent of the entire crop, but this has fallen to just over 14 percent in recent years. The reduction in procurement volumes has been a result of the below market prices paid by MCSE, and the relative profitability of alternative crops.

10.15 From late 2003, MCSE plans to eliminate the quota applied to all cotton farmers and concentrate on contract production from a limited number of growers (20,000 farmers on 60,000 acres) to ensure sufficient seed for future production. In exchange for subsidised inputs and technical services, contracted growers will have to provide 100 viss per acre. The price for cotton for seed under the old system was fixed at MYK 180 per viss for 2002-03, whereas for the upcoming 2003-04 season the price will be MYK 400 per viss, plus a premium for quality (cleaned cotton). In comparison, the market price for cotton is MYK 365-400 per viss, and up to MYK 500 per viss for seed cotton.

10.16 With few exceptions, the majority of ginning in Myanmar is carried out using single roller machines manufactured in the U.K. in the late 1800s to early 1900s. The private sector is exclusively single roller gins while the SEE sector has embarked on a modernization drive and has purchased some double roller gins from India and Japan, as well as some Saw gins from the US.

10.17 The private sector has nearly 49% of the available capacity, and just over 76% of ginning capacity is from single roller gins. This represents a total capacity of just over 311,000 tonnes of cotton seed per year, or an estimated capacity utilization of around 60%. There are wide discrepancies in gin utilization rates depending on the basis used for measurement. Under full operating conditions (2 shifts per day, 365 days per year) the capacity utilization ranged from 23% down to less than 2%, with most surveyed gins operating at less than 8%. Under "normal" operating conditions (1 shift per day, ginning season depending on length of harvest and availability of cotton) capacity utilization ranged from 63% down to 24%; with three of the 5 gins surveyed having less than 26% capacity utilization. As a consequence, the data appear to suggest that the majority of ginning is carried out in the private sector and a significant proportion of the SEE ginning sector is chronically under utilized.

10.18 Cotton by-products include linter, cotton seed for planting, and cotton seed for oil production. Interviews with gins suggest that cotton seed reserved for seed varies between 30% (private gin) and 75% (SEE gins). SEE gins reserve higher levels of seed for planting as they attempt to maintain adequate supplies of seed for delivery to farmers in their catchments area. A major constraint to sustainability of yields is the quality of seed supplied by MCSE gins to farmers for planting. Since quotas are set on weight, not quality, farmers typically provide their worst quality cotton to MCSE under the compulsory procurement system. Not only is genetically inferior seed reserved for planting in the next season, but germination rates estimated at only 40-60% leads to typical seeding rates of as high as 16 kg/acre as opposed to recommended rates of approximately 3-5 kg/acre.

10.19 One of the major constraints facing the SEE sector is the inability to secure sufficient quantities of cotton at the prevailing procurement prices. While MCSE continues to set fixed prices below the market rate cotton farmers will always prefer to sell on the open market.

D. EDIBLE OIL PRODUCTION

10.20 The oil crop sub-sector is second only in importance to rice in the agricultural economy of Myanmar. With a total sown area of 7.25 million acres (3.0 million ha) oil crops encompass a range of annual oilseeds and oil palm (a perennial crop). Oilseeds comprise around 16.4 percent of total sown area for agriculture, while total production is around 1.4 million tonnes. The most important oil crops, based upon a three year average (2000/01–2002/03), are sesame, groundnut and sunflower (3.4, 1.6 and 1.2 million acres respectively). Oilseed crops grown also include 0.3 million ha of cottonseed, which is a by-product of cotton fibre production and 116,000 ha of soybean, which has traditionally been used for culinary (non-oil) purposes. Niger seed and mustard are of local importance in the higher altitude areas but do not generally enter the commercial oil sector.

10.21 Over 80% of the oil crop production is concentrated in the central dry zone area, which encompasses the Divisions of Magway, Mandalay, Sagaing and parts of Bago. Sesame and groundnut are traditional crops within the region and remain dominant, although sunflower (a more recent introduction) and cotton are also important.

10.22 Normally groundnut oil is the most expensive edible oil while palm oil is the cheapest in the market. However, prices of edible oils in general fluctuate widely. This is closely related to domestic production level of oilseed crops and import volumes of palm oil. Since the latter half of 2001 imports of oil palm have decreased and the retail price of edible oil has increased significantly. The price of palm oil out of Malaysia averaged around US$515 per tonne for 2001-2002, but increased to US$745 per tonne in the first half of 2003. However, the variability in prices is greatly reduced from previous years, indicating a rising but stable price for imports of palm oil.

10.23 In the absence of a formal oil export trade, oilseeds are consumed largely in the domestic market, where they must compete with palm oil. Producers typically either process their seed in local village mills for home consumption (often paying for the service with the cake) or sell to traders coming to the village. Village traders, in turn, sell to commercial mills in larger settlements and towns, often through the medium of central crop exchanges (CCEs) where brokers charge an average 1.5 percent commission for negotiating sales but do not physically handle the

crop. Reported marketing margins for oil seeds are low and evidence suggests that the marketing system is relatively competitive, with a wide range of participants. However, market price information is limited at village level.

10.24 All milling of sesame, groundnut and sunflower in Myanmar is undertaken in the private sector and in 2001-02 a total of approximately 400,000 tonnes of groundnut, sesame and sunflower seed oil were produced.

10.25 All private sector mills are of the expeller type and are commonly in the 1 tonne per day to 20 tonnes per day range, with a small number of mills reaching 50 tonnes per day or higher. In general oil extraction rates in Myanmar are below that of their international counterparts. As all sesame, groundnut and sunflower processing currently utilizes mechanical expeller technology, the resulting cake has a remaining oil content of 6-7 percent. Cake is an important secondary product and is primarily used for animal and aquaculture feed.

10.26 The ubiquitous use of mechanical extraction technologies significantly reduces the efficiency of oil extraction due to the relatively high proportion of oil left in the cake. It also reduces the value of the cake itself, as high oil content cake is more difficult to store and more prone to rancidity and a resulting low acceptance by livestock. Submitting residue cake from expeller mills to solvent extraction, as is the practice in other countries, would yield a further 6% of oil (from the cake volume) and improve the value of the cake. It is estimated that if only 50% of cake was treated in this manner, an additional 20,000 tonnes of oil would be produced annually. In addition, the development of solvent extraction capacity in Myanmar would have the added advantage of offering appropriate processing facilities for soybean, which is unsuited to expeller extraction, and even sunflower, which is better handled through chemical extraction.

10.27 Low oilseed prices and household incomes have limited the ability and willingness of farmers to adopt improved seed varieties and technology packages, and have been a direct cause of stagnation in domestic production levels over the last few decades. Most millers interviewed indicated a lack of raw material input as being a significant constraint on their operations. Although problems within the oil crops sector may be most serious with respect to prices and productivity, the limited efficiency of current processing operations poses a further problem. Expeller technologies currently in use are typically sub-optimal, in terms of both extraction efficiency and costs per unit. While the edible oil extraction industry suffers less capacity under-utilization than other agro-processing sectors, several constraints to exist to efficient use of existing plant. Firstly, delays in getting raw material inputs contribute to significant deterioration of existing stocks. For instance, the rice bran oil plants have a significant trade with private mills in exchanging old bran for new; indicating that they store bran for too long before processing. Secondly, the majority of extraction plants indicated that access to stable electricity supplies was a major constraint to their operations.

10.28 The major constraints affecting the edible oil sector in Myanmar involve institutional and policy issues. The role of the state sector in production and processing has been quite limited, leaving the way open for the private sector to conduct operations. While private enterprises do not have to compete with highly subsidized state enterprises as in other sectors, government external trade policies with respect to oilseeds have had a serious depressing effect on production and prices. By restricting the export of oilseeds and edible oil in an attempt to make Myanmar self sufficient in edible oil production, the government has lost the opportunity for valuable export earnings from exporting high valued sesame and groundnut oil and importing lower valued palm

oil. While this policy regime is understandable; the desire to enable the population to have access to edible oil at reasonable prices, it ignores the fact that poorer consumers have to purchase the lower valued palm oil in any case and that the vast majority of oilseed producers lose out from having to sell their harvest at lower prices than that obtainable on the world market.

E. WHEAT MILLING AND CEREAL PRODUCTS

10.29 The wheat industry in Myanmar is a small but important industry, comprising around 0.5 percent of the total sown area. Wheat production occurs principally in Upper Myanmar, and is concentrated in Sagaing and Mandalay Divisions, where it typically forms part of a rotation with paddy, maize, sesame or groundnuts. In 2000-01, the area under production was 198,000 acres, producing 92,000 tonnes. While the cost of production of wheat has increased, the farm gate price has also increased. Despite this, actual areas under wheat production have been declining in the face of competition from more profitable crops such as chickpea and increases in wheat volume have been due to mainly increases in yield (due to improved technology and management) and expanded imports.

10.30 Foodstuffs Industries (formerly the Foodstuffs and General Merchandise Trade Corporation) is part of the Ministry of Industry (MOI) No. 1 and purchases wheat grain directly from farmers or through cooperatives for use in its flour mills. Private traders and flour-mill owners can also purchase wheat grain directly through the market. Flour milled by Foodstuffs Industries is either distributed to state owned processing factories or sold on the open market. In general, because wheat is not a controlled crop item, the government owned enterprises act like any other private enterprise and can purchase, distribute and sell wheat, wheat flour and wheat flour products on the open market. Imports of wheat and wheat flour are carried out solely by the private sector. Private millers note that it is moderately difficult to import wheat grain and flour, due to general government restrictions on imports and exports.

10.31 Most of the flour mills in Myanmar are small mills, with very few large and medium size mills. According to one industry source, in Myanmar as a whole there are only 2 large commercial mills, less than 10 medium size mills, and over 100 small size mills. Most of the processing plants produce noodles and assorted biscuits.

10.32 Private milling factories are located mainly in Yangon and Mandalay, although the government does have their own wheat flour processing factories producing noodles and assorted biscuits. While the capacity of the state sector processing factories is relatively high, the utilization rates are uniformly low, with most plants running below 35%. In the private sector, by contrast, capacity utilization is relatively high, running around 60-75%.

10.33 The key constraint for wheat processing is the relatively low levels of domestic production of wheat. In part this is due to the agro-ecological difficulties in growing wheat in Myanmar, but principally it is due to the costs and returns to wheat versus other crops suitable for the same area. For example, profitability of wheat is around US$110 per acre while chickpeas' net return is around US$212 per acre (on an FOB basis). As long as US and EU subsidies keep world prices low, there is little incentive for domestic production of wheat.

10.34 In addition to the low levels of domestic production and restrictions on imports, millers note that difficulties in obtaining reliable and stable supplies of electricity impose

important constraints on their milling operations. Domestic demand for wheat products is limited since wheat is not considered a staple food. Consumption of wheat is mainly for breads, biscuits, cakes and noodles, and consumers are price sensitive. With increases in incomes consumption should increase.

F. PULSES AND BEANS PROCESSING

10.35 Although the pulse industry in Myanmar is very important, providing 72% of agricultural exports by value in 2000-2001, little processing occurs to the crop. Black gram, green gram (mung bean) chick pea and pigeon pea are among the most important crops in this sub-sector which occupied over 3 million hectares in 2001-2002, or some 20% of the sown agricultural area.

10.36 Most of the pulses are traded in the Mandalay and Yangon markets. Strong price rises in the 1990s have now moderated as Myanmar has become the second largest exporter of pulses in the world (exports reached 938,000 tonnes in 2002/2003), and hence has a significant impact on international prices. World prices for black gram have fallen significantly recently, from an average of US$468 in 2001 to US$285 in 2003. Reductions in prices for green gram and chickpea have not been as drastic, while prices for pigeon pea have increased over the same time period.

10.37 The extent of processing of pulses depends on their final use. Most of the pulses are exported as fresh produce, involving only limited grading and sorting. Machine splitting of husks is gaining popularity, although machine peeled pulses fetch less on the market due to the low levels of technology used resulting in damaged pulses. Most of the private enterprises who have installed cleaning and sorting equipment are involved in the export trade.

10.38 Constraints in the pulse processing sector are relatively few compared with other agro-industrial sectors. The main reason for this is the lack of government involvement in production, processing or trading. The major processing problem is the low level of technology used for processing, particularly husking and splitting machines. Access to stable and reliable supplies of electricity is another problem facing processors, but not as significant as for other industries.

G. SUGAR MILLING AND PROCESSING

10.39 The majority of sugarcane is produced in Mandalay, Bago, Magway and Sagaing Divisions and in Shan State. The area of production in 2001-2002 was around 163,000 hectares, and 7.116 million tonnes of cane was harvested in 2001-02 for an average yield of 43.7 tonnes of cane per hectare. On average, sugarcane area under the control of the Myanma Sugarcane Enterprise (MSE) accounts for around 50 percent of total sugarcane area, while production is around 52 percent. The private sector thus provides half of the production of sugarcane and sugar.

10.40 Yields of sugarcane under the control of the MSE are significantly higher (20.2 tonnes per acre compared with 18.8 tonnes per acre on a national level). In part this is due to the ability of farmers to apply fertilizer since they receive some advance payment for their quota, but more importantly MSE pays for cane on the basis of weight rather than sugar content; providing an incentive for farmers to grow cane to maximize weight rather than quality.

10.41 The MSE mills provide sugar to Government agencies at fixed prices which cover their operating costs but are significantly below the open market price for sugar. Low government procurement prices for cane have meant that sugarcane production and the volume of sugarcane flowing to MSE mills have been lower than that expected in an open market. From the 2003-04 crop year MSE will be experimenting with increasing their procurement price to MYK 3,500 per tonne, up from the current MYK 2,500 per tonne. This scheme will be voluntary, and MSE will continue to provide technical and material assistance to farmers who accept the lower price.

10.42 While the private sector has been prohibited from exporting sugar, the state sector is engaged in limited exports of white plantation and refined sugar. Domestic consumption of refined sugar is relatively low; with per capita consumption estimated at around 4kg per annum. Most of the domestic refined sugar market involves sugar for manufacturing purposes, rather than direct consumption. The majority of sugar goes towards producing alcoholic beverages (Rum), condensed milk, biscuit and confectionary makers, and soft drink manufacturers. In Myanmar, jaggery – a traditional form of unrefined sugar in cake or pellet form - is an important component of the diet and many sweetmeats and cakes are prepared with jaggery.

10.43 Overall, the private sugar processing industry was estimated to produce 127,774 tonnes of refined sugar in 2001-02, compared with 115,655 tonnes from the state sector; the private sector having 52.5% of the market. The production of sugar from the state sector has increased in recent years, from below 55,000 tonnes prior to 1999-2000 to over 94,000 tonnes after 2000-01. This has been due to the construction of 9 new mills under MSE which came online during the 2000-01 crop year. Presently there are 18 mills in operation, with a plan to construct an additional 20 mills over the next 25 years. According to Ministry of Industry-1, there are around 819 small and medium scale sugar mills in Myanmar. These do not include the numerous small sugar and jaggery processing plants that are scattered across the country.

10.44 MSE mills appear to be running at around 28% capacity, recovering 8.5% of cane as white sugar and 4% as molasses. Sugar recovery rates are estimated at around 8% for the state sector and 4% for the private sector. The lower recovery rates for the private sector appear to be due to the predominant use of open pan technology for the manufacture of jaggery rather than vacuum pan and centrifugal technology used by more modern mills. In a significant number of cases MSE mills have to wait for up to a week before they receive enough cane to operate their mill for at least one day's crush. This lack of capacity utilization, and the consequent implications for economic viability of the mills is disturbing, even more so considering that the 8 mills that were in operation prior to the big expansion of milling capacity in 2000 were in fact only operating at 37 percent of capacity themselves.

10.45 The key constraint facing the state sugar industry is the discrepancy between the high production cost and low official procurement price for cane, resulting in farmers being reluctant to provide cane to the factories. In addition, the scattered nature of production under smallholder control is the opposite required for a well functioning industrialized production process. Combined with a lack of adequate transportation infrastructure, the delays in getting cane to the mills mean that the quality of the crushed cane is significantly reduced.

10.46 The major constraints faced by the private sector processing plants are, firstly, access to sufficient supplies of raw material and, secondly, access to reliable supplies of electricity.

H. AGRICULTURAL MACHINERY PRODUCTION

10.47 There are two ministries producing agricultural machinery; MOI (2) and MOAI. Under these ministries are several different enterprises and departments who are producing farm machinery. MOI (2) is responsible for producing tractors, power tillers, threshers, disc harrows, disc ploughs and machine parts. MOAI is responsible for producing power tillers, reapers, threshers, trailers and machine parts. There are also several small private manufacturing enterprises that are producing farm implements for sale, mainly based around Mandalay. At present there are 99 tractor stations (retail outlets), 5 farm machinery factories and 1 farm machinery plant under the Agricultural Mechanization Department (AMD), with another factory due to come on line in late October 2003.

10.48 According to official statistics from CSO, the stock of four wheel tractors in Myanmar in 2001 was around 11,000, while the stock of two wheel tractors (16hp power tillers and 6 hp power reapers) was around 42,000 in 1997-98. AMD themselves estimate that the stock of two wheel tractors is around 70,000 and four wheel tractors around 9,000. AMD has the ability to produce nearly 14,000 power tillers and 5,500 power reapers per year. However, 10,000 of the power tillers and 5,000 of the power reapers are supposed to come from the newly commissioned factory at Kyaukse which is yet to start operations.

10.49 The plan by MOAI to expand mechanization to cover 63 percent of crop land by 2030-31 is an ambitious programme hampered by the high cost of machinery, the limited supply of machinery (both imported and domestically produced) and the lack of adequate demand analysis. Most farmers cannot afford to purchase machinery outright, and are either forced to form groups with other farmers or rent machinery from private contractors. As such, it is doubtful whether the level of demand for farm machinery reaches the level of supply of machinery from state machinery manufacturing plants combined with private sector and imported machinery.

10.50 The lack of capital is a major constraint for farmers wanting to purchase agricultural machinery. There are few financial institutions providing loans for equipment purchases, particularly after the recent financial crisis. MADB is unable to generate enough capital to extend their lending products to sufficient number of farmers, particularly for equipment purchases.

I. FERTILIZER PRODUCTION

10.51 The domestic fertilizer industry in Myanmar is concentrated around the production of urea fertilizer from the abundant sources of natural gas in the country. Smaller amounts of compound fertilizer, bio-fertilizer and foliar fertilizers are produced by both SEEs and private companies from imported materials. In the state enterprise sector there are three urea plants run by Myanma Petrochemical Enterprise (MPE), producing around 160,000 tonnes per year, or less than 40% of total capacity of 425,000 tonnes per year. Urea fertilizer production is carried out under the Myanma Oil and Gas Enterprise (MOGE), who also imports urea fertilizer (having taken over the MOAI import license in 2002). In addition to MOGE, MOAI imports fertilizer through its various departments for their own crop production programmes. In addition to MOGE and MOAI, there are several other ministries and enterprises importing fertilizer. The Ministry of Defense through Myanma Economic Holdings imports fertilizer for its military farms, and the Cooperative Department is also involved in fertilizer imports. In terms of private production of compound

fertilizers, there are relatively few enterprises who are involved in production, as opposed to simply importing compound fertilizer.

10.52 Before 1993-1994 fertilizer prices were heavily subsidized by the government, which has since removed the subsidies on all but the MOAI subsidized crop production carried out by the SEEs under MOAI. Subsequently, market prices have risen to international levels and the government has also allowed the private sector to import and distribute fertilizer. Despite the increases in prices, few private sector companies are willing to import and distribute fertilizers due to government restrictions on imports through their trade policy.

10.53 Apart from the urea plants, domestic production of the other chemical fertilizers is limited, and of low quality. The three urea plants are under the control of Myanma Petroleum Enterprise (MPE). These were built in the 1970s and are effectively obsolete. Production of urea is not growing, despite increased crop production, even though there is excess capacity in these plants; averaging 36% over the period 1980-2001. The urea plants rely on supplies of natural gas as their key feedstock, and natural gas production is under the control of the MOGE. The MOGE prefers to export natural gas in order to obtain much needed foreign exchange, and thus supplies of gas to the urea plants have been decreasing.

10.54 Despite a lack of competition in the fertilizer market, most enterprises are finding it difficult to achieve profitability. For both types of enterprises the major constraints are the lack of reliable supplies of electricity and the lack of demand for their relatively expensive products.

10.55 For SEEs, the chronic underutilization of existing capacity is a function of the difficulties in purchasing raw material inputs, not only of fertilizer precursors but of spare parts and consumables. The main cause of this is the lack of foreign exchange to purchase inputs that have to be imported, and the lack of local currency to purchase domestically sourced inputs as well as to convert to foreign exchange. This is a direct consequence of the low prices set for SSE outputs, as well as an obvious lack of demand despite the lower prices.

10.56 For private enterprises, the main constraints other than those mentioned above are the difficulties in importing raw material inputs. Unlike SEEs which have difficulty in obtaining the foreign exchange, private enterprises have difficulty with the regulations governing imports and exports. Those companies wishing to be involved in the fertilizer import business must have another business generating export earnings.

J. MAJOR DEVELOPMENT POTENTIALS AND CONSTRAINTS IN AGRO-INDUSTRIAL DEVELOPMENT

Opportunities for Agro-Industry in Myanmar

10.57 On the basis of the above discussion, what then are the opportunities for agro-industry in Myanmar? Clearly, improvements in agricultural productivity, processing efficiency and export opportunities are the desired outcomes of any sectoral development strategy. These should be broad-based and not targeted towards any particular commodity or market, in order to enable the private sector to make the most of their entrepreneurial skills in their investment strategies. There appears to be extremely limited scope for further expansion of state intervention in agricultural production, processing and marketing, a fact recognized by most of the government bureaucracy.

With limited capacity and budgetary resources, opportunities for state intervention appear limited to a regulatory and advisory role.

10.58 The growth potential for agro-industry lies typically not so much in specific products or processes, as in overall increases in efficiency arising from the removal of sub-sector wide constraints. However, it is clear that there are some specific areas in which considerable benefits could be realized. These are discussed briefly below.

Improvements in Rice Milling

10.59 Without a doubt, the most important short-term potential for growth within the agro-industry sector lies with private sector rice milling. It is clear that average recovery rates in Myanmar are well below regional and international standards, and that considerable improvement can be made in efficiency through more modern equipment and better control of operations (e.g. replacement of rollers or use of improved roller materials). These gains could amount to as much as 20 percent for smaller private sector mills, and perhaps 10 percent for larger or more modern private sector ones. Given that the national paddy harvest in 2001/02 was an estimated 22 million tonnes, an average 10 percent increase in recovery alone would yield 2.2 million tonnes of additional rice each year (although there would be a reduction in broken grain and other secondary products). With wholesale rice prices in 2002 ranging from K80,000 to K150,000 per tonnes, depending upon variety and market, gross total gains could be estimated at K250 billion per annum, or approximately US$250 million at the prevailing market rate of exchange.

Improvements in Edible Oil Milling

10.60 A further area of significant potential is in solvent extraction within private sector oilseed milling. Currently, the approximately 1.4 million tonnes of groundnut, sesame and sunflower produced annually in Myanmar are milled entirely mechanically, leaving oilcake which is relatively high in residual oil. If only approximately 60 percent of the cake produced in the central Dry Zone area were subject to further solvent extraction, a further 3 percent of oil (or approximately 5-7 percent of residue in the cake) could be extracted (assuming a high level of mechanical extraction having taken place already). This would contribute a further 20,000 tonnes per annum (or more than 5 percent) to national oil supplies, with a gross value in the region of MYK 15 billion per annum (US$15.5 million at market rates of exchange), without taking into account any possible increase in the value of the de-oiled cake, which in international markets fetches a better price than oilcake.

10.61 The development of private sector solvent extraction capacity in Myanmar would have the added advantage of providing a processing capacity for soybean, which is unsuited to expeller extraction. With production of soybean in 2000-01 exceeding 100,000 tonnes, and considerable agronomic potential for the introduction of soybean into delta crop rotations, the processing of soybean offers a major opportunity to reduce the national edible oil deficit.

Improvements in Agricultural Mechanization

10.62 While mechanization of agriculture is still extremely limited, most smallholder farms are able to utilize draft power to meet their tillage requirements. However, significant underutilization of land, both in terms of cropping intensity and extensification, is in part due to

the lack of mechanization. This is particularly the case with households with land holdings over 2 hectares in size, where double oxen draft power is not sufficient to till the whole land holding. This in turn has significant implications since the 1992/93 Agricultural Census estimates that the average farm size is 2.5 ha and 54 percent of farmers out of a total of 2.72 million agricultural land holdings have less than 2 ha; occupying 21 percent of cultivated land. The potential for mechanization is therefore the potential to reach 46 percent of farmers, covering 79 percent of the 15.5 million acres of cultivated land.

10.63 Considering that some 21-24% of cultivated land is covered by machinery (around 3.18 million acres), even if in the short to medium term only a modest additional 10% of farmers were able to effectively and efficiently use mechanization, and only an additional 10% of cultivated land was suitable for mechanized tillage services using power tillers and reapers, this would equate to some 270,000 households, and 1.55 million acres of land. Considering domestic SOE manufacturing capacity for agricultural machinery is only some 21,000 machines per year, it would take nearly 13 years of production for the SOE factories to satisfy this additional demand. There is considerable scope for increased sales of agricultural machinery to farmers for their own crop production or for private sector contract services.

10.64 As the country evolves towards a market based economy it would be expected that the commercial activities of the Agricultural Mechanization Department (AMD) to be divested over time to the private sector. The long-term roles of AMD should therefore be to monitor and regulate the sub-sector, provide an incentive framework for increased private sector involvement in manufacture and hire services, and train and support private farmer operators and agricultural contractors in the technical aspects of mechanization and in hire service management.

Improvements in Cotton Production and Processing

10.65 While there is some debate about the agro-ecological suitability of cotton production in Myanmar, particularly in the water scarce Dry Zone area, the importance of the downstream textile industry suggests that improvements in cotton production and efficiency will contribute greatly to the economic profitability of the sector as a whole.

10.66 As an example, the export orientated textile industry provides direct employment for over 150,000 people and hundreds of thousands more farmers, traders and millers employed in providing raw material inputs. In the year 2000, Myanmar exported nearly US$404 million worth of garments, illustrating its importance to the economic development of Myanmar. In addition to the export of textiles and garments, there are still significant levels of unmet domestic demand; necessitating a net import of textiles. Per capita consumption of fabrics in Myanmar is around 5.47 yards, of which only 0.65 yards is provided by the SOE sector, 1.42 yards from the cooperative sector and 0.27 yards from imports. This is significantly below the per capita average for regional neighbours. Before the current round of sanctions placed on exports from Myanmar to the US and EU, the retail prices of garments made in Myanmar and sold in the US were price competitive with those from Viet Nam and India. Given the higher cost structure of the garment industry in Myanmar compared with those two countries, there is considerable scope for increased competitiveness if the cost structure could be reduced further. Major constraints to this include the cost of imported raw materials and energy costs.

10.67 Improvements in seed quality, fertilizer use and agricultural practices will play a big role in increasing cotton yields. Similarly improvements in marketing through the formulation of quality standards and the sale by quality and weight rather than just weight alone will improve the quality of cotton seed being offered for sale. Modernization of ginning operations will not play an important role in improving cotton industry productivity, as existing gins are grossly under-utilized, most particularly in the SOE sector. Production would have to almost triple before capacity constraints justified a review of ginning operations and their upgrading potential. As such, any upgrade of ginning operations would have to be looked at on a case-by-case basis, and individual entrepreneurs would have to make their own decision. The role for governments and donors would be in providing an enabling environment and access to broad-based credit to facilitate private sector development in the cotton industry.

Reform of State Owned Enterprises

10.68 A final significant area of growth potential identified in this report relates to the activities of State Owned Enterprises within the agricultural sector. Due to the restrictions that these entities work under – in terms of pricing, capital investment and business planning – they suffer major losses in operations and have a significant distortionary impact on the market for the commodities in which they deal.

10.69 Low government procurement prices for raw material inputs have left SOEs struggling to operate plants at more than 50 percent utilization rates. In some SOE plants processing cotton, for example, utilization rates are under 4 percent. In the private sector capacity utilization rates are higher, but still less than economical in the long run.

10.70 The liberalization of SOEs to operate under market conditions offers a significant potential for growth in agro-industry in Myanmar. By eliminating lower than market procurement prices and output sales prices, and by allowing SOEs to structure their operations in accordance with market demands, improved operating efficiencies would be expected in rice milling, cotton ginning, sugarcane milling and in ancillary, but important, industries such as machinery and fertilizers. Improved operating efficiencies would in turn permit improved prices for producers and so contribute to further sector growth. While quantification of such gains is not possible at this stage, it is noted that the SOEs in the agricultural sector lost some MYK 17.7 billion in 1999/00 and MYK 63.5 billion cumulatively over 1994-2000. If these enterprises were made to breakeven, this would save MYK 17.7 billion per year in government expenditures, based on 1999/00 data. If they became even modestly profitable, say a 10 percent return, this would add nearly MYK 20 billion per year to the economy, based on 1999/00 expenditures. Thus the net benefit would be almost MYK 40 billion per year, or US$40 million based on current exchange rates.

K. KEY CONSTRAINTS TO SECTORAL GROWTH

10.71 As Myanmar is in transition from a socialist command economy towards a market-orientated economy there are relatively high levels of government control over various industries, depending on historical factors as well as their perceived importance for food security and other national objectives.

10.72 Industries such as rice, cotton and sugarcane, with a large SEE presence, are faced with problems in procurement and capacity utilization that are not faced in other sectors with less government involvement; for example pulses and edible oils. Capacity utilization and efficiency are lower for SEEs than the private sector, due to the latter's ability to rapidly implement changes in their operating procedures and investments in accordance with changes in market conditions. In some sectors the SEEs have recently undergone extensive modernization of plant and equipment, thereby making those enterprises more technically efficient. However, fundamentals of market supply and demand have been left unaddressed; resulting in less capacity utilization than before and higher levels of state indebtedness. Thus while enterprises may be technically efficient in terms of scale and modernization, they are not economically efficient.

10.73 In industries with less government involvement in production and processing, as in pulses and edible oils, capacity utilization and economic returns are much higher. In the case of edible oils the restrictions on exports hampers the industry significantly and reduces potential production.

10.74 In all industries reviewed, the major constraints were lack of raw material input and access to reliable supplies of electricity. For the latter constraint, it is noted that the government plans to triple capacity on the national grid over the period 2003-2006; mainly through hydroelectric schemes. This will go some way to reducing the number of blackouts experienced by households and enterprises but does not address the dilapidated condition of the transmission network.

10.75 For the former constraint, it is noted that around 40 percent of arable farming land is currently classified as "cultivatable wasteland", mainly in the dry zone area. While the government is embarking on large scale irrigation schemes to address the lack of water in the dry zone area, the choice of cropping patterns (rice, cotton) does not appear to be ideal; considering other crops such as pulses and oilseeds are more agro-ecologically suited to these areas and less intensive in their use of water.

10.76 Fundamentally, the lack of raw material for agro-industry is a function on the low procurement prices offered by SEEs and the distortionary marketing policies in place; particularly for the export market. As an example, the ban on oilseed and edible oil exports is purportedly for food security issues; yet the export of high valued edible oils such as sesame and groundnut and the import of low valued palm oil would not only earn valuable foreign exchange but lower the overall price of oil for the poorer sections of the community.

10.77 In terms of government interventions, there is a role for the state in supplying essential services such as infrastructure (roads, market access, irrigation and rural electricity) and in applying economic policies conducive to proper operation of a market-orientated economy. The role of the private sector is in supplying the inputs, production, processing and marketing operations necessary to provide agricultural products to consumers. In other words, the private sector should be involved in the operation of the supply or value chain, while the government provides infrastructure facilities and an enabling and facilitating environment for the proper functioning of that value chain.

11. AGRICULTURAL RESEARCH, EXTENSION AND EDUCATION[1]

A. AGRICULTURAL RESEARCH

11.1 Agricultural research is entirely the responsibility of the Ministry of Agriculture and Irrigation (MOAI), although within that body there are a large number of agencies which play some role. Research programmes are developed on an agency by agency basis and utilize a network of research, testing and breeding facilities throughout Myanmar.

Research Institutions

11.2 **Myanma Agriculture Service (MAS)**. This is the umbrella organization of MOAI that coordinates agricultural research and extension in the country. It is formed by divisions and institutes (see Chart 1). The functions of those that are mandated to implement agricultural research are briefly described as follows:

- *Central Agriculture Research Institute (CARI)* is the core institution for agricultural research in Myanmar. CARI has 19 research farms covering all rice eco-systems of Myanmar, and a total of 654 staff, including 2 Ph.D. and 19 M.Sc. This year's budget for all activities of CARI is about MYK 250 million (equivalent to US$250,000). The research work is oriented to increased crop productivity. CARI comprises 15 divisions: Rice, Other Cereal Crops, Oilseed Crops, Food Legumes, Fibre Crops, Sugar Crops, Horticulture, Agricultural Chemistry, Agronomy, Plant Physiology, Entomology, Plant Pathology, Seed Bank, Farm Machinery, and Regional Research Development.

- *Vegetable and Fruit Research and Development Centre (VFRDC)* conducts research and germplasm collection of vegetables and fruits. The VFRDC has a land area of 101 acres and a total of 43 staff, including four MSc degree holders. The Centre is supported by 16 horticulture farms covering all agro-ecological regions of the country.

- *Central Agriculture Research and Training Centre (CARTC)* has the task to provide informal training and develop varieties and hybrids of fruits, vegetables and flowers. The centre is located on a 60 acres farm in Helga Township, and has a total of 74 staff, including four Senior Research Officers.

- *Seed Division (SD)* is responsible for foundation and registered seed production across a range of crops and undertakes limited research in rice. It operates 12 central farms and 22 seed farms situated in all 16 states and divisions, as well as the Myanmar Rice Research Centre with a total farm area of 184 acres, of which 81 acres are used for seed production and 26 acres for research activities. The total number of staff in the farm is 54, one of which is the research

[1] The following section is a summary of Working Paper 7 "Agricultural Research and Extension" contained in Volume 2 of this interim report and prepared by Alvaro Bueno and revised by Dr Pramod K. Agrawal, Research and Extension Specialists for the Agricultural Sector Review.

coordinator who holds a Ph.D. degree. There are about 10 field staffs involved with implementation of research activities and programmes. Out of a total budget of MYK 494 million allocated by MAS to the seed division for 2002/03, MYK 11.5 million was earmarked to be used for research.

– Other MAS Divisions of relevance include*: Plant Protection Division (PPD)* which conducts very limited research in IPM methodologies. The *Land Use Division (LUD)* is responsible for research in soil conservation, management, fertility, soil-plant relationships, and land use.

11.3 **Agriculture Mechanization Department (AMD)**. The functions of the department are to research, produce, procure, distribute and repair small farm machinery. Although research is a mandate of the department, it does not presently conduct such activities.

11.4 **Myanma Sugarcane Enterprise (MSE)**. Its variety improvement programme places emphasis on introduction, hybridization and selection of varieties. Hybrids and varieties are systematically evaluated and selected under recommended dosages of inputs. However, most farmers do not apply the recommended dosages of fertilizers because of high input prices. Similarly, most cane in the country is planted under rain fed conditions, but the MSE allocates substantial resources to research on water management, irrigation schedule and water requirement.

11.5 **Myanma Cotton and Sericulture Enterprise (MCSE)**. The objective of the MCSE is to increase production of cotton, expand area of mulberry, produce cotton lint for local industry and export, and increase income of farmers and improve their livelihood. MCSE operates seven research farms with a focus on variety development.

11.6 **Myanma Jute Industries (MJI)**. The objective of the MJI is to assist farmers in increasing jute and kenaf production, purchase fibre for processing and export, and supervise quality control. The division has a small R&D cell tasked to conduct agronomy research in two research farms in the Delta region.

11.7 **Myanma Perennial Crops Enterprise (MPCE)**. The main objective of the Enterprise is to expand the area and production of rubber, oil palm and cashew nuts. The enterprise provides extension services and supplies inputs to farmers, promotes technology development and conducts research. Programmes are focused on rubber and oil palm breeding through germplasm introduction and clonal trials, primarily at the Applied Research Centre for Perennial Crops (ARCPC) at Mawlamyine in Mon State, although there are also three research farms. MPCE also operates a Development Centre for Rubber Technology in Yangon Division

B. RESEARCH APPROACH AND PRIORITIES

11.8 Research institutions follow the main national agricultural policies very closely in defining their approaches, priorities and objectives. The research work at CARI, VFRDC, CARTC and indeed most other institutions, is almost entirely oriented towards increased productivity for individual crops and the development of high yielding varieties. Little attention is paid to research in the context of multiple crop systems or whole farm activities, precluding researchers from considering competing demands between crops for cash costs, labour, water or

draught traction, or complementary effects from input usage or nitrogen-fixing on previous crops. Issues of profitability, production cost, marketing, agro-ecological constraints, and socio-economic limitations of farmers are seldom considered in the planning, design and implementation of research projects. The research activities of the Seed Division, for example, use only recommended levels of fertilizers, which rice farmers seldom apply in practice.

11.9 Furthermore, because of perceived limitations in capacity in the satellite research stations, most projects are selected and designed centrally at CARI-Yezin, with field staff merely following instructions. With research priorities at CARI generally being set based on conclusions reached at annual technical meetings in Yezin that are not attended by field level research personnel, extension staff, or farmers, there is no effective feedback mechanisms to support priority setting or programme design.

11.10 Presently, most research on fertilizer application targets maximum yield rather than maximum financial returns. This is of considerable concern, because farmers commonly opt for reduction in fertilizer levels to save on production costs and reduce cash outlays. However, major reductions in input use may lead to very low yields and even lower profits, so there is an urgent need to understand, and convey to farmers, the costs and returns of different levels of fertilizer and other input usage.

11.11 In summary, most agricultural research in Myanmar is based on specific commodities, targets the development of high yielding varieties and other high production technologies, and does not account for issues of profitability, production cost, marketing, agro-ecological constraints, and socio-economic limitations of farmers in the planning process of research projects.

C. AGRICULTURAL EDUCATION AND TRAINING

11.12 Graduate and post graduate Agricultural Education is offered by Yezin Agriculture University, with diplomas in Agriculture offered by the seven State Agriculture Institutes (SAIs). Pre and post service training is also offered by Central Agriculture Research and Training Centre (CARTC). All these institutions come under the MOAI.

11.13 Most research at YAU is undertaken by students for academic purposes, some in collaboration with CARI. There are 132 academic staff, including 7 Ph.D. and 56 M.Sc. degree holders, teaching in nine departments. The University offers M.Sc. courses, and introduced Ph.D. courses in 2002. The budget for 2003/04 is MYK 87 million, of which MYK 3.8 million are allocated for research.

11.14 Since the inception of the SAIs in 1954, a total of 9,560 students have graduated from all institutes, of which 9,148 received a Diploma in Agriculture and 412 a Diploma in Animal Husbandry. The total number of staff in all SAIs is 636, of which 198 are teaching staff. Most instructors at SAIs have B.Ag.Sc. degrees. The funds allocated by DAP for current expenditures for all SAIs in fiscal year of 2002/03 were MYK 56 million.

11.15 CARTC has very good physical facilities for residential training. Training activities are not planned by the Centre, but by the major clients (MAS and the Extension Division), with the Centre implements the training. About 2,500 persons are trained each year. There is no

established mechanism to consider the needs of the farmers in the development of the various training curricula.

D. SEED PRODUCTION AND DISTRIBUTION

11.16 Breeder and Foundation seed is produced by CARI. Foundation seed as well as registered seed are produced by seed division. Registered seed is given to Extension Division to produce certified seed by contract growers (farmers).

11.17 Production of certified seed of all major crops cover only a fraction of the total planted area. It is estimated that production of certified seed of rice covers only 2% of the demand, for pulses it is 1-2% and for oil seeds the coverage is 0.1 to 15%. Because of involvement of Private Sector in seed sale the quality seed sale in maize is about 20%.

11.18 There is virtually no involvement of private sector in seed production. There are many seed farms and skilled staff in the various extension institutions strategically located throughout the country covering all agro-ecological conditions and production areas. Some of these farms could be carefully selected and reorganized within a national seed production programme, regulated by the new seed law under consideration by the MOAI, with participation of the public and private sectors, which could assure production of sufficient and high quality certified seed to cover significant areas of all major crops.

E. THE NATIONAL AGRICULTURAL EXTENSION SERVICE

11.19 The effective dissemination of improved technologies is a high priority for the MOAI, and follow-up assistance in supporting farmers, through such means as training and demonstrations, is crucial for sustained agricultural development. Linkages between extension and research are pursued through various mechanisms, including training the staff of departments and enterprises of the MOAI on different crops and subjects.

Extension Institutions

11.20 **Myanma Agriculture Service (MAS)**. In addition to its responsibilities in research, MAS also acts as the umbrella organization of MOAI for all extension efforts. It encompasses the following divisions/centres with responsibilities in extension:

- *Agricultural Extension Division (AED)* is the largest branch of the MAS with about 12,000 staff, of which more than 1,000 are agriculture university graduates. AED is responsible for implementation of extension programmes and distribution of inputs and seeds. It operates 10 state farms. AED is organized into the following sections: Cereal, Oilseed Crops, Food Legume, Horticulture, State Farm, Border Area Development, Administration and Accounting, Quality Rice, Deep-Water and Virgin Land Development, and Bio-Fertilizer. The division implements its extension activities by launching special programmes in selected areas for specific crops, but rice has received the largest share of investments. The ratio of extension agent to farmers is about 1:500. Extension camps are established in every township.

The most recent extension programme for rice is "Reaching towards Optimum Productivity", jointly implemented by the AED and LUD in 180 townships throughout the rice production area. Although oil seeds, pulses and industrial crops also play an important role in the peoples' diet and economy of the country, there are no special extension programmes being implemented for these crops. In addition to technology demonstration, AED plays a significant role in the seed chain, producing and distributing certified seed.

– The *Plant Protection Division (PPD)* delivers training in IPM, including the implementation of farmers' field schools while the *Land Use Division (LUD)* provides extension services to farmers in soil conservation, surveys, soil amelioration, land mapping, and chemical analysis of soil and water.

11.21 **Myanma Sugarcane Enterprise (MSE**) has the responsibility for disseminating technology for sugarcane production. It has its own extension service, with 654 field extension officers stationed at township level. Extension staff includes four M.Sc. and 146 B.Sc. degree holders, but the staff is heavily loaded with other tasks such as area census, production estimates, procurement of cane, and supply of inputs. Only a minimum effort is put into transfer of technology.

11.22 In spite of all these activities and limitations of having post graduate research scientists the enterprise is working hard and doing plant breeding research for development of better varieties. Students, registered at Yangon University, are working for Ph.D. in active collaboration with CARI.

11.23 **Myanma Cotton and Sericulture Enterprise (MCSE)** has its own independent extension service, present in four divisions, 20 districts, and 72 townships with a total staff of 2,605 including four Ph.D. and 38 M.Sc. degree holders. About 680 extension officers are stationed at village tract level. There are nine regional farms and 295 training camps. The Longyaw Model Cotton Farm is the largest farm under the control of the MCSE. The farm has about 8,400 acres, of which 5,300 acres are actually under cultivation, mostly for seed production. The farm produces the complete seed cycle, namely: breeders', foundation, registered and certified seed. The method of technology dissemination is the T&V system, which includes training and demonstrations, but carries a top-down design based on standard cultural practices and blanket fertilizer rates.

11.24 **Myanma Jute Industries (MJI)** has its own extension service, established in six important production areas, with 458 extension workers, of which 68 have B.Sc. and 318 have Diploma degrees. These officers cover an area of 230,000 acres with a ratio of extension officer to farmer of 1:500. The extension programmes are implemented through distribution of pamphlets, articles on newspapers and radio, and distribution of seeds.

11.25 **Myanma Perennial Crops Enterprise (MPCE)** is responsible for provision of technical assistance to farmers and for the establishment of nurseries of rubber and oil palm. The 377 staff, including 47 professionals, visits farmers for technical advice and distribution of seeds.

11.26 **Agriculture Mechanization Department (AMD)** has the responsibility to provide farm services, such as land preparation, cultivation and harvesting; provide extension services for upland and deep-water areas; and disseminate harvesting technologies.

11.27 **Irrigation Department (ID)** has the responsibility to carry out hydrological, geological and topographical surveys; design new irrigation schemes; and provide operation and maintenance for existing schemes.

11.28 **Water Resources Utilization Department (WRUD)** supplies irrigation by pumping from rivers, streams and groundwater sources, and promotes use of sprinklers and drip irrigation systems.

Extension Approach and Methods

11.29 Modern technology is the main engine of growth in agriculture and the MOAI is focused on its effective dissemination. The linkages between research and extension are given special attention and pursued by training staff and farmers. Demonstration plots on farmers' fields are used by the extension services to disseminate technologies proven within the research stations. These demonstrations are strategically located within the village to reach a large number of farmers.

11.30 The Special High Yielding (SHY) programme for rice, implemented by AED, was based on proven technology, government support, and mass participation of farmers. The programme encouraged farmers to compete among themselves and reach high rice productivity, which further encouraged application of high levels of fertilizers and inputs. The training and visit (T&V) extension approach emphasises regular meetings between extension agents, subject matter specialists and farmers. AED has developed the Special Crop Production Zone extension programme for rice and other crops, combining principles of the T&V and SHY. It is designed for regions of favourable agro-ecological conditions and uses high yielding varieties, high levels of fertilizers and certified seed.

11.31 More participatory extension approaches have been attempted by AED. These are based on the selection of pilot areas and farmers' groups, where extension agents and farmers design crop development plans based on perceived constraints. Crop plans are packages of technologies demonstrated to farmers in study plots. Meetings, training and field days are conducted in the demonstration sites. The Farmer Field School is another recent participatory extension approach introduced by the Plant Protection Division. It is based on non-formal adult education methods that focus more on discussion and experimentation rather than traditional training.

11.32 In general, extension services of the various agricultural institutions do not give much attention to the differences in agro-ecological or socio-economic conditions in the planning process of their extension programmes. In addition, it has a very strong bias towards the use of high levels of inputs and access to irrigation, which excludes the majority of the small resource-limited rice farmers. To some extent this focus reflects the lack of economically or agro-ecologically driven research activities (see above), however, the extension institutions themselves do not have adequate mechanisms to assess or respond to basic farmers' needs, environmental limitations and socio-economic conditions in the planning of their extension programmes. As a consequence, there is a low rate of adoption of improved technologies, which results in low yields, insufficient farmers' income, and limited production of the main commodities.

F. COORDINATION MECHANISMS BETWEEN AGRICULTURAL RESEARCH AND EXTENSION

11.33 There are a plethora of organizations conducting agricultural research and extension in Myanmar, and there is little coordination within each discipline or between disciplines, leading to an emphasis on crop specific solutions rather than farming system approaches. Furthermore, the lack of coordination poses considerable risk of duplication of efforts. The most common processes by which research and extension organizations interact is through annual meetings sponsored by CARI with participation of research and extension managers; annual seminars convened by the Myanmar Academy of Agricultural Sciences; individual interactions between field research and extension staff, which is mostly ad-hoc and not organized; and implementation of demonstration plots, and training, which is also not systematic nor organized.

11.34 Of particular concern is the absence of operational interaction between staff of CARI's outlying research farms and staff of the extension services. Extension agents rarely come to the research stations and researchers do not routinely visit extension offices or demonstration sites. CARI and Yezin Agricultural University are located adjacent to each other, but effective interaction between the two institutions occurs only occasionally on an individual project basis. Within the various State Enterprises, the coordination between research and extension occurs in annual workshops attended by research and extension managers, but not field staff. One of the limitations is the lack of mobility and incentives to travel outside the research farms and township limits. Similarly, there is no mechanism for efficient dissemination and exchange of scientific information between research, extension, and farmers. The few reports are circulated mostly among research staff.

11.35 Farmers and their problems/constraints are seldom considered in the planning process of research/extension work. Most research activities are planned in a centralized manner by the various research institutions and mechanically implemented by field staff. Since the planning process of research programmes rarely consider production constraints, farmers' needs and extension views and conditions, the technologies generated are often not adapted and/or not of interest to the majority of end users, rendering some research programmes expensive and irrelevant.

G. KEY POTENTIALS AND CONSTRAINTS TO THE STRENGTHENING OF AGRICULTURAL RESEARCH, EXTENSION AND EDUCATION

11.36 Myanmar has a large network of research and extension institutions and physical facilities strategically located in all agro-ecological regions of the country, with considerable land areas available in the form or research, seed or extension farms. The research and extension system is relatively well staffed, with at least some of the personnel within the system having received post-graduate training. Furthermore, the Agricultural University (YAU) is well located and has qualified and experienced teaching staff and a research farm with access to irrigation.

11.37 Despite these strong features, however, Myanmar has consistently lower yields than neighbouring countries or the regional average across almost all crops. Only in two main crop categories – rice (89% of the regional average) and beans/pulses (65-150% of regional average) do national yields approach regional averages, and the beans/pulses group are among those least influenced by traditional research and extension programmes.

11.38 Such relatively poor agronomic performance under the favourable agro-ecological conditions present in Myanmar suggests that producers, far from maximising yields and output as is the intention of existing research and extension programmes, are rather choosing a low input/low output strategy. While many factors may influence farmers in adopting such a strategy, including liquidity problems in obtaining cash for inputs and poor market stimuli, it is likely that a number of elements directly related to the research and extension process play a role.

11.39 Keys among these are the following:

- The lack of access for many farmers to adequate high quality seed that would provide the yield response to make it worthwhile using significant quantities of purchased inputs;

- The extensive use of research, seed and extension farms for commercial production in order to augment limited budgets, or return funds to headquarters, as well as the scarcity of farm infrastructure (tractors, storage, irrigation), which limit the available land for research and trials work;

- Limited mobility of research and particularly extension staff, sometimes poor motivation as a result of low salaries and benefits, and competing demands to undertake unrelated tasks, all limit the efficiency of personnel;

- Limited knowledge concerning (a) response to different levels of input usage with improved varieties; (b) how genetic material and cultural practices should be modified under different agro-ecological conditions, access to supplemental water and time of planting; (c) the relationship between expected output prices at harvest and the degree to which purchased inputs (or intensive labour use) are justified, and: (d) the interrelationships between different crops (and animals) within a farm rotation, and the influence of planting date and input decisions of one crop on the performance and requirements of others.

11.40 To resolve these constraints will require considerable investment in both financial and institutional terms, as they will require not only an improvement in the capacity of research and extension personnel to undertake effective programmes, but will also demand an extensive restructuring of the way in which research needs are identified and prioritised, conducted and disseminated. It will also require considerable improvements in linkages between different research bodies and between researchers and extension services and their staff.

11.41 Research programmes are, for the most part, commodity based and production oriented. Most projects are “stand alone” in the sense that they do not form building blocks of a programme targeted to reach a well-defined objective. Projects normally do not take into account farmers’ needs and constraints, production cost, profitability, marketing, and insertion of the researched technology into the prevailing cropping system. Similar activities are repeated year after year without a clear objective. In part, this occurs because projects and programmes are usually centrally planned at headquarters for implementation on research farms. Those who plan do not have the in-depth experience and knowledge of the local agro-ecological and socio-economic conditions, and those who implement in many instances do not understand the technical design of the projects. In addition, priorities are usually set at headquarters without effective involvement of research field staff, extension agents, and farmers.

11.42 Similarly, most extension messages are centrally designed by managers and mechanically implemented by field staff over a diverse range of agro-ecological and socio-economic conditions, without proper consideration of farmers' needs and limitations, or market requirements. The consequence of this approach is a low adoption rate for technical recommendations.

11.43 Most institutions lack systematic mechanisms for coordination and linkage with other research agencies or with extension services. Rationalization of research facilities and programmes should be considered in order to keep only strategic units that represent major agro-ecological regions and host high priority programmes that have potential for significant socio-economic impact. These facilities should have modern and updated equipment to provide proper working conditions to research experts. The current initiative of the MOAI to consolidate research organization at the Department level is an important initial step in the right direction that needs to be supported.

11.44 The YAU has strategic importance in preparing skilled scientists for strengthening the research and extension systems. But, skills and knowledge of teaching staff are outdated; the institution lacks modern facilities and equipment, and has an outdated curriculum. MOAI should consider a major review of YAU (and also of the SAIs and other training centres), followed by an investment programme to upgrade these institutions to a level capable of producing high quality graduates for research and extension

11.45 Overall numbers of research and extension staff may seem adequate, but most institutions have few skilled experts. That research staffs that have advanced degrees are, for the most part, assigned to managerial posts and do not implement research projects. The vast majority of those implementing research projects have B.Sc. degrees or lower academic qualification. Extension services of AED, departments and Enterprises have a very large number of staff assigned to all hierarchical levels and stationed in all geographical units throughout the country. But, the technical skills and academic qualification of this large work force is outdated and very limited.

11.46 Specialized training programmes based on farmers' needs and constraints, agro-ecological and socio-economic conditions, and realities of research and extension organizations, are virtually non-existent. Training at post-graduate level at YAU is not specifically tailored to address priority constraints of research and extension. Skills and knowledge of teaching staff are outdated, the institution lacks modern facilities and equipment, has an outdated curriculum biased towards theory with less attention to practical skills, and very low salaries and incentives to teaching staff.

11.47 A further problem faced by extension staff is that those operating in the field are generally required to perform a number of other activities such as promotion of area expansion, distribution of inputs, and procurement of production, which conflict with their responsibility to disseminate improved technologies. In addition, lack of transport prevents extension workers from visiting production areas for demonstrations and training.

11.48 Operational linkages between research institutions and among research, extension, and training organizations within MOAI are very weak. There are many institutions that conduct research in a variety of crops, and topics, without any systematic mechanism of coordination, exposing the process of technology generation to duplications and overlaps with consequent low

efficiency of utilization of limited financial and human resources. The exchange of scientific information between research organizations, and among research, extension and training institutions is very limited. Libraries of research, extension, and training institutions are outdated and lack most important agricultural scientific literature.

11.49 Issues of profitability, production cost, marketing, environmental constraints, and socio-economic conditions of farmers are seldom considered in the planning and design stage of research projects and extension programmes. The planning process is mostly top-down, due to lack of skilled personnel at local level and rigid organizational structure that inhibits creative thinking.

11.50 Although research allocations of departments, institutes and enterprises, seem to cover most current expenditures, they are, nonetheless, a very small percentage of the total budgets of the institutions. If research and extension activities are to increase significantly from the present low levels, these allocations would represent a major constraint.

H. SPECIFIC INVESTMENT AND POLICY INITIATIVES

11.51 A gradual reorganization process of the crop research system, designed to build upon existing resources would include the establishment of a National Agricultural Research and Extension Council with departmental authority within the MOAI. This action seems to be presently under implementation by the MOAI. This Council would coordinate all crop research and extension in the country, advice the government on research and extension policy, and monitor and evaluate research and extension programmes. The Council would work through an executive committee. Under the Council, a number of strategic national research programmes would be established to coordinate research activities of major priority commodities, themes, production factors, and agro-ecologies. All institutions interested in the respective commodity would be invited to join the relevant national programme. It would be necessary to establish a transparent budgetary mechanism to finance this reorganized research and extension system.

11.52 Priority setting at programme level would be inter-institutional and multidisciplinary with participation of all stakeholders, including research, extension and farmers' representatives. It should contribute to avoid overlaps and duplications, and should increase the level of institutional coordination in research, extension and training within each national programme.

11.53 The extension system must decentralize its planning approach in order to give local managers (state/division, district, township, and village tract) responsibilities and resources to plan and implement extension programmes relevant to their specific agro-ecological and socio-economic conditions. Success in disseminating improved technologies by extension organizations require functional linkages with stakeholders including farmers, research institutions, training centres, and the private sector. Decentralization of extension planning and upgrade of skills of extension staff would facilitate the establishment of effective linkage mechanisms.

11.54 The extension service has a large workforce, many of which has in-depth practical field experience, and is committed to their work. But, the technical skills and academic qualification of this workforce is limited and outdated. The development of an effective, motivated and professional extension workforce is, perhaps, the most important investment to be made in the extension system in Myanmar. This would require a comprehensive review of

existing human resources and experts skills available. Since the present job market does not offer the skills necessary for immediate hiring, a comprehensive training programme should be implemented as part of a larger human resource development plan. Human resources for extension should be dimensioned in the light of the various extension programmes, projects, objectives, and priorities. Training providers would be selected on the basis of their capability to deliver the required output. Training abroad should be considered in special cases. Major attention would be placed on participatory approaches that take into consideration poverty issues, environmental protection, social and financial benefits, and markets among others.

11.55 The Extension Division should concentrate on its core competence and the certified seed production should be hived-off. A commercial seed company may be established either in Public sector or private sector or a joint venture between the Government of Myanmar and the private sector. A seed certification agency may be set-up for seed quality assessment and enforcement. To encourage the use of good quality seeds, in addition to the above, farmer's participatory seed production may be started, to start with, in few village tract which could be increased later.

11.56 The course curricula and facilities of YAU, CARTC and SAI may be reviewed and updated. There should be a proper balance between the theory and practical classes. Library and farm facilities may be upgraded. The facilities to access "world wide web" and internet may be developed as the teaching tools. These teaching institutions should develop a mechanism to interact with the farmers and address their concern with respect to farming.

12. AGRICULTURAL MARKETING[1]

A. INTRODUCTION

12.1 In order to provide detailed information with respect to the functioning and performance of the agricultural marketing system in Myanmar, a detailed field study of 15 representative commodities was undertaken during the period September-November 2003. The field study comprised extensive interviews with representatives of all major participants in the marketing system, including farmers, village level (primary) collectors, town wholesalers, processors (including rice and oilseed millers), members of Central Crop Exchanges, large scale wholesalers trading between Divisions and States, market wholesalers in consumption centres, retailers and consumers.

12.2 For each of the selected commodities the study assessed such factors as: (a) consumption and product flows; (b) marketing channels and participants; (c) costs of production; (d) production cost/benefit ratios; (d) marketing system losses, and; (e) marketing costs and margins.

12.3 Farmers were also asked about the factors influencing their participation in the marketing system and their knowledge of system functioning. Finally, information was gathered on the role of the public sector in the marketing of all commodities studied. The commodities selected were:

Cereals	Oilseeds	Pulses	Culinary	Fruit	Meat
Rice (Paddy) Maize	Groundnut Sesame Sunflower Niger	Green gram Black gram Pigeon pea Soybean	Onion Garlic Chili	Banana	Chicken

12.4 The information gathered as a result of this study is presented first on a commodity by commodity basis, and then lessons are drawn as to the overall performance of the marketing system, its strengths and weaknesses.

B. PADDY AND RICE MARKETING IN MYANMAR

12.5 Rice is by far the most important agricultural commodity in Myanmar, and paddy (unprocessed rice) accounted for 6.6 million ha or 42% of total sown area in 2001. Myanmar is self-sufficient in rice production and exports occur in some years. Although paddy is grown predominantly in the Delta zone, it is the main staple food throughout the entire country. Rice marketing, and related policies, therefore affects almost everyone in the country, whether as a producer or a consumer.

[1] The following section is a summary of a national agricultural marketing study currently underway, being conducted by Myanmar Marketing Research and Development Company (MMRD).

Supply and Consumption

12.6 Total paddy production in 2001-02 is recorded as 21.6 million tonnes. Monsoon paddy, harvested from September to December, contributed 86% of that total. The remaining 14% is from summer paddy cultivation from January to June. There is a continuous supply of paddy to the rice market for approximately 10 months per year, however an estimated 90 % of supply is in the September- April period.

12.7 According to the Household Income and Expenditure Survey (HIES) survey of 1997, per capita annual consumption of rice was 129 kg in urban areas, but varied significantly in rural areas, from 135 kg/capita/annum in Chin State to 220 kg in Rakhine State. Consumption figures in terms of paddy would be higher, reflecting the approximately 60% conversion ratio in milling paddy for rice. In addition, rice is consumed in the form of processed snacks such as noodle, vermicelli and rice cake etc. Rice bran is utilized as feed for fish farming and for oil extraction.

12.8 Based on the finding of the HIES, it is estimated that, after deducting rural household consumption, retention for seed and losses, the volume of paddy reaching the market was approximately 10 million tonnes in 2001/02. Total domestic paddy utilization for the same year, including urban consumption, totalled approximately 16.3 million tonnes, or some 79% of production, leaving a surplus of 4.4 million tonnes (equivalent to 2.65 million tonnes of rice). As export levels have averaged less than 5% of total production over the last decade, the disposal of this apparent surplus can probably be accounted for largely by the snack food sector and possibly unofficial cross-border trade.

Role of the Public Sector

12.9 Until the 2003 harvest season, a proportion of all paddy production was purchased from farmers under a mandatory quota system. In 1998-99, 1.9 million tonnes or 14% of total production was procured. The rate of compulsory procurement has been 10-12 baskets/acre in recent years (516-620 kg/ha) at a price of MYK 380 per basket in 2002 (US$0.19/kg at prevailing market rates of exchange). Earlier this was little more than 25% of open market prices, but has averaged closer to 50% in recent years. In exchange, half of the purchase price was provided in advance. After milling, this rice is supplied at subsidized prices to Government employees, police and the military, and exported where national surpluses were deemed to exist.

12.10 Compulsory procurement was dropped in 2003 as part of a liberalization of the rice marketing system, which also included permitting the private sector to engage in exporting, for the first time in many decades[1]. Under Government control, efforts were made to boost rice exports in 2001-2002, achieving 931,000 tonnes, but average exports over the last five years have been little more than 250,000 tonnes/annum.

Profitability of Paddy Production

12.11 Although input levels, yields and even prices may vary significantly from region to region average cost benefit levels were calculated for monsoon and summer paddy production,

[1] Private sector exports of rice were suspended again, however in early 2004, supposedly on a temporary basis.

based on farmer responses. Both yields and production costs were higher for summer rice (almost always irrigated) than for monsoon rice (the latter typically largely or totally rainfed).

Comparative Profitability of Monsoon and Summer Rice Production

Harvest	Yield (kg/ka)	Revenue (MYK/ha)	Cost (MYK/ha)	Gross Margin	Benefit/Cost Ratio	Break Even (kg/ha)
Monsoon	3,004	216,000	cc84,792	131,208	1.55	1,179
Summer	3,655	262,800	120,600	142,200	1.18	1,677
Cost/Benefit Ratio: Ratio of gross margin to production costs.						

12.12 Farm gate prices were not found to vary widely between the two harvests. As a result, summer rice was found to generate a higher gross margin than monsoon production. However, due to the higher costs involved, summer rice had a higher break-even yield level than monsoon rice and yielded a cost/benefit ratio that is significantly lower.

Marketing Channels, Costs and Margins

12.13 For the country as a whole, paddy is in surplus. However, with national production concentrated so heavily on irrigated output from the Delta region, rice production is insufficient to meet local requirements in nine of the country's 17 Divisions. The biggest flow of rice is from the surplus area in the lower part of the country such as Ayeyarwady, Bago, Yangon Division and Mon State to the rice deficit areas of the central part of the country, Magway, Mandalay and Sagaing Division and the hilly region, Shan State.

12.14 Most farmers sell their crop as paddy in their own villages to a range of primary collectors. The majority of primary collectors interviewed purchased paddy with their own money. In some cases, rice millers made prior 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. All rice millers interviewed mainly rely on their own funds for working capital.

12.15 Town wholesalers play an important role in rice marketing and are often involved in inter-State/Division trade. None collects 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.

Marketing Costs and Margins

12.16 Marketing costs and margins for system participants are summarised below. It should be noted that paddy/rice will not necessarily pass through all system participants. Marketing costs may include storage, transport, bagging, fees, communications and losses. Overall losses within the rice marketing system are estimated to average 10%, but range from as little as 4% to as high as 16%.

Marketing Costs and Margins for Paddy/Rice Marketing Participants

Item	Primary Collector	Miller	Township Wholesaler	Inter-Division/ State Wholesaler	Market Wholesaler	Retailer
Marketing	1.7%	2.1%	4.4%	5.9%	1.5%	1.2%
Milling		3%				
G. Margin	3.6%	15%	3%	3.3%	2.3%	5.4%
Note: Gross margin = Purchase cost less marketing and milling cost (where applicable), including losses.						

Constraints to Rice Marketing

12.17 Few obvious technical constraints exist with respect to the functioning of the national marketing system for rice. Overall, the domestic marketing system appears to work effectively and in a competitive manner, with low margins across the entire system. Perhaps the most important single technical limitation is the lack of wholesale marketing space in most major urban centres, forcing rice trading to occur in a dispersed fashion and making effective oversight of weights, measures and other standards difficult.

12.18 A number of policy related constraints can be identified, however, all related to the approval in April 2003 of private sector participation in rice exporting (since suspended). These include the unstable policy environment, the requirement for extensive paperwork prior to export, the presence of export taxes and the restrictions on use of foreign exchange earnings. Together, these constraints seriously limit the ability of the private sector to engage in rice exporting, even when permitted.

C. MAIZE MARKETING IN MYANMAR

12.19 Maize in Myanmar is the second most important cereal crop, after rice. Maize production at the present meets or exceeds needs for local utilization. Moreover, new cultural practices and new maize hybrid varieties offer the potential for future yield increases that are expected to expand supply. Maize prices have become more attractive due to the increased demand from the expanding domestic livestock sector and an unhindered export market, so production should respond.

12.20 Major growing areas are Shan State, Chin State, and Sagaing, Mandalay, Ayeyarwady and Magway Divisions. Currently, more than one third of the total sown area is in Shan State. The central dry zone regions comprising Sagaing, Magway and Mandalay, contribute a further 44 % of sown area.

Supply and Consumption

12.21 Total production in 2001-2002 was 540,000 tonnes, almost double the level five years earlier. Maize is cultivated in the monsoon season (75% of total planted area) as well as the cold season (25% of total planted area) where adequate moisture exists. The first harvest comes to the market from August to November and the second from January to February. Monsoon season production contributed 92% of total production in 2000-2001. At present, hybrid maize seeds

constitute about 30 percent of the total planted area and are expected to increase to 60 percent of total corn seeds by 2005.

12.22 With an average annual growth rate of about 8% in the broiler industry, total domestic consumption of maize is expected to increase in order to meet demand for animal feed. Broiler/Layer feed rations in feed mills are currently composed of 50-60% maize. There is currently little demand for maize for human consumption.

12.23 Maize currently has no restrictions on trade and accounts for 35% of total agricultural crop export earnings. Some 30% of domestic production has been exported in recent years, reaching 164,000 tonnes in 2002 with an FOB value of US$15.9 million. The primary export market is Bangladesh.

Profitability of Maize Production

12.24 Cost of production and returns data was collected with respect to two hybrid varieties; one local and one imported.

Comparative Profitability of Local and Imported Hybrid Maize Varieties

Variety	Yield (kg/ha)	Revenue (MYK/ha)	Cost (MYK/ha)	Gross Margin	Benefit/ Cost Ratio	Break Even (kg/ha)
CP Hybrid	4,940	257,000	114,000	143,000	1.3	2,200
Yezin Hybrid	3,700	193,000	89,000	104,000	1.2	1,700
Cost/Benefit Ratio: Ratio of gross margin to production costs.						

Marketing Channels, Costs and Margins

12.25 As Southern Shan State is the major producing region for maize, Aungban and Taunggyi have become major maize markets. The maize from Shan is generally transported to Yangon, while that from the Dry Zone travels to Mandalay. Some amount of maize is exported to China through border trade from Mandalay market.

12.26 Farmers sell their produce on farm, or at local collection points or warehouses. Farmers were not aware of export prices. Small and medium farmers sell their maize immediately after the harvest. Primary collectors are usually the first commercial purchasers of maize in the marketing chain. They usually sell to wholesalers. Some primary collectors act as purchasing agents for exporters on a 1-3% commission. Town wholesalers buy maize from farmers and primary collectors and transport the grain before selling to large scale wholesalers. Maize is not commonly handled in local markets, but passes directly to feed formulators or exporters.

Marketing Cost and Margins

12.27 Marketing costs for maize are high in comparison with those in the rice marketing system. Transport is a major element for both primary collectors and township wholesalers, reflecting the more restricted supplies and the location of the main producing area in Shan State.

Marketing Costs and Margins for Maize Marketing Participants

Item	Primary Collector	Township Wholesaler	Inter-Division/ State Wholesaler
Marketing	12.4%	33.6%	9.3%
G. Margin	6.1%	7.0%	1.8%
Note: Gross margin = Purchase cost less marketing and milling cost (where applicable), including losses			

Constraints to Maize Marketing

12.28 As noted, the relatively limited numbers of maize producers appears to result in higher marketing costs and – with the exception of the large-scale wholesalers, gross margins. As maize is not an important commodity at Central Crop Exchange Level, maize lacks the efficient trading base that rice, pulses and oilseeds enjoy. Exporters have to pay 10% of export earning as tax and cost of export is relatively high. Therefore it is necessary for maize exporters to reduce the cost of export to become more competitive and be able to expand markets.

D. OILSEED CROPS MARKETING IN MYANMAR

12.29 Oilseed crops are second to paddy in term of sown area in Myanmar and approximately equal to the pulses. The major oilseed crops are groundnut, sesame and, more recently, sunflower. Soybean, niger and mustard are also cultivated as oilseed crops in some regions.

Supply and Consumption

12.30 Apart from the predominant use for edible oil, oilseeds are consumed directly, in other foods and as snack items. Consumption for traditional snack business such as groundnut brittle, sesame brittle, and roasted sesame powder is estimated as more than 5% of total production.

12.31 Myanmar is not self-sufficient in edible oil. As a result palm oil is imported to bridge the gap between supply and demand. Edible oil is also arriving from neighbouring countries in 10 viss cans (16 kg). Soybean, grown extensively in Shan State, is a potential new source of edible oil, but currently is used almost entirely for culinary purposes. Other available sources of edible oil are cotton seed oil and rice bran oil.

12.32 According to the 1997 Household Income and Expenditure Survey, per capita annual consumption of cooking oil and fat is 9.4 kg/capita in urban areas and 8.6 kg/capita in rural areas. However rural households in Sagaing Division consume 15.7 kg/capita, while those in Chin State consume only 0.2 kg/capita. In both rural and urban areas, groundnut oil accounts for approximately 50% of total oil consumption. By contrast, sesame accounts for 43% of consumption in rural areas, but only 17% among urban populations, where palm oil is of importance. Other oils, including mustard, niger and rapeseed make minor contributions, particularly in rural areas. Domestic market volumes have been estimated from household income and expenditure survey data to be about 0.46 million tonnes in 2003.

12.33 Sesame seed is exported, although since Government took control of exports in 1998, annual exports have declined significantly from an average of more than 50,000 tonnes/annum to below 20,000 tonnes/annum. While niger seed exports were banned in 2001, but previously had averaged around 15,000 tonnes per annum.

Profitability of Oilseed Production

12.34 The oilseeds group contains both highly profitable crops, such as winter groundnut, as well as extremely marginal crops, such as sunflower. Nevertheless, sunflower has expanded rapidly in the last two decades while groundnut has stagnated. The answer lies in the suitability of sunflower as a low cost catch crop between rotations, while the high input requirements of groundnut – particularly in terms of seed – make it difficult for many farmers to afford. While winter crops are more profitable than monsoon plantings, the highest cost/benefit ratio is observed for irrigated sesame, where low input costs combine with moderately good revenues.

Comparative Profitability of Principal Oilseeds

Crop	Yield (kg/ha)	Revenue (MYK/ha)	Cost (MYK/ha)	Gross Margin	Benefit/ Cost Ratio	Break Even (kg/ha)
Groundnut (monsoon)	1,115	415,000	154,000	261,000	1.7	580
Groundnut (winter)	1,535	571,000	194,000	376,000	1.9	731
Sesame (monsoon)	365	133,000	56,000	77,000	1.4	151
Sesame (winter)	485	178,000	66,000	112,000	1.7	182
Sesame (irrigated)	726	267,000	86,500	180,000	2.1	236
Sunflower	430	107,000	46,000	61,000	1.3	218
Cost/Benefit Ratio: Ratio of gross margin to production costs.						

Marketing Channels, Costs and Margins

12.35 In the case of groundnut, sesame and sunflower, major market flows are from the Dry Zone to Mandalay and Yangon. Soybean flows principally from Shan State to Mandalay, some directly to Yangon. Some quantity of sesame and soybean cross into China through unofficial border trade. Sunflower oil is often mixed with groundnut oil and then sold in the market as second grade quality groundnut oil.

12.36 Most farmers sell to primary collectors who generally purchase on their own account but some may sell the crop on behalf of the producers, receiving a commission. Wholesalers may employ their own agents and provide working capital for crop collection. Millers may buy from primary collectors or through the Central Crop Exchange (CCE). They generally do not use agents or provide credit. Millers may sell the oil and cake back through the Central Crop Exchanges or directly to bottlers and feed formulators - especially if they are large. There are 3,165 registered oil mills in Myanmar; all those handling sesame and groundnut are privately owned.

12.37 Town wholesalers often employ their own agents for crop collection. They generally sell through one of the CCEs. Large scale wholesalers also buy sesame seed on behalf of exporters. They get 1% commission and they take responsibility for meeting export specifications.

Role of the Public Sector

12.38 Although no compulsory purchasing exists for oilseeds, the seed and edible oil sector is among those for which state controls are still in place with respect to international trade. Edible oils are prohibited export items. The apparent logic for this ban is that Myanmar is currently a deficit producer of edible oil, and it is feared that exports of edible oil would further increase this deficit.

12.39 Exports of whole seeds are permitted but, since 1998, sesame can only be exported through Government agencies. The impact of this move on prices was immediate, with sesame seed prices dropping by one third from October 1998 to July 1999 and volumes declining by almost two thirds.

Marketing Costs and Margins

12.40 Marketing costs and margins for the two major oilseeds – groundnut and sesame are similar to those found for rice, while sunflower has slightly higher costs, probably associated with more sparse production and higher assembly costs.

Marketing Costs and Margins for Oilseed Marketing Participants

Item	Groundnut		Sesame		Sunflower	
	1° Collector	Township Wholesaler	1° Collector	Township Wholesaler	1° Collector	Township Wholesaler
Marketing	3.7%	8.0%	3.3%	8.5%	5.1%	10.3%
G. Margin	3.8%	4.0%	3.8%	2.5%	2.2%	3.2%
Note: Gross margin = Purchase cost less marketing and milling cost (where applicable), including losses.						

Constraints to Oilseeds Marketing

12.41 The principal constraints to oilseed marketing are policy related, and derive from the imposition of government restrictions on export trade while permitting the import of cheap palm oil. The long established status of groundnut and sesame have led to well developed domestic marketing systems, albeit with some confusion over weights and measures employed in different areas of the country.

E. PULSE CROP MARKETING IN MYANMAR

12.42 The beans and pulses make up the third key commodity group in Myanmar, together with paddy and the oilseeds. There are more than 40 species cultivated, but black gram, green gram and pigeon pea are the most important economically. Both the area and production of pulses has risen dramatically over the last fifteen years, although there are now signs that this is levelling off. The appeal of pulses to producers has rested on their low input requirements, low water use and uncontrolled trade regime.

Supply and Consumption

12.43 Total production of beans and pulses in 2001/02 reached approximately 2.5 million tonnes on nearly 3 million ha of sown area. Almost 2 million ha and 2 million tonnes of that amount derived from black gram, green gram and pigeon pea. **A**ccording to the 2001 HIES data, per capita annual consumption of pulses was 4.7 kg in urban areas and 5.4 kg in rural areas. Consumption is highest in Mandalay Division at 11.3 kg/capita and lowest in Tannintharyi Division and Mon State (1.0 kg).

12.44 Foreign trade is classified into formal trade from Yangon Port, and Border Areas trade, principally with India and Bangladesh. No reliable figures exist for the latter, but it is believed that 10% of the export is carried out through this route. According to official statistics from 1999-00, 34% of total pulse production was exported, but this reaches 80% for pigeon pea.

Profitability of Pulse Production

12.45 In comparison with some other cost categories, pulses are not particularly profitable, yielding gross margins only in the MYK 100,000/ha range and cost/benefit ratios of 1.3-1.7. However, their low production costs make them affordable for small producers and they have low water requirements. In addition the crop residue is an important manure or fuel source for rural households.

Comparative Profitability of Principal Pulses

Crop	Yield (kg/ha)	Revenue (MYK/ha)	Cost (MYK/ha)	Gross Margin	Benefit/ Cost Ratio	Break Even (kg/ha)
Green Gram	970	163,000	61,000	102,000	1.7	363
Black Gram	1,210	222,000	92,500	130,000	1.4	503
Pigeon Pea	808	173,000	76,000	97,000	1.3	353
Cost/Benefit Ratio: Ratio of gross margin to production costs.						

Market Channels, Costs and Margins

12.46 Pulses are largely a crop of the central Dry Zone, including Sagaing, Magway and Bago, although Black Gram is also an important crop in Ayeyarwady Division in the Delta. Apart from informal cross border trade, most flows are to Yangon, for export, although there is domestic consumption of black and green gram through markets in most areas. Farmers generally sell to primary collectors in the village or go to the nearest town. The large scale wholesalers and exporters have their own commission agent or brokers who generally operate through the CCEs. The rest do not employ agents, purchasing from primary traders. All the Yangon wholesalers interviewed had their own agents in main markets and major producing areas for crop collection. None of them provided the working capital to the agents.

12.47 All the wholesalers in Yangon stored product while assembling shipments. The storage quantity was in the range from 10 to 40 thousand bags (500-2,000 tonnes). Normally, most of wholesalers stored for 3 to 4 months before cleaning and grading pulses are termed "raw". After cleaning and grading they are termed Ready Cargo (RC).

Role of the Public Sector

12.48 Pulses were the first major crop group for which marketing controls were lifted in 1988, and this free market has been widely credited with being a major factor in the tremendous growth of pulse production over the last decade. At the end of 2000, however, the Government imposed a compulsory buying scheme for green and black gram to obtain product for export. Producers were required to sell two baskets/acre to state buyers. Advance payment was made to farmers. This approach was dropped again in late 2002.

Marketing Costs and Margins

12.49 Marketing costs and margins are very low for the pulse marketing chain. For no crop does the reported gross margin exceed two per cent, and marketing costs are also lower than for most other crops, falling in the 5-7% range. The efficiency of pulse marketing is probably closely related to the low system losses for the participants reviewed (exporters are normally responsible for cleaning and grading and report losses of 2-3% at this stage), and the concentration of marketing channels towards export, as opposed to the diversified domestic market.

Marketing Costs and Margins for Pulses Marketing Participants

Item	Back Gram		Green Gram		Pigeon Pea	
	1° Collector	Township Wholesaler	1° Collector	Township Wholesaler	1° Collector	Township Wholesaler
Marketing	1.2%	7.3%	1.4%	5.4%	2.1%	6.1%
G. Margin	1.5%	1.1%	1.0%	1.1%	1.0%	1.1%

Note: Gross margin = Purchase cost less marketing and milling cost (where applicable), including losses.

Constraints to Pulses Marketing

12.50 There are few marketing constraints apparent for pulses beyond those uncertainties introduced by Government policy changes. Pulse trading relies heavily on the CCEs with their low margins, and most storage occurs at the exporters' warehouses in Yangon or Mandalay.

F. CULINARY CROP MARKETING IN MYANMAR

12.51 In Myanmar, onion, garlic, dried chilli and potato are known as culinary crops, and are important for domestic consumption. Large quantities of onion are exported, but garlic is imported from China to meet domestic demand. Small quantities of dried chilli are reported exported to China and Thailand through border trade.

Supply and Consumption

12.52 Onion production has increased dramatically in the last two decades, from 100,000 tonnes to 640,000 tonnes in 2001/02, largely to meet export demand. A further 95,000 tonnes of garlic was produced in that year, as well as 68,000 tonnes of chilli. Together, these crops accounted for almost 200,000 ha, largely in the central Dry Zone of the country,

although Shan State is also an important producer. Most production occurs in the winter, as the high moisture content and disease problems makes monsoon production more difficult and less profitable.

12.53 According to the 2001 HIES, per capita annual consumption of onion was 4.12 kg in urban areas, 3.53 kg in rural areas. Per capita annual consumption of garlic was 1.57 kg in both urban and rural areas. Per capita annual consumption of chilli is 1.37 kg in urban areas and 1.57 kg in rural areas. Domestic use of onion is estimated at 177,000 tonnes, garlic at 76,000 tonnes and chilli at 73,000 tonnes.

Profitability of Culinary Crop Production

12.54 The culinary crops analyses by the study were the most profitable agricultural activities encountered. Onion, in particular, yields a gross margin of almost MYK 1 million/ha (US$1,000/ha) and a cost/benefit ratio of 3.6. Even garlic, a crop in which domestic production is insufficient to meet demand, yields a cost/benefit ratio of 2.2. The exception to these cases is chilli which, despite higher prices, is rendered much less profitable by relatively low yields. It is probable that expanded production of onion and garlic is restricted by the availability of suitable land (some under rice) and the need to invest almost MYK 300,000/ha in production – a figure that few small farmers can contemplate.

Comparative Profitability of Principal Culinary Crops

Crop	Yield (kg/ha)	Revenue (MYK/ha)	Cost (MYK/ha)	Gross Margin	Benefit/ Cost Ratio	Break Even (kg/ha)
Onion	10,100	1,266,000	277,000	990,000	3.6	2,215
Garlic	7,300	1,245,000	386,000	859,000	2.2	2,260
Chilli (dry)	1,400	567,000	231,000	336,000	1.5	561
Cost/Benefit Ratio: Ratio of gross margin to production costs.						

Marketing Channels, Costs and Margins

12.55 Some small farmers transport their culinary crops to local wholesale markets for direct sale to consumers, but most sell to wholesaler agents who operate in the major producing areas, receiving a commission of about 3%. Town wholesalers are responsible for sorting and grading and face significant crop losses at this point. The product is then sold on to market wholesalers for domestic consumption, or to exporters or long-distance wholesalers.

Marketing Costs and Margins

12.56 While marketing costs are higher than in the case of cereals and pulses – as would be expected from the perishable nature of culinary crops – gross margins are relatively low for both onion and chilli.

Marketing Costs and Margins for Culinary Crop Marketing Participants

Segment	Onion		Garlic		Chilli	
	Gross Margin	Marketing Cost	Gross Margin	Marketing Cost	Gross Margin	Marketing Cost
1º Collector	3.7%	3.6%	6.9%	3.8%	6.5%	1.6%
Town Wholesaler	10.3%	14.7%	6.1%	10.4%	5.1%	11.9%
Market Wholesaler	3.4%	5.7%	10.4%	5.6%	5.0%	5.2%
Market Retailer	8.9%	7.7%	17.1%	9.3%	8.4%	10.2%

Constraints to Culinary Crops Marketing

12.57 In the absence of Government intervention in culinary crops marketing, the most important constraint to the existing marketing system is the absence of adequate wholesale market facilities, leading to relatively high loss rates at the wholesale level.

G. BANANA MARKETING IN MYANMAR

12.58 Among the horticulture crops, banana is the most common. It grows in abundance in almost every part of the country year round. As utilization of banana is highly related in Myanmar culture, the demand is strong. Total area under banana is 46,855 ha in Myanmar. Ayeyarwady Division accounts for the largest area and more than 70% of the total sown area is in the delta region. The average banana sown area per farmer is about 3 acre. Depending on the variety, the banana can be harvested after six months of planting and normal harvest is after one year. Three harvests during the 18 months are found in Ayeyarwady Division. After 18 months, they start again in another location. The yield of the first harvest is the highest, yields decrease from the second generation.

Supply and Consumption

12.59 There is no published data for per capita consumption of banana. Therefore domestic consumption is estimated based on production. In 1999-2000, total production of banana was 75,154,000 bunches. There is an average of 5 hands of banana per bunch. Therefore per capita annual consumption of banana may be 7.8 hands.

Marketing Channel, Costs and Margins

12.60 Banana is a very perishable fruit and hence its marketing faces problems of loss and reduction in value. In local or short distance marketing the number of intermediaries is small but in long distance marketing commission agents and wholesalers are involved. Transport of bananas within the delta area is often by boat or train.

12.61 Majority of the farmers sell their product to the primary collector, although some sell directly in local markets. Most of the primary collectors transport the fruit to the Central Crop (CCE). Wholesalers buy the bunch of banana from primary collector as well as from farmers.

Marketing Costs and Margins

12.62 As would be expected marketing costs and gross margins for banana are considerably higher than for less perishable crops.

Marketing Costs and Margins for Banana Marketing Participants

Segment	Gross Margin	Marketing Cost
1º Collector	9.1%	7.7%
Town Wholesaler	18.2%	16.8%
Market Wholesaler	17.2%	10.6%
Market Retailer	6.7%	16.7%

Marketing Constraints

12.63 Although higher losses are to be expected for bananas than for many other crops, the absence of ripening facilities and other wholesale market infrastructure results in bananas being cut ripe and suffering significant system losses.

H. POULTRY MARKETING IN MYANMAR

12.64 The poultry industry of Myanmar comprises chicken, ducks and geese. Among them, chicken is the most important. Both the commercial broiler and layer sectors have increased substantially over the last 10 years. Production is concentrated around larger urban areas such as Yangon, Mandalay and Taunggyi.

12.65 Despite the growth in commercial production, chicken production in Myanmar is still mainly characterized by small-scale production. Village-based production is largely carried out under free range or scavenging system using indigenous varieties capable of generating cheap supplies for home consumption and income generation. In Myanmar, local village chicken constitutes over 80 percent of the total poultry population.

Supply and Consumption

12.66 Consumption of meat in Myanmar is quite low as compared to developed countries. While the per capita consumption of fish was 28.5 kg in 2001-2002, per capita consumption of meat was only 9.9 kg. More than ten million broilers are estimated to be raised in Yangon Division each month, 85 per cent of which are sold in Yangon's main chicken market. A decade ago daily broiler sales totaled about 3,000 viss in Yangon markets. By 2002/03 this had risen to more than 25,000 viss/day, yielding some MYK 28 million.

12.67 National marketing volumes can be estimated based on finding of the HIES. In urban Myanmar, per capita monthly consumption of chicken is 0.15 viss and in rural Myanmar it is 0.09 viss.

Profitability of Chicken Production

12.68 Although commercial layer operations yield far higher gross margins per operation, these arise principally because of their size. Their Cost/Benefit ratio is the lowest for any commodity analysed, at only 0.4. This compares unfavourably with local chicken production, which yields a Cost/Benefit ratio of almost 2.8. However, local chicken production tends to be constrained to much smaller-scale operations, and the returns probably do not take adequate account of risks from mortality.

Comparative Profitability of Commercial and Local Chicken Production

Commodity	Revenue (MYK'000)	Cost (MYK'000)	Gross Margin	Benefit/ Cost Ratio
Commercial Layer	9,337	6,775	2,562	0.4
Local Chicken	800	213	588	2.8
Cost/Benefit Ratio: Ratio of gross margin to production costs				

Marketing Channels, Costs and Margins

12.69 Marketing costs and margins for poultry are comparable with those for culinary crops and lower than those seen for horticultural crops, although local chicken (meat) tends to attract higher gross margins (although not marketing costs) than do commercial layers (eggs).

Marketing Costs and Margins for Poultry Marketing Participants

Segment	Commercial Layer		Local Chicken	
	Marketing Cost	Gross Margin	Marketing Cost	Gross Margin
1º Collector	4.5%	3.8%	4.4%	5.4%
Large Scale Wholesaler	7.7%	3.8%	7.7%	5.0%
Marketing Wholesaler	2.9%	4.0%	2.8%	8.5%
Marketing Retailer	3.7%	9.2%	3.8%	12.2%

Constraints to Poultry Marketing

12.70 Most key problems facing the poultry sector are production, rather than, marketing related. Among these, the high mortality of introduced breeds, a low feed resource base at the village level and lack of understanding of the complex biological, cultural and socio-economic relationships have been important. With limited village level vaccination and predominantly live sale of animals, the highly infectious Newcastle disease is a major constraint to both production and marketing from village chicken production systems.

I. SUMMARY OF AGRICULTURAL MARKETING STATUS AND PERFORMANCE

12.71 The domestic agricultural marketing system for those commodities covered in this study is generally efficient and effective. There is considerable evidence of competitive access for farmers to a choice of primary collectors and even town wholesalers or millers across all crops

and commodities. The analyses underline the wide variation in returns to major annual crops and livestock products produced in Myanmar. Calculated gross margins per acre range from less than MYK 25,000 (US$64/ha) for sunflower to as high as MYK 400,000/acre (over US$1,000/ha) for winter onion. Figures for chicken are not comparable as they are not calculated on an area basis. Returns to perennial crops calculated in other recent studies generally show much lower rates of return, although rubber did appear profitable.

12.72 Variation between commodities tends to be less in cost/benefit terms[1], as those crops with low returns tend to have far lower production costs, and vice versa, although this does not hold true for many of the plantation crops. Those commodities analysed in the working paper range from a low of 0.4 for commercial layer operations to a high of 3.6 for winter onion. Summer paddy and local hybrid maize, with C/B ratios of 1.2, are the poorest performing crops analysed. Plantation crops generally yielded C/B ratios below 1, but rubber was calculated at 2.3.

12.73 Perhaps the most important conclusion arising from the above results is that paddy is not an attractive crop when compared with many alternatives. Furthermore, rice is a heavy consumer of water, particularly for summer paddy, which is entirely dependent upon irrigation. Although water is considered as a free good in the analyses, there are substantial opportunity costs associated with crops which are intensive users of water. Irrigated sesame, for example, can yield higher gross margins and cost/benefit ratios than paddy, but consumes far less water, allowing a greater area to be grown with the same volume of water availability.

Inadequate Post Harvest Technology

12.74 Considerable losses occur throughout the marketing system in Myanmar, especially from perishable products such as the culinary and horticultural crops. Only oilseeds and pulses appear to show little post-harvest loss. Losses occur not only on farm but also during storage, transport and handling. A number of measures might be undertaken to reduce losses, including improved on-farm storage. However, due to the short-term nature of farm storage for most producers, it would appear to be the wholesale system where most loss reduction potential exists.

Crop	Minimum losses	Maximum Losses	Mean Losses
Rice	4	16	10.0
Maize	5	28	16.5
Groundnut	4	12	8.0
Sesame	3	10	6.5
Sunflower	6	12	9.0
Niger	2	10	6.0
Black gram	5	12	8.5
Green gram	7	12	9.5
Pigeon pea	4	14	9.0
Onion	28	34	31.0
Garlic	16	32	24.0
Dried Chilli	5	24	14.5
Banana	10	40	25.0

[1] The Cost/Benefit ratio divides the gross margin by overall costs of production and provides a measure of the scale of benefits in comparison with the costs.

Policy Impediments to Marketing

12.75 Despite an overall commitment to move towards free market policies, the intervention of government into agricultural marketing remains widespread, despite the important recent moves to liberalise rice marketing. A considerable number of agricultural commodities face distorted markets, generally due to restrictions on export marketing (either prohibited or only permitted through Government agencies). These distortions are created through a combination of prohibiting export sales by the private sector, the imposition of a 10% across the board export tax, limiting retention of foreign exchange earnings, and the activities of state-owned enterprises in processing and marketing.

12.76 Furthermore, although compulsory procurement now appears to have been lifted on rice, it was introduced for black and green gram as recently as 2000, but subsequently lifted in 2002, bringing into question the strength of the Government commitment in this area.

Market Infrastructure and Standards

12.77 One key area where the Myanmar agricultural marketing system is poorly developed is that of infrastructure and standards. While the emergence of Central Crop Exchanges has contributed significantly to the efficient functioning of the trading mechanism within the agricultural marketing system, it has not provided similar support to the physical handling and movement of the products. While this has not been a major drawback for relatively non-perishable products such as oilseeds and pulses, the previous table shows that it is a serious problem for culinary crops, horticultural products and other perishable items.

12.78 In general, it would be far more satisfactory if traders were able to conduct their negotiations in the vicinity, if not the actual presence, of the commodity in question. This is especially the case with fresh produce. Yet Myanmar possesses no wholesale marketing facilities of the sort encountered in other countries. Such facilities could not only link more closely the trading and physical transaction elements of the marketing system, but could also provide appropriate storage, washing, grading and other facilities which may not be available at the smaller individual warehouses currently used.

12.79 The establishment of centralized wholesale facilities for cities such as Mandalay and Yangon would also facilitate progress in the area of establishing national standards for weights and measures used in agricultural marketing. Efforts should be made to establish a single set of measures that would be used throughout the marketing chain, and which can be checked at wholesale market level through the use of weighbridges for trucks and inspected scales for smaller volumes.

13. RURAL FINANCIAL SERVICES[1]

A. INTRODUCTION

13.1 The demand for rural finance in Myanmar is high, including both credit and secure savings facilities. Over 70% of the workforce is engaged in agriculture, which generates 57% of the gross domestic product; however, only 1-3% of formal bank loan volume is extended to the agriculture sector. Development of a sustainable, market-oriented rural finance system could therefore have a significant impact on economic growth and poverty reduction.

13.2 Myanmar's financial system consists of:

- 4 state-owned banks with specific mandates;
- 20 private banks;
- 18 representative offices of foreign banks;
- Cooperative credit societies established under the Ministry of Cooperatives;
- State-owned and private pawnshops;
- Microfinance projects established by international donors and local associations; and
- Informal lenders, such as moneylenders, traders, and input suppliers.

13.3 Myanmar has pursued a well-intentioned policy of providing subsidized institutional credit to farmers through the state-owned Myanma Agricultural Development Bank (MADB). However, as has been seen in other countries that have followed similar policies, implementation of this policy has yielded results that are quite different from those desired. MADB's outreach is limited, loan sizes are inadequate, MADB drains scarce resources from the Government budget, and other formal sector financial intermediaries are discouraged or prohibited from filling the financial gap in rural areas. In a few townships, microfinance projects supported by international donors partially fill the gap. Overall, however, outreach of the formal financial sector remains limited, and the rural population relies mostly on informal sources of finance, especially moneylenders, traders, and input suppliers.

B. PROVISION OF RURAL FINANCE

Myanma Agricultural and Rural Development Bank (MADB)

13.4 As the Government's main instrument for implementing its rural finance policy, MADB essentially acts as a channel for Government funds and subsidies. Its current status is defined by the Myanma Agricultural and Rural Development Bank Law (1990) and accompanying Rules (1991). MADB is exempted from the Financial Institutions of Myanmar

[1] The following section is a summary of Working Paper 9 "Rural Finance" contained in Volume 3 of this study and prepared by Brett Coleman, Rural Finance Specialist for the Agricultural Sector Review.

Law (1990) and, therefore, is not subject to the regulation and supervision of the Central Bank of Myanmar (CBM). In practice, however, it follows many CBM directives that apply to other banks.

13.5 Per the 1990 Law, MADB's mandate is to "effectively support the development of agricultural, livestock and rural socio-economic enterprises in the country by providing banking services". The Law prescribes key aspects of how MADB may operate. For example, the Law allows three types of loans: (i) annual loans up to 1 year; (ii) short-term loans of 1 to 4 years; and (iii) long-term loans from 4 to 20 years. Interest rates are to be prescribed by the Ministry of Agriculture and Irrigation (MAI). Per the Rules, MADB may accept 5 types of deposits, and may make loans, advances, or overdrafts to "State-owned agricultural organizations, livestock organizations, cooperative societies, private persons, joint venture in cooperation there among, village banks, farmers, entrepreneurs and labourers for agricultural, livestock and rural socio-economic enterprises". Per the Land Nationalization Act of 1954, agricultural land is unacceptable as collateral for MADB and other financial institutions because such land officially belongs to the state, and land tillage rights cannot be transferred or mortgaged.

13.6 MADB has a head office in Yangon, 16 divisional offices, and 205 branches, one each in 205 of Myanmar's 325 townships. Currently, MADB claims about 1 million active, borrowing members in about 150,000 farmers' groups, as well as 2 million depositors. Its borrowers represent about 17% of rural households.

13.7 Although the 1990 Law gives MADB a mandate to provide financial services to a broad spectrum of rural borrowers, in practice it provides loans only to farmers for agricultural production. In addition to "seasonal loans" and "term loans", MADB also administers "border area development loans", which carry an interest rate of 1% per year.

13.8 Seasonal loans make up the bulk of MADB's lending and are granted for growing paddy, groundnuts, pulses, sesame, cotton, jute, mustard, maize, and sugarcane.[1] Seasonal loans are made without collateral, but are guaranteed by joint-liability groups of 5 to 10 members. In principle, loan size is to be determined according to the borrower's demand and capacity to repay, and is targeted to be approximately 30% of production costs. In practice, because of MADB's limited funds, loan size is much smaller. In 2003-04, loan rates for growing rice (which account for 80% of MADB seasonal loan volume) were MYK 2,000 to 8,000 per acre, while production costs were MYK 50,000 to 61,000 per acre. Loan rates for other crops were an even smaller percentage of production costs. From 1998 to 2003, the number of loans granted fell from 1.66 million to 1.23 million; and although loan volume increased from MYK 10,359 million in 1998-99 to MYK 12,015 in 2002-03 (with a projected increase to MYK 20,150 million in 2003-04), if adjusted for inflation, total lending has also fallen, indicating an overall trend of diminishing lending to a diminishing client base. Moreover, as MADB does not conduct mobile banking, farmers are required to travel to the MADB branch to receive and repay their loans, imposing considerable expense (relative to loan size) on farmers. Farmers surveyed unanimously said that MADB loan sizes were too small, and many said that the small loan size did not justify the expense of travelling to the MADB branch to borrow and repay. In 2 of 9 villages visited, all MADB members had ceased borrowing two years ago for this reason. In all villages, when farmers were asked if they preferred the status quo (small loans at 15% interest) or larger loans at 36% interest, farmers unanimously indicated a preference for larger loans at higher interest rates.

[1] In 2002-03, only 1,615 borrowers received term loans, for a total of MYK 234 million.

Farmers are much more concerned about *access* to larger loans and are willing to pay *commercial interest rates* for them.

13.9 MADB's decreasing lending is the result of its decreasing funding base, when adjusted for inflation. MADB's loanable funds come from its capital, reserves, customer deposits, and short-term borrowing of Government funds. For 2003-04, MADB's loanable funds are projected to be MYK 20,822 million (MYK 15,000 million borrowed from the Government; MYK 4,616 million in deposits; and MYK 1,206 in capital and reserves). However, growth in each funding source is effectively constrained. The 1990 Law requires MADB to allocate 25% of its nets profits to its Reserve Fund at the end of each financial year, and transfer the balance of net profit to the Government; and it limits MADB's capital to MYK 1,000 million. Hence, capital and reserves are limited by law. MADB borrows from the largest state-owned bank, the Myanma Economic Bank (MEB), at 10% per annum. However, the amount that MADB is allowed to borrow from MEB is determined by the Government each year and is therefore limited by budgetary considerations. With respect to savings, MADB pays a deposit rate of 9% per year, considerably below inflation, so clients are not encouraged by the interest rate to deposit savings. In principle, farmers are encouraged to save by being allowed to borrow an investment loan equal to five times their savings; in practice, MADB's limited loan funds severely restricts implementation of this incentive scheme. MADB further adopted a policy in March 2003 of not allowing customers to withdraw any deposits except in "exceptional" circumstances—in practice, this means that customers can withdraw their savings only if they agree to leave MADB and forfeit all borrowing privileges. Hence, savings are not a service, but rather a requirement to maintain borrowing privileges, and clients maintain only the minimum required. As a result of this set of laws, regulations, and policies, MADB's funding base is restricted, which in turn limits its lending.

13.10 In practice MADB follows the interest rates set for the other banks by CBM. Since mid-2000, this is 15% for loans and 9% for deposits. With an official inflation rate of 54% in 2002-03, real interest rates were significantly negative. More generally, negative real interest rates have been the norm in recent years.

13.11 MADB has adopted a policy that no loans shall be written off. In line with this policy, MADB reports a 100% repayment rate in every year since 1991, but evidence indicates that repayment is overestimated. MADB reports that it is able to make a contribution to the State out of its annual profits every year, making a total contribution of almost MYK 4 billion from 1980 to 2003. However, adjusting for inflation, MADB represents a net loss to the Government budget every year as a result of the Government's subsidizing MADB's negative real interest rates (i.e. by the Government's lending to MADB at 10% interest while inflation is significantly higher). Such losses amounted to approximately MYK 4 billion in 2002-03. MADB's financial self-sufficiency ratio is between 52% and 70%, again indicating that MADB is a net loss to the Government budget, rather than a net contributor.

13.12 Despite its constraints, MADB has several strengths on which it can build. First, it has a relatively large branch network, with branches in nearly two thirds of Myanmar's 325 townships. Second, it has established substantial public trust. Third, MADB has staff who is dedicated to their jobs and to MADB's mission to deliver productive agricultural loans to farmers. Fourth, MADB maintains a relatively strong credit culture. MADB documents state that its future plan includes the goal of financial self-sustainability, although it has yet to articulate a strategy to achieve this goal. Revisions to MADB's policies would increase its potential to achieve this goal

by building on MADB's strengths and substantially enhancing MADB's performance, thus improving its outreach, sustainability, and positive impact on Myanmar's agricultural sector.

13.13 Foremost among the policy constraints faced by MADB is the cap on interest rates. A lending rate of 15% in an environment of high inflation ensures MADB's decapitalization and net losses to the Government budget. Only positive real interest rates are consistent with MADB's stated goal of financial self-sustainability. Similarly, in an inflationary environment, the deposit rate ceiling of 9% will continue to hinder MADB's ability to mobilize deposits. With budgetary resources scarce, current policies will ensure that MADB's outreach and loan size will remain small. In addition to charging positive real interest rates on loans, MADB should introduce easily accessible deposits with positive real interest rates if it wishes to mobilize significant deposits.

13.14 Another constraint faced by MADB is the capacity of staff. Both a cause and an effect of MADB's weak performance is the lack of strong banking skills of many of its staff. Because of MADB's mandate, there has not been a strong emphasis on recruiting either experienced bankers at senior levels, or business and accounting majors at entry levels. Staff at the key assistant manager level is not recruited by MADB, but instead are recruited by the Public Service Selection and Training Board, which is appointed by the Government. Nor is there a formal training programme for staff. MADB will eventually be in need of substantial technical assistance if it wishes to reform into a modern bank and fulfil its goal of financial self-sufficiency. Skills for credit assessment, risk management, accounting and auditing, asset valuation, business planning, and marketing integral to function on a market-basis must be built over time.

13.15 MADB has 100% of its loan portfolio in agriculture, primarily in rice cultivation. It therefore has high risk concentrations related to climate, natural disaster, and agricultural price movements. While agriculture should remain an important part of the portfolio, MADB should diversify its lending to reduce its own risk and to foster the growth of non-farm income, rural enterprises, and employment in rural areas. This would also be consistent with the provisions of the 1990 Law, which gave MADB a broad mandate beyond agricultural lending.

13.16 The inability to accept agricultural land as collateral is a further constraint to lending to farmers. Land is the most important asset that farmers have, but is also the one asset that is not allowed as collateral. Reforms that allow agriculture land to be used as collateral will therefore increase access to credit.

Other Formal Banks

13.17 The role of other banks in providing financial services for agriculture and the rural economy is limited and indirect. MADB's mission has been interpreted to mean that MADB shall be the *only* source of institutional credit for agricultural production in Myanmar. Other formal banks are thus prohibited from providing credit for agricultural production.

13.18 Although none of the other 3 state-owned banks provide financial services directly to the agricultural sector, MEB (the largest bank in Myanmar) plays two key roles in financing the sector. First, MEB lends money to MADB for its lending programme. Second, traders (mostly agricultural traders) make up 75 to 80% of MEB's clients and lending volume. As of July 2003, MEB's loan portfolio was MYK 122 billion, with roughly MYK 95 billion to traders. Because traders provide the bulk of financing to farmers, MEB's financing of traders indirectly finances

the rural economy. MEB, however, lends to traders at 15% per year. As traders typically lend to farmers at interest rates of 5 to 20% per month, MEB effectively subsidizes traders. MEB's subsidized lending is another net loss to the Government budget.

13.19 The Livestock and Fisheries Development Bank (nominally private but treated largely as a state-owned bank) had a loan portfolio of MYK 9,059 million as of 31 March 2003 and lends mainly to fisheries. It has 8 branches, located in coastal and inland fisheries areas.

13.20 Private banks were first established in 1992. Twenty private banks exist today and experienced significant growth in the 1990s and into early 2003. Despite this growth, indicators show the relatively nascent stage of the financial sector's new market-orientation. By international standards, Myanmar's banks are quite small, including its largest bank, the state-owned MEB. Moreover, notwithstanding the rapid growth in deposits in recent years, overall bank savings remain low, and the ratio of currency in circulation to total deposits exceeds 80%. By comparison, Thailand's ratio is about 8%. This ratio indicates that Myanmar's banks are insufficiently creating credit. Failure to adequately fulfil the role of normal banks is due to weakened confidence in the currency, due to consistently high inflation and exchange rate depreciation, as well as the low returns to savings deposits, again due to high inflation in the context of interest rate controls.

13.21 Although all banks other than MADB are prohibited from lending for agriculture, several private banks have expressed a desire to conduct microfinance activities for farmers; and 2 have successfully piloted microfinance to community-based organizations formed under UNDP's Human Development Initiative (HDI) Project. However, CBM directed these banks to cease their microfinance activities after one loan cycle.

13.22 Despite not lending for agriculture, the private banks provide significant financing to traders, which represent about 75% of their loan portfolios. Again, however, lending rates are capped by CBM at 15% per year, making lending inherently unprofitable. Private banks generate their profits through remittances and other services.

13.23 Given the importance that the Government places on agricultural development, the explicit prohibition on agricultural lending by banks other than MADB is difficult to understand or justify. Most other developing countries encourage the commercialization of microfinance, rather than leave this market to the interventions of state-owned banks and non-government organizations (NGOs). The desire of a number of banks in Myanmar to carry out microfinance activities should be nurtured rather than discouraged. Only by commercializing rural and microfinance will Myanmar achieve the financial deepening necessary to deliver affordable financial services on a sustainable basis to farmers and rural entrepreneurs.

13.24 The growth in private banking was abruptly reversed in February 2003 with the advent of a serious banking crisis. The underlying cause of the crisis appears to be the collapse of several shady "private financial companies" in the informal financial sector. These firms, without being licensed by CBM, took deposits from the public, sold shares, and promised interest rates or returns to investors of up to 6% per month. Although their activities were in violation of the Central Bank of Myanmar Law (1990) and the Financial Institutions of Myanmar Law (1990), CBM did not intervene. With the public not discerning the difference between the formal and informal financial institutions, the collapse of these schemes spread to the banking sector during the first week of February 2003.

13.25 The banking crisis underlines the need to grant operational autonomy to CBM and strengthen its supervision capacity. Unfortunately, the lack of a timely and forceful response by CBM may have exacerbated the crisis. For example, late and insufficient supply of liquidity to solvent banks, instructions to limit deposit withdrawals, and instructions to recall outstanding loans likely further undermined confidence in the private banks and forced losses on businesses. Even now, it is not clear (or not clearly reported) if any banks were indeed insolvent, or if they merely faced liquidity problems in the face of a run on their deposits. If indeed any banks were in financial distress or facing liquidity problems *prior to* the run on deposits, then CBM's inability to identify and act on the trouble in the course of its normal supervision function also underlines the need to strengthen CBM's supervision capacity and authority. Of special concern are reports that CBM officials did not believe that they had authority to intervene to restrict or halt the shady operations of the "informal finance companies" despite the obvious risk they posed to the integrity of the financial system. The Central Bank of Myanmar Law (1990) and the Financial Institutions of Myanmar Law (1990) appear to clearly give CBM the legal authority to regulate the financial sector and issue directives to all types of financial institutions. An independent CBM could have responded more forcefully and quickly to restrict the illegal activities of the informal finance companies and stem the ensuing contagion.

UNDP Microfinance Project

13.26 The UNDP Microfinance Project is actually 3 projects that began in 1997 as part of UNDP's multi-sector HDI. One is the Delta Region Microfinance Organization (DRMO) implemented in 3 townships of the Delta region; another is the Dry Zone Microfinance Organization (DZMO) implemented in 3 townships of the Dry Zone; and the third is the Credit for Rural Development Institution (CRDI) implemented in 5 townships of Southern Shan State. Since their inception, all have focused on sustainability and best practice while targeting the landless and working poor.

13.27 All 3 projects implement a variation of the Grameen Bank model. Interest rates that can be used are agreed with the Government. Effective lending rates range from 38.5% to 45% per year, and deposit rates range from 15% to 25%. The interest rates are higher than the caps placed on formal banks, but still render full self-sufficiency difficult. Operational self-sufficiency of each programme is well over 100%, and reported repayment rates are from 98 to 100%, but financial self-sufficiency is well below 100% because of the inflationary environment.[1] Despite this, all 3 projects are experiencing considerable success in terms of outreach, impact, and financial performance, and are demonstrating the potential of best-practice microfinance in Myanmar. Indeed, 2 of the 3 projects report approaching the "saturation" point in the townships where they operate; further expansion will require operating in townships other than those stipulated in the agreement with the Government.

13.28 DRMO has reached 43,102 clients, or about half of all rural households in the 3 townships that it serves, and has 30,789 active clients with a total loan portfolio outstanding of MYK 806,664,000 (average loan size MYK 26,200). DZMO has reached 58,350 clients (of whom 47,032 are still active), representing about half of all rural households in the 3 townships that it

[1] DRMO reports financial self-sufficiency of 67%; CRDI reports 75%; and DZMO reports 152%. However, DZMO uses an unrealistic inflation rate of 20% in its calculation; a more realistic inflation rate would push this ratio under 100%.

serves; the current loan portfolio is MYK 1.1 billion (average loan size MYK 23,400). CRDI has reached 34,505 clients (of whom 31,105 are still active) representing about 40% of all rural households in the 5 townships that it serves; the current loan portfolio is MYK 718.2 million (average loan size MYK 23,100). In their respective project areas, each is the largest source of institutional credit, significantly surpassing outreach and loan volume of MADB.

Other Microfinance Projects and Activities

13.29 As of 30 September 2003, 1,904 credit cooperative societies with 416,308 members are licensed with the Department of Cooperatives, under the Ministry of Cooperatives. Permitted by their license to carry out only savings and lending activities, they have loans outstanding of MYK 4,427 million and total savings of MYK 4,807 million. Deposit interest rates are 12% per year, and lending rates are 18%. The vast majority of the credit cooperative societies are urban based and consist of members drawn from the Government civil service. As such, they do not play a significant role in providing rural financial services. As with the formal banks, low interest rates severely constrain their operations, and deposit mobilization is low, with average savings per member of only MYK 11,500.

13.30 The Small Loans Enterprise Department is a Government-owned network of pawnshops, with 185 Small Loans branches. As of 30 September 2003, it had about 120,000 loans outstanding with a total value of MYK 5,397 million. An interest rate of 3% per month is charged on all loans, which may have a maximum maturity of 5 months. The Small Loans Enterprise has an overdraft limit with MEB of MYK 6,000 million for 2003-04, which carries an interest rate of 11% per year, which suggests that the Small Loans Enterprise is costly to the Government's budget. With its on-lending rate of 3% per month, however, these losses are partially offset by its "contribution" and taxes to the Government. Private pawnshops are pervasive throughout the country and typically charge 5% per month on their loans. Given their branch locations in rural townships, it is likely that many pawnshop clients are farmers, but data on loan use or occupation of clients is not kept. Interviews with villagers in the Delta, Dry Zone, and Southern Shan State indicate that 10 to 20% had loans with pawnshops (both private and Small Loans branches).

13.31 The UNDP Integrated Community Development Project (ICDP) is the follow-on project to 7 projects started under HDI. Three of the HDI projects included a village revolving fund component. Collectively, community based organizations (CBOs) in about 1,350 villages received about MYK 1,500 million in Southern Shan State, the Delta, and the Dry Zone. The Dry Zone project was able to mobilize additional funds through the participation of Yoma Bank and Kanbawza Bank. However, both banks were instructed to cease this lending by CBM. Many of the revolving funds were reported to have encountered problems common to village revolving funds, including poor management and low repayment rates. Although the new ICDP does not have a revolving fund component, it has found that only 40% of the revolving funds are still functioning. By agreement, revolving funds were not established in the villages where the UNDP microfinance projects were operating as it was feared that the two methodologies would confuse villagers. With support for the revolving funds ending, an opportunity exists for the 3 UNDP best-practice projects to expand into the villages that were provided with revolving funds.

13.32 Save the Children (US) began its "Dawn Program" microfinance project in January 2002 in the peri-urban area of Shwe Pwi Tha, about 30 kilometres from Yangon. It currently serves 2,945 clients in more than 100 solidarity groups of 20 to 25 members each. Although still

small, it is a stand-alone microfinance project with a focus on international best practice and long-term sustainability. Borrowers pay a flat interest rate of 4% per month. Save's clientele includes few farmers; instead, it primarily serves small and micro entrepreneurs, and small traders. Average loan size is small, about MYK 10,000, and most borrowers are poor. Save reports a 100% on-time repayment rate, operating self-sufficiency of 161%, and financial self-sufficiency of 50%. Save's project has the potential to eventually transform into a formal microfinance institution once a legal and regulatory framework is in place.

13.33 World Vision started its Micro-enterprise Development Program in 1997 in 4 urban townships (3 in Yangon and 1 in Mandalay). Loans are made to individuals formed into groups of 5 to 7 members, and loans vary from MYK 15,000 to MYK 75,000. Loan maturity is 6 months, repaid in weekly instalments of principal and interest, which is 48% per year. World Vision's programme targets long-term sustainability.

13.34 CARE began its microfinance project in 2001 in Rakhine State. It currently serves 2,250 households in about 36 villages. It follows a credit union model, and has mobilized MYK 5 million in savings, which have been augmented by a grant of MYK 6 million from CARE. Its lending portfolio is currently MYK 11 million. CARE reports repayment rates of over 98%, with loan sizes ranging from MYK 10,000 to MYK 30,000.

13.35 Myanma Maternal and Child Welfare Association (MMCWA) is a local association that was founded in 1991 and receives strong Government support. MMCWA has a branch in all of Myanmar's 324 townships. MMCWA supports micro-credit in all 324 townships. Each township branch executive committee identifies 10 poor households and loans about MYK 1,000 per household. The loan funds come from donations of local executive committee members. Interest is 2% per month, and the maximum loan size is 10,000, with a maturity of 1 year. MMCWA has helped more than 80,000 beneficiaries since its micro-credit programme started in 1996. MMCWA lends mostly to female small traders for income generation. No deposits are mobilized. MMCWA staff has not received any training in microfinance, and the focus of its micro-credit programme is not on sustainability. Loan sizes therefore remain small, as does outreach.

13.36 Myanma Women's Entrepreneurship Association (MWEA) is a local association, registered in 1995 under the Ministry of Home Affairs, and conducts a small microfinance project for women in 10 bazaars in the Yangon area. Loans carry an interest rate of 3% per month, with a maturity of 5 months. Funds come from members of MWEA, who pay a "life membership" fee of MYK 10,000. Its current portfolio is MYK 2.1 million to 350 members. No savings are mobilized. MWEA staff has not had formal microfinance training, but have visited the UNDP Microfinance Project in Kyaupadaung.

13.37 The Centre for Integrated Rural Development for Asia and the Pacific (CIRDAP) project includes a micro-credit component. The project is being implemented by the Department of Agricultural Planning under MAI, and has a steering committee that includes representatives of MAS and MADB. The project started in July 1999; its second loan was granted in 2001 to 137 borrowers; total disbursement was MYK 4.458 million, making average loan size MYK 32,500. The interest rate is 2% per month, part of which goes to the village welfare fund, which has supported community development works such as schools, toilets, and electrification. Training has also been provided to women in leadership, accounting, health awareness, animal husbandry, tailoring, vegetable growing, and mushroom cultivation. Compulsory savings of MYK 100 per

month are collected from members and deposited in MADB. The project suffers from a lack of focus on sustainability as manifested by interest rates substantially below the inflation rate. In addition, potential conflicts of interest may arise from social goals being mixed with the business orientation necessary for sustainable microfinance.

13.38 Microfinance in Myanmar is at an embryonic stage of development and faces three major constraints to sustainability. First, as is common to all financial institutions, the high rate of inflation makes the financial environment risky, and interest rate restrictions (whether explicit or implicit) render profitability, sustainability, and increased outreach difficult. Second, the lack of clear legislation or regulations regarding microfinance institutions or activities places their activities in legal limbo. Establishing an enabling framework should be given high priority. The 3 UNDP microfinance projects have clearly achieved the greatest success and are demonstrating the potential of best-practice microfinance in Myanmar. A top priority should be to permit these 3 projects to operate on a wider geographic scale, and to be replicated in other areas of the country. Third, some microfinance projects suffer from lack of experience and training in microfinance. As a result, despite best intentions, they follow practices that have proved unsuccessful in other contexts. All would be well advised to separate their microfinance from other activities, have experienced professional staff manage the microfinance activities, and establish the goal of long-term sustainability for the microfinance activities.

Informal Finance

13.39 Discussions with several groups of farmers and villagers in different areas of the country indicate that rural inhabitants continue to depend primarily on informal sources of finance, including moneylenders, traders, input suppliers, and middlemen. Informal interest rates range from 5 to 20% per month, with most borrowers reporting rates over 10%. The vast majority of villagers surveyed (whether they were farmers or landless) borrowed extensively from informal sources. Typical debts ranged from MYK 50,000 to MYK 200,000. This compared with MADB loans of MYK 10,000 to MYK 20,000; or microfinance project loans of MYK 20,000 to MYK 50,000. It can be expected that the 80% of rural households that do not have access to MADB or microfinance project loans are even more reliant on informal credit sources.

13.40 Transactions took a variety of forms, with noticeable differences apparent in different regions of the country. In the Delta region, most transactions were reportedly in cash. None of the farmers met reported borrowing inputs or repaying in kind. However, a fertilizer shop owner reported that middlemen supplied some villages in the area, and in a randomly chosen village, villagers reported that 50 to 80% of farmers received their fertilizer on credit from a middleman, but repayment was always in cash. In the Dry Zone, borrowing in kind was common, with estimates that about one third of farmers borrowed fertilizer at an interest rate equivalent to 80% per year. Repayment in kind with harvested crops was common, as was repayment in cash. It was also common for farmers to sell standing crops (especially about a month before the harvest, when households are most desperate for money). The value received varied from 50 to 75% of the value of crops at harvest (though the steep implicit interest rate was reduced somewhat by the lender paying the harvesting costs). In Southern Shan State, the average informal debt was larger than in the Delta or Dry Zone, primarily because of the higher production costs (and higher profitability) of the crops grown. Typical debt exceeded MYK 100,000. Similarly, credit transactions were most developed and complex there. Most villagers in the area depended on traders and input suppliers in the market town of Aung Ban for their credit transactions. The vast majority of

villagers reported borrowing in kind (especially fertilizer, but also seeds and pesticide) and repaying in kind with crops. Credit transactions often involved triangular arrangements among farmer, trader, and input supplier. For example, a farmer could ask a trader to purchase inputs from a supplier, in which case the farmer would repay the trader in kind (with a steep discount in the price of the crops delivered). Similarly, a farmer who was in debt to an input supplier could sell crops at a discount to a trader, in exchange for which the trader would liquidate the debt with the input supplier. In some cases, where a trader was also an input supplier, the farmer would borrow inputs in kind and repay in crops. Reports indicated that some 80 to 90% of transactions were in kind. In all 3 areas, farmers and other villagers expressed a strong demand for institutional credit at commercial interest rates (defined as 36 to 48% per year).

C. LESSONS TO BE LEARNED FROM INTERNATIONAL EXPERIENCE

13.41 Myanmar's fiscal deficits in recent years have been substantial, and are manifested through high inflation and the depreciation of the currency. Inflation can be directly linked to the fiscal deficits, which are financed by borrowing from CBM. **Macroeconomic stability and low inflation are prerequisites to the functioning of the financial sector, of which rural and microfinance are an integral part.**

13.42 Beyond the need for macroeconomic stability, Myanmar's rural finance system will benefit from reforms based on its own experience, as well as international experience. The highest priority must be to end the policies of financial repression currently followed, including interest rate controls and directed lending. These policies produced counterproductive results in other countries, and are yielding similar results in Myanmar.

13.43 International experience has shown that (i) agricultural credit programmes primarily serve large farmers, (ii) substantial amounts of such credit are diverted to other uses, (iii) alternative funding sources, including savings, are crowded out, (iv) the programmes fail to support sustained use of new technologies because low profits in the credit programmes prevented financial institutions from providing sustained access to resources, and (v) the programmes fail to meet the total financial needs of farm households, including non-farm income-generating activities. In short, directed credit programmes have led to low efficiency, high operational costs, low loan recovery and non-availability of financial services, as well as misallocation of financial resources. These programmes have undermined the development of financial systems that might otherwise have developed to provide sustained services.

13.44 International consensus now is to focus on developing "rural finance" rather than agricultural credit. Rural finance systems are characterized by real positive interest rates, demand-driven loans, and efficient and viable financial institutions. The new financial system development approach is focused on (i) creating the necessary infrastructure for the provision of effective financial intermediation services (e.g., laws, regulations, supervision); (ii) increased outreach, sustainability, and performance through market-based provision of services; and (iii) ways to overcome the problems of high transactions costs and risks associated with rural lending.

13.45 An important objective of the new financial market approach is to eliminate subsidies in rural finance, especially those related to low lending rates. Market forces are relied upon to mobilize funds from savers and force financial intermediaries to improve their loan allocation and repayment. Subsidies should be temporary and transparent and not linked to lending activities but

rather to institution building. To help reduce transaction costs, training for bank staff in new lending practices or for banking operations and automation may be subsidized. By contrast, loans should not be subsidized. Since no favours in the form of subsidized loans are being delivered, bank officers are less susceptible to corruption.

13.46 Governments have a crucial role to play in fostering the development of a viable rural finance system. The financial systems approach recognizes that agricultural credit operations and other financial services for small farmers and rural small entrepreneurs cannot function in isolation, but depend on a healthy environment for financial institutions, including favourable macroeconomic, agricultural sector, private sector, and financial sector policies. A crucial issue is the profitability of farming. Provision of essential rural infrastructure and support services such as roads, markets, agricultural research, and extension are crucial to making farming more profitable. Favourable agricultural policies create an environment in which private financial institutions are willing to service farmers.

13.47 Governments must also establish an appropriate financial system development policy, which supports effective financial intermediation, reduces financial transaction costs, facilitates the use of appropriate loan collateral, and develops a proper regulatory and supervisory framework for the different types of financial institutions. Policies should facilitate the experimentation and adoption of new financial technologies and development of attractive financial products. Governments also have an important role in improving information and providing incentives to improve the performance of financial intermediaries. Financial institutions should have updated and accurate information systems in place that are readily available to management, bank supervisors, and policy makers.

13.48 However, governments should not: (i) direct credit to targeted users and purposes, (ii) set interest rates, (iii) forgive loans, (iv) intervene in the business and personnel policies of financial institutions, or (v) unduly limit the operational autonomy and management of financial intermediaries, including state-owned banks. These are inconsistent with allowing free markets to allocate resources. Government interventions in rural finance should be guided by the objective of complementing or facilitating the workings of the market.

Recommendations for Expanding Agriculture and Rural Finance in Myanmar

13.49 The Myanmar Agricultural Development Bank plays a significant, although limited, role in rural and agricultural finance. In order it to increase its role in the future, it is recommended that:

- MADB develops a strategy for, and begins the process of, transforming into a self-sustaining market-oriented financial institution.
- Management and staff banking skills are upgraded.
- The lending portfolio is diversified, and MADB is permitted to enter into a wider range of financing in the rural sector, including livestock, processing and non-farm income generating activities. In the longer term MADB should assume full management and lending autonomy and determine its own portfolio mix, even beyond the rural sector.

- MADB is audited according to international accounting standards to gain a true picture of its financial position and its costs to the Government budget. This will enable Government policy makers to make informed decisions about MADB.

13.50 To further increase the provision of rural finance and allow it to catalyze growth in the rural economy, it is recommended that:

- The prohibition on lending by other banks to the agriculture sector is eliminated;
- Agricultural land is accepted as collateral;
- Existing best-practice microfinance projects are allowed to expand;
- All microfinance projects emphasize long-term sustainability as a goal; and
- A diversity of sustainable, market-oriented, competitive rural financial institutions is fostered through enabling regulations.

13.51 It should be stressed, however, that the above actions will have only limited impact without attention to the overall macroeconomic and policy environment within which rural financial services must operate. The following are considered to be basic conditions that must be met if the full potential of the rural financial services sub-sector is to be realized.

- Macroeconomic stability and low inflation are primary objectives;
- Interest rate subsidies and caps are eliminated;
- Subsidies are channelled through means other than the interest rate (e.g. through training, technical assistance, seed capital);
- The Government phases out all directed credit;
- CBM is granted increased autonomy as bank supervisor, regulator, and lender of last resort; and
- CBM's capacity in regulation and supervision is enhanced.

13.52 Implementation of these recommendations would require a strategic, phased approach. For example, interest rate caps could gradually be eased at the same time that inflation is being reduced. Similarly, directed lending could be phased out in conjunction with sequenced financial sector liberalization. While it is recommended that the prohibition on lending by other banks to the agriculture sector be eliminated, the recent banking crisis underlines the need to strengthen CBM's autonomy and capacity to supervise the banks before they are allowed to undertake their own microfinance activities. Microfinance regulations should facilitate the establishment of more MFIs rather than impose new burdens on MFIs. Implementing many of the recommendations above would benefit from technical assistance from international donors. However, several actions and policy improvements could be implemented in the short term without donor support.

14. SUMMARY AND CONCLUSIONS

A. THE CURRENT STATUS AND PERFORMANCE OF THE AGRICULTURAL SECTOR

14.1 The agricultural sector in Myanmar has the potential to be the engine for rapid and sustained national economic growth, poverty reduction, and the generation of surpluses for investment in infrastructure and industrialization. Nevertheless, despite a number of important changes made in this period, and an official 10% per annum growth rate in agriculture in recent years, the overall performance of the agricultural sector has been disappointing.

14.2 There are areas where significant progress has occurred, particularly in those sub-sectors where producers and other participants have experienced the benefits of almost complete liberalization, or where large public investments have been made, such as in irrigation systems. Too often, however, the agricultural sector has been characterised by low productivity, slow rates of growth, inefficient use of resources, and a failure to generate increasing standards of living for the rural population.

14.3 With the exception of the pulses, crop yields are generally substantially below the average for developing countries in South East Asia (see Table 2), while livestock production is still largely traditional and low intensity, with recent signs of a cut back even in the limited peri-urban commercial operations that do exist. Fisheries have seen strong growth in off-shore marine capture, but are now probably exceeding maximum sustainable yields. The development of inland and aquaculture fishery resources has been slow, and falls well behind the volumes being generated in other regional countries.

14.4 In the table below, those crops which have performed relatively well over the last decade are identified, together with their increases in sown area, production and yield[1]. They comprise a total of 14 crops from a list of 54 provided in official data. Several aspects are notable. Firstly, with the exception of sugarcane and long staple cotton, all high performing crops have been ones in which the State has played little or no role. Both sugarcane and cotton have achieved their increases through considerable Government production support which might not be economically justifiable. Secondly, with a few exceptions, increases in output have been driven largely by increased sown area; generally the result of a switch from other crops rather than opening up of new territory, although this latter may have occurred in more remote areas especially for the oilseeds. Yield improvements have been limited; even an overall growth of 50% over a ten year period implies only 4% improvement per annum, and most crops have not managed even that. In fact, eight of the 12 highest performing crops in Myanmar over the last decade achieved yield increases averaging less than 2% per annum.

14.5 Such relatively limited growth in productivity would perhaps not be a major concern in a country that was rapidly industrialising, but this is not the case in Myanmar. Not only is industry's contribution to GDP lower than any other country in the region, but it is declining. Economic growth has been achieved in such areas as garment production, mining, power,

[1] All crops listed in official statistics which show a growth in area or production of 200% or more from 1990/91-2000/01, are included.

construction and services, but with agriculture still accounting for nearly two thirds of employment, and more than three quarters of the population still living in rural areas, agricultural growth will be vital to the future development of the country for decades to come.

Crops Exhibiting Major Increases in Sown Area or Production, 1990/91-2000/01

Crop	Change in Area	Change in Production	Change in Yield
Oilseeds			
Sunflower	217%	186%	-18%
Niger	182%	330%	47%
Mustard	212%	269%	12%
Pulses			
Black gram	323%	430%	18%
Green gram	537%	726%	27%
Cow pea [a/]	239%	381%	41%
Pigeon pea	411%	656%	45%
Rice bean	207%	332%	18%
Duffin bean	280%	292%	3%
Lentil bean	233%	600%	110%
Soybean	248%	327%	18%
Other			
Onion	154%	242%	34%
Sugarcane	191%	200%	1%
Long staple cotton	657%	595%	-15%

Source: Table 1.
[a/] Combined average of bocate and pelun, both listed as cow pea.

14.6 Newly released household and expenditure data from 2001 (before recent renewed restrictions on access to international markets were imposed by other countries) confirms that rural populations are poor and getting poorer. Per capita expenditures, which increased in the first half of the 1990s, appear to have declined over the four years to 2001, and now stand at less than US 30¢ per day, at prevailing market exchange rates. The proportion of total household budgets expended on food has increased marginally, to almost 73% and there are indications (including from the 1997 survey) that expenditure is only partly being met by income, suggesting decapitalization or increased indebtedness among rural populations. This decapitalization is corroborated by the results of the rural social study conducted as part of this review which suggests that the proportion of landless has increased substantially in recent years and is now in the range of 30% of the rural population.

14.7 Yet Myanmar also possesses enormous potential in the agricultural sector. Not only is it estimated that no more than 60% of cultivatable land is in use, but there are huge water resources, some of which – because of their artesian formation – may even have the potential for extraction without pumping. The four main river basins alone carry six times more water than is currently extracted, and there are major groundwater reserves available which are currently largely untouched. The wide range of agro-ecological and climatic zones offers the possibility of a great diversity in production, and the huge markets of bordering countries such as China and India offer a strong potential for export growth. Finally, a long-standing tradition of community collaboration in rural areas provides important opportunities for community-based development.

14.8 The example of the pulses and oilseeds, which collectively have expanded their sown area threefold, and their production fourfold, in ten years shows how it is possible to achieve growth which is pro-poor, utilizes scarce resources (especially water) efficiently and earns significant amounts of foreign exchange.

14.9 The remainder of this final section looks at where these possibilities for growth may lie, and what constraints currently exist to their realization.

B. MAJOR SUB-SECTORAL POTENTIALS FOR SECTOR DEVELOPMENT

14.10 Important opportunities for gains in productivity within the agricultural sector in Myanmar have been identified in the individual sub-sector studies. In the table below these are summarised for the four productive sectors of crop production, livestock production, fisheries and agro-industry. Recommendations for actions related to agricultural research and extension, water and irrigation, marketing and rural finance, are dealt with under the constraints section, as these are essentially service areas which will contribute to the realization of productive potentials. Strategies for building upon these opportunities, and ameliorating or eliminating related constraints, as well as specific investment proposals to achieve these objectives, are the subject of Volume 2 of this study.

Major Development Potentials for Production Areas in the Agricultural Sector

Crop Production	Livestock Production
Intensification of production Utilization of cultivable waste land Diversification of cropping patterns Horticulture, oilseeds and tree crops	Income generation for poor Expansion of milk supply Export of pork, poultry, eggs
Fisheries	**Agro-industry**
Small-scale village fishponds Resumption of reservoir capture fisheries Coastal cage aquaculture Shrimp cultivation	Added value to agricultural production Improved efficiency in rice milling Solvent extraction of edible oil Small-scale mechanization

14.11 While specifically pro-poor potentials have been identified only for livestock and fisheries - those relating to income generation for poor and landless populations in the case of livestock, and the expansion of small-scale village fishponds in the case of fisheries – the impact of realizing almost all of the potentials cited would be significant for poverty reduction in Myanmar, given the overwhelming predominance of small-scale farms in rural production and the impact of wage employment for the large landless population in rural areas.

14.12 Of particular importance for pro-poor development in light of the apparent high levels of landless populations in rural areas would be the development of the ‘cultivable waste land’ areas for smallholder production. In recent years, however, the policy of leasing such areas in large blocks (exceeding 2,000 ha) has in many cases led to increasing illegal tenant farming as settlers pay to farm otherwise idle land held under such lease agreements.

Crop Production

14.13 In the Crop Production Working Paper it is estimated that intensification alone could result in increased production of approximately 4 million tonnes of cereals, pulses, oilseeds and cotton, with a further 3.5 million tonnes of sugarcane. This is assuming yields that are no higher than developing country regional averages and are quite compatible with agro-ecological conditions within production zones. However, achieving these increased production levels will require considerably greater use of agricultural inputs, including particularly improved seeds and fertilizers, as well as a better understanding and application of cultivation practices appropriate to each zone. Increased labour demands are also a likely consequence of intensification of production, and could provide worthwhile levels of additional employment for rural landless populations.

14.14 Expansion of agricultural area also offers a major potential, although one which can only be realized in the medium to long term. Assuming average yields across a range of crops of little more than 1,000 kg/ha, bringing into cultivation only 20% of the currently unutilised cultivatable waste land could add a further 1.4 million tonnes to national production, even at current yields. The employment creation derived from an expansion of almost 1.5 million ha would be substantial. Per hectare labour inputs vary widely according to crop, but even for relatively low labour input crops such as oilseeds, from 125-250 person days per hectare would be necessary. This would equate to perhaps 600,000 to 1.2 million person years of additional labour requirement and could contribute importantly to the reduction of landless populations.

14.15 The impact of crop diversification would be particularly important for poverty reduction, as the primary outcome would be increased on-farm income and employment rather than expanded total output. It would be expected to be particularly significant in irrigated areas, where the substitution of some areas of paddy by crops with lower water requirements, or requiring only supplemental irrigation, could enable a substantial increase in irrigated areas, and hence income and labour usage (particularly if high intensity crops such as vegetables are adopted), without expanding water delivery capacity. Diversification in the hill areas by substitution of paddy with more environmentally appropriate crops would also enhance the sustainability of agricultural production.

14.16 **Although some specific crop potentials are mentioned – such as horticultural crops, oilseeds, and some tree crops – it is strongly recommended that these crops do not replace rice, cotton and maize as targets for Government support.** Under a liberalised production and marketing system, farmers will respond to the best opportunities of their own accord, shifting sown area and input intensity to meet market demand. If research and extension services are made responsive to user needs, these too will increase efforts in those crops where there is greatest farmer demand. Government should instead focus its efforts on creating an appropriate enabling environment which will support farmers and other market participants no matter what crops or commodities are involved.

Livestock

14.17 For livestock, the pro-poor impact of increased small-scale animal husbandry could be significant. Experience from a number of other countries, both regionally and beyond, indicate that the production of poultry, pigs and small ruminants can be a major contributor to household

incomes in landless families or those with marginal holdings. Data gathered under the marketing study[1] suggests that the production of local chickens can be a highly profitable activity, yielding a cost/benefit ratio of 2.6 (net returns of MYK 2.6 for every MYK 1 expended), largely because production costs are low. The low costs of traditional production systems makes small livestock an affordable activity for poor households. Among the crops, only the highly input intensive culinary crops such as onion and garlic provide a greater cost/benefit ratio.

14.18 While these activities can already be found in Myanmar, there exists a potential for a major expansion if serious constraints in financing and disease control can be dealt with. Poor rural populations would also benefit substantially from the development of cooperative milk collection schemes, as are operated in India and Bangladesh. Covering literally hundreds of thousands of families, these schemes provide a daily income to very poor families and can significantly increase national milk and dairy products supply. Such activities in the livestock sector would also be nutritionally beneficial.

14.19 Export of livestock products, particularly pork, poultry and eggs, is also a potentially attractive option, but one probably suited to medium-scale or large producers. Nevertheless, the foreign exchange earnings and income generation from a successful export programme could be of importance.

Fisheries

14.20 The fisheries sector offers several important unrealised potentials. Small-scale village fishponds, typically of no more than 400 m^2 per pond, could considerably increase village household incomes and quality of diet, and would be expected to cover their investment costs over a relatively short period of time. A re-opening and effective exploitation of reservoir fisheries would also be expected to benefit primarily poor families and could have a significant impact on national fish supplies, particularly for inland populations. According to the Fisheries study[2], Viet Nam obtains approximately 250,000 tonnes of fish annually from its reservoirs.

14.21 Another important contributor to rural poverty reduction would be the replacement of commercial lease-based rights to riverine and other open water fishing with local community control. Currently, villagers are frequently unable to extract fish from the rivers on which their land borders, as these rights have been purchased by others at auction. While such an approach may increase Government revenues in the short term, it can have a serious impact on food security and income for local communities as well as risking the sustainability of the fishery, given that leaseholders have an incentive to extract the maximum quantity of fish possible during their lease period. The long term costs of the commercial lease approach are therefore likely to be high.

14.22 Substantial benefits might also be derived from the development of coastal cage culture of marine fish, but here further work is required to determine appropriate levels of scale and investment costs. Semi-intensive shrimp production also offers considerable potential, if undertaken in an environmentally appropriate manner, but is probably more suited to medium and large-scale producers due to the high investment and technical skills required. It could, however, offer similar employment benefits to those arising from livestock product exports.

[1] See Working Paper 8.
[2] See Working Paper 5.

Agro-Industry

14.23 The agro industrial sector In Myanmar is largely characterised by aging machinery (dating back to the late 1800s in the case of cotton ginning), poor extraction efficiency and low capacity utilization rates. Considerable potential exists to increase value added to the agriculture sector through the replacement of existing large-scale operations with smaller, more efficient processing. A substantial growth in agricultural output would provide increased raw material and allow the rapid expansion of value-added processing activities. An example of this potential is the cotton sector where national production is able to meet only a proportion of domestic demand for cloth, largely due to insufficient supplies of seed cotton It should be stressed, however, that the continuing extensive involvement of the public sector in this area constitutes a major constraint to the development of agro industry, as it permits the continued operation of large-scale loss-making enterprises which impede more efficient enterprises and compete for raw material.

14.24 It is clear that considerable improvements can be made in the efficiency of rice milling, amounting to as much as 20% for smaller mills, and perhaps 10% for larger or more modern ones. Given national paddy harvests exceeding 20 million tonnes per annum, an average 10% increase in milling efficiency alone would yield 2 million tonnes of additional rice each year (although there would be a corresponding reduction in broken grains and other secondary products).

14.25 A further area of significant potential is in solvent extraction within oilseed milling. Currently, the approximately 1.4 million tonnes of groundnut, sesame and sunflower produced annually in Myanmar are milled entirely mechanically, leaving oilcake which is relatively high in residual oil. The use of solvent extraction technology on the resulting oilcake could increase national supplies by 5-10%, yielding MYK 15 billion or more per annum and allow higher farm-gate prices for oilseeds. The development of solvent extraction capacity in Myanmar would have the added advantage of providing a processing capacity for soybean, which is unsuited to expeller extraction. With production of soybean in 2001/02 reaching almost 120,000 tonnes, and considerable agronomic potential for the introduction of soybean into delta crop rotations, the processing of soybean could contribute to crop diversification, as well as contributing to a reduction in the national edible oil deficit.

14.26 The further development of small-scale mechanization, including particularly two-wheeled tractors, but also simple seed drills, water pumps and similar devices could assist in ensuring timely agricultural operations and contribute to higher yields and greater cropping intensity. Small-scale mechanization could also facilitate greater utilization of currently idle land. However, it should be noted that the principal beneficiaries of any effort to expand small-scale mechanization would be those producers with more land than can be adequately handled with family labour. These will not generally include the more than 50% of producers on less than 2 ha. Any programme to support mechanization would also have to be carefully assessed for its impact on farm wage labour; a key source of income for rural landless populations.

14.27 The potential for employment creation within an expanded agro-industrial sector is substantial. The creation of a national solvent extraction capacity alone, for example, is projected to generate some 3,000 jobs, including suppliers and related areas, although no estimates are available for the sub-sector as a whole. Much of this employment would likely be generated in rural towns, providing additional income-earning opportunities to rural residents.

C. KEY TECHNICAL CONSTRAINTS TO THE REALIZATION OF DEVELOPMENT POTENTIALS

14.28 A number of the constraints to realization of sector potentials are of a primarily technical nature, and these are presented below. The dividing line between technical and policy can often be difficult to define clearly, and some of these constraints will reappear again as policy issues. It should also be stressed that, in the opinion of the experts participating in these studies, the most important constraints to sector growth and development are those related to policy. However, this is not to say that technical constraints are not significant and listed below are such constraints that require technical solutions; whether through investment, institutional restructuring or increased knowledge.

Major Technical Constraints to Development of the Agricultural Sector

Crop Production	Livestock	Fisheries
Seed quality and access Limited technical knowledge of variation in crop requirements Limited information on wasteland potentials Access to financing	Inadequate funding for LBVD Financing for livestock purchase Poorly performing and targeted AI system Disease monitoring & control	Inadequate funding for DOF Access to financing and TA for small-scale aquaculture Inadequate supervision and extension capacity No knowledge of cage aquaculture
Agro-industry	**Water & Irrigation**	**Agricultural Research**
Inadequate rural electrification Financing for investment	Inefficient water use Poor water management Limited attention to small-scale potentials Insufficient budget for proposed expansion	Lack of local participation and input to programme design Insufficient investment in MAS and YAU Poor mobility and motivation of field staff Ineffective sectoral coordination and research/extension linkage
Rural Finance		
Capital available for lending Effectiveness of MADB operations Limited outreach of microfinance organisations	**Marketing**	**Sectoral**
	Wholesale facilities Standards and quality control	Human resource development

Crop Production

14.29 Two of the major technical constraints applicable to crop production relate to inadequate knowledge and information. In the one case, little is known about the differing needs of crops according to variations in location and cost/price ratios. Extension recommendations – and the research on which they are based - tend to be absolute; that is they do not in general take into account differing agro-climatic conditions or the fact that the optimum level of input usage will vary according to the costs and prices faced by the farmer. Hence, recommendations are valid only in very specific circumstances and do not match the reality faced by most producers. As a result they are frequently ignored and farmers continue to utilise traditional practices.

14.30 In the second case, the lack of knowledge concerns the specific potentials of the more than seven million hectares of cultivatable waste land in Myanmar. Although this land offers an enormous potential for sector growth, it is important to understand the productive, environmental

and even social characteristics of these areas before undertaking major efforts to promote expansion. This will require detailed studies of large areas of the country.

14.31 Seed quality and access is a major constraint facing crop production in Myanmar today, although there are serious concerns as to the extent to which farmers will adopt improved seeds unless other conditions are met, including knowledge of required cultivation practices (see above), access to financing (see below), and liberalized markets for their products. Although considerable seed research is undertaken in Myanmar, it is clear that the mechanisms for seed multiplication and distribution are not effective. The lack of an effective seed programme in Myanmar can be attributed to a number of factors including: (i) a lack of clarity as to responsibility (with a number of agencies involved); (ii) lack of operational funds; (iii) inadequate land and facilities available for foundation and breeder seed multiplication under appropriate agro-ecological conditions; (iv) and the lack of participation of private multipliers for certified seed.

14.32 Financing is a common constraint across almost all sub-sectors, and will be discussed in more detail under the constraints related to the rural financial sub-sector. For crop production, financing is of relevance not only for the purchase of inputs, but also for investments that would contribute to improved productivity such as bore-holes and draught animals or machinery.

Livestock

14.33 Although MOAI faces a number of financial constraints, particularly with respect to the operations of MAS, it is well funded in comparison with MLBF, which in 1999/00 received just over 1% of the capital budget and 6% of the current budget of MOAI. As a result, both livestock and fisheries face serious constraints to all activities mandated to MLBF, including disease monitoring and control, vaccination, artificial insemination, and livestock extension.

14.34 The inadequate functioning of the animal health system is an important constraint to a number of the growth potentials described above. Attempts to promote livestock ownership among poor and disadvantaged groups will be put at risk if animal mortality at village level remains high. Poor disease control will also affect dairy expansion and animal exports, the latter particularly for notifiable diseases such as foot and mouth. In part the answer lies with increased budgets, but there is also the need to rationalize the role and operations of LBVD extension staff, and encourage a greater role in animal health by farmer groups.

14.35 The same can be said for the poor performance of the LBVD artificial insemination programme. Here, a shortage of funds, combined with a lack of priority setting and a poorly equipped field force with little mobility and conflicting demands for their time, has resulted in an almost total lack of effectiveness of AI in Myanmar. While initial customers for improved AI services are likely to be the larger commercial herd operators around Yangon and Mandalay, it is believed that AI could play an important role in providing genetically improved animals to poor families under income generation programmes.

14.36 Finally, despite the existence of a Livestock and Fisheries Development Bank (LFDB) there is an almost total absence of financing for small-scale livestock related operations

and investments[1] and this is believed to be a factor in the limited development of 'backyard' dairy operations of the type seen in Bangladesh and India. Not only are producers affected; lack of access to financing has also been identified as a major constraint to the establishment of small-scale dairy processing enterprises.

Fisheries

14.37 The situation in fisheries is in many ways analogous to that in livestock. A shortage of funds allocation to the DOF severely limits the ability of the Government to effectively pursue a wide range of activities, including: (i) enforcing of laws and regulations such as the ban on prohibited fishing gear; (ii) revenue and statistical data collection; (iii) marine fisheries management; (iv) fisheries development, and (v) small-scale aquaculture support. Under these conditions the DOF is unable to maintain any extension service at all, and is completely unequipped to supervise and support the expanded exploitation of aquaculture and inland fisheries opportunities.

14.38 While other regional countries are able to extract substantial quantities of fish from their reservoir systems each year, this is not the case in Myanmar. In part, this is policy related (see below), but the lack of a capacity to supervise reservoir fishery precludes DOF from managing such a fishery or of collecting the licensing revenues that this source might bring. Expanded shrimp cultivation could yield significant economic returns but has the potential for extensive environmental and social impact if not adequately planned or managed. This planning and management capacity is also largely lacking.

14.39 Financial and personnel constraints have led to an inability to undertake applied research into promising new approaches to fishery such as coastal cage culture. Developed with considerable success in other S.E. Asian countries, this technology is largely unexplored in Myanmar.

14.40 Finally, the almost universal problems related to financing – particularly of small-scale aquaculture operations – are as serious in the fisheries sub-sector as in others. While the MLFB has made some loans for fish farming, the total portfolio was only MYK 481 million (US$50,000) in 2002. With only 195 borrowers, average loan size would be in excess of MYK 3 million (approximately US$3,250), a considerable amount by Myanmar standards, and suggesting that these borrowers were not among the poorest rural inhabitants.

Agro-Industry

14.41 Most of the constraints facing the agro-industrial sub-sector are policy related. Nevertheless, two clear technical constraints can be identified. The first is rural electrification. Access to electricity, especially the significant amounts required by mills and processing plants, is the biggest single complaint voiced by agro-industrialists interviewed in the course of the study. The cost of any new private facility almost inevitably includes provision for an electricity sub-station (an item provided in other countries by the grid) and even this may not be sufficient to

[1] LFDB has recently financed two small loans programmes for livestock purchase, but these do not form part of on-going small-holder livestock lending.

avoid lengthy periods of blackout, as demand exceeds supply on many local grids. In more remote areas there may be no electricity supply at all.

14.42 The second issue is the availability of financing for agro-industrial activities. Agro-industries not only require capital for construction of processing facilities, they also tend to have large demands for working capital to finance their inherently seasonal activities. The lack of participation by most mills in Myanmar in the financing of production may well arise, at least in part, from their own difficulties in obtaining financing. Normally a business of this type can borrow at rates cheaper than the farmer can, and can not only ensure supplies but also create arbitrage profits by channelling such funds to their suppliers at a higher interest rate.

Water and Irrigation

14.43 Although Myanmar is not in general an arid country, there is a deficit of precipitation in many parts of the country during some months of the year. In the central dry zone, this deficit period is lengthy and often includes an interval during the Monsoon itself. A lack of adequate water supply is thus one of the most important limiting factors on crop production in Myanmar during major portions of the year. Considerable resources and effort have been expended to reduce this constraint in recent years and the total irrigated area has doubled over the period 1992-2002. Nevertheless, water supply and irrigation remain constraining factors in the agricultural sector.

14.44 Perhaps the most important technical constraint to water use and irrigation relates to the inefficient utilisation of available supplies. As most areas under irrigation are required to grow paddy twice a year, there is a very heavy water demand per hectare. This demand limits the area covered for any given supply of water. Calculations presented in the Irrigation and Water Resource Management study[1] suggest that it is possible to double the gross margin per unit of water supplied through the selection of optimum cropping patterns. In addition, data suggests that the water is often inefficiently transported and applied, resulting in an irrigation efficiency of as low as 21-34%.

14.45 Energy costs are often a significant factor in water extraction and delivery. The apparent availability of an artesian water source underlying much of the delta zone is thus of considerable importance and the lack of work in developing this potential resource has constrained water delivery within the area.

14.46 There has also been only very limited attention to small-scale water extraction, using such technologies as village or group boreholes and low lift river pumps that have been widely developed in other regional countries. The low cost of these approaches and the tendency of farmers to utilise such sources primarily for supplemental irrigation – thus ensuring a high gross margin per unit of water applied – would render such technologies attractive not only from the perspective of poverty reduction but also efficiency of water use.

14.47 Management of irrigation operations has traditionally been a State responsibility, under the control of the Irrigation Department. This has led to considerable inefficiency in operations, as decisions tend to be taken on a top-down basis, with relatively little reference to

[1] See Working Paper 4.

local needs and requirements. Nor is this approach likely to ensure the active support of the beneficiary farmers in the maintenance of infrastructure and equipment. The existing style of water management comprises a serious constraint to maximisation of water use efficiency.

Agricultural Research, Extension and Education

14.48 As is the case for irrigation, agricultural research, extension and education in Myanmar tend to be largely centrally planned and managed activities. A number of features of the current research and extension system constitute constraints to the development of the agricultural sector, although it is worth noting that a Department of Agricultural research has apparently now been established within MOAI to improve the coordination and integration of research activities. Nevertheless, this move is not expected to significantly impact key constraints in extension and education.

14.49 It remains to be seen whether the new Agricultural Research Department will effectively improve the manner in which agricultural research is undertaken. Almost all current research programmes are centrally planned and are often of only limited relevance to local conditions. Furthermore, they tend to focus upon maximising physical output, rather than returns. There is little local input by researchers, extension staff or farmers, to the establishment of research priorities, and research priorities are largely driven by centrally established production targets for key crops. Rice receives a predominant proportion of research funds, limiting work on diversification.

14.50 The conditions under which MAS field staff operates – whether in research or extension – are far from ideal for the effective operation of these two services. Field staff is relatively poorly trained, with better educated staff often filling central positions, and they have only very limited mobility, restricting their ability to visit field stations or farmers. This lack of mobility is exacerbated by the very low per diem payments provided to those travelling overnight or long distance.

14.51 Coordination is not only a problem in research. Neither the Department of Livestock nor the Department of Fisheries have an effective extension presence, and the separation of the MLBF from MOAI renders any collaboration through a joint extension force very difficult. As a result, farmers receive almost no information on non-crop aspects of agriculture.

14.52 With only 2.4% of total capital funds allocated to MOAI in 2002/03 (MYK 352 million, or approximately US$363,000 at prevailing market rates of exchange), MAS is critically short of resources for investment in either research or extension. The Yezin Agricultural University does not fare any better, having received less than MYK 25 million (approximately US$26,000) for capital expenditure in 2002/03.

Marketing

14.53 Although the national marketing system for agricultural products appears to function relatively efficiently, with relatively low margins for product handling, constraints do exist in a number of areas. These include the lack of adequate wholesale markets, which leads to higher than necessary post-harvest loss rates by increasing product movement and making access to proper storage and handling facilities more difficult. Of equal importance is the absence of

established grades and standards, resulting in a diversity of measures, both in different regions and for different crops, and reduced transparency in market pricing. In general, metric units are used only when products are entering export channels. Finally, the lack of quality standards and quality control mechanisms for goods that are exported, or could be exported in the future, is seen as a significant factor in the low price received by most agricultural commodities originating in Myanmar.

Rural Finance

14.54 Financial constraints appear on the priority list of almost all the other sub-sectors. As is the case for agro-industry, however, most constraints imposed by the functioning of the existing rural financial system are derived from policy decisions rather than technical limitations. In finance in particular, the distinction between what is policy and what is technical is often unclear, but several at least partially technical issues will be referred to here.

14.55 Of particular importance is the availability of capital for financial agencies operating in the rural area; primarily the MADB, but also the MLFB and to some extent the micro finance programmes. If MADB and MLFB are to have a significant impact on financing constraints affecting almost all sub-sectors of the agricultural economy, it is essential that they have access to substantially increased amounts of lending capital.

14.56 In addition to funding, the effectiveness of MADB operations in particular is constrained by organisational and institutional issues related to staff recruitment and training, management systems, and financial accountability. There is an urgent need to upgrade the institutional capacity of both MADB and MLFB in order for them to provide adequate service to rural borrowers.

14.57 The limited outreach of existing rural micro finance organisations is a further constraining factor, particularly in relation to poverty reduction among women and landless populations, who are the prime beneficiaries of their activities. Currently these organizations serve approximately 136,000 rural households in only 11 townships in Myanmar. Given that these institutions are currently almost alone in providing support to these priority groups (and constitute a more important source of credit than the MADB in the townships served), this level of coverage – approximately half of the population in just over 3% of townships – is far below that needed. In part, this limited coverage is a result of policy decisions, but it also reflects limited financial resources and the availability of trained personnel and institutions capable of establishing and implementing micro finance programmes.

Human Resource Development

14.58 Although a number of issues are of relevance across a number of sub-sectors, human resource development in particular can be regarded as a truly sectoral issue. Financial constraints and the relative isolation of Myanmar in recent years have significantly reduced the number of sector professionals who have the opportunity to benefit from international training, while the shortage of funding and academic interchanges with other tertiary educational institutes has left Yezin Agricultural University inadequately prepared and equipped to replace this exposure. This shortage is particularly of concern with respect to plant and animal breeding and health, economic analysis and analytical skills. As many of those within the sector in possession of Ph.D.s and

other specialised training of an international standard are now approaching retirement age, this problem will become critical within the next 5-10 years, and may result in the absence of sufficient experts capable of planning and leading the rapid sector growth so urgently needed.

14.59 At the field level, improved and expanded training is also urgently needed for those involved in research and extension as well as field operations (animal and plant health, AI, supervision of fisheries operations etc.). Although such training does not have to be at international level, it does require that YAU and other training institutes run by different departments are adequately equipped and their curricula and training methodology thoroughly reviewed and revised where necessary.

14.60 Not all human resource constraints are related to training, however. Given the high rates of inflation in Myanmar, and the infrequency and limited level of public sector salary increases, public servants in Myanmar now operate under considerable economic difficulties. Added to this is the lack of resource to maintain mobility of staff and allow them to participate actively in field operations. Under these circumstances, a real risk exists that the public agricultural sector will experience severe difficulties in recruiting and retaining high quality staff in the future.

D. REQUIRED POLICY CHANGES FOR THE REALIZATION OF POTENTIALS

14.61 The economic liberalization process which commenced in 1989/90 has not yet been completed. Many vestiges of socialist era policies still remain and have a substantive impact on the efficiency and growth of the agricultural sector. More worryingly, despite the national objective of moving towards a more market-oriented economy, new policies have been introduced in recent years (e.g. controls on sesame and niger seed exports, compulsory procurement of pulses) which have actually increased State intervention (sometimes temporarily) and hence have added to the distortions affecting sector operations.

14.62 Eliminating policy constraints has one major advantage over eliminating technical constraints; the direct financial cost involved is usually much less. Yet the impact of distortionary or restrictive policies is often much greater that that of technical limitations. It can therefore be very cost effective to deal first with policy issues, and only attempt to enter into technical constraints where it is apparent that these continue to be problematic in an improved policy environment, and where the private sector will not deal with them independently of government financing. This latter may be the case, for example, where the constraint relates to public goods which would provide few benefits for a private investor.

Major Policy Constraints to Development of the Agricultural Sector

Crop Production	Livestock	Fisheries	Agro-Industry
Directed production Land and water rights Trade restrictions	Inadequate standards and regulations Import restrictions	Prohibition on reservoir fishing Environmental policy	Support to SEEs Price controls Trade restrictions
Water & Irrigation	**Research & Extension**	**Finance**	**Marketing**
Directed production Water pricing User management	Centralised planning Separation of extension services	Caps on interest rates Restrictions on micro-finance expansion Restriction of private sector lending to sector	Trade restrictions Price controls

14.63 Some of the policy areas that must be modified if accelerated growth is to be achieved are summarised in the table above. Many have been raised previously in this chapter, as they often have a profound effect on the existence and severity of technical constraints.

14.64 Because many of these issues are of relevance to more than one sub-sector, some of the more important are considered below from a sector-wide basis.

Directed Production

14.65 More than half of the cultivated area farmed in Myanmar is accounted for by three crops – paddy, cotton and sugarcane – that operate largely under systems of directed production. This policy of controlling the crops grown on certain types of land, particularly irrigated land, has major impacts in a number of areas. In particular, it forces farmers into the production of selected priority crops even though other alternatives may be more financially or economically attractive. The Irrigation and Water Resource Management study[1] estimates the economic cost of this policy in irrigation schemes at MYK 8-35 per m^3 of water applied. Given that irrigation was applied on almost 2 million hectares of land in 2002/03 the total cost at a national level would be substantial.

14.66 Under the major Sedawgyi scheme[2], for example, modelling has shown that the benefit from removing constraints to crop selection would be as high as MYK 175,000/ha/annum (approximately US$180/ha) as a result of an expanded irrigated area, a significantly increased cropping intensity and higher gross margins on replacement crops. While benefits were lower on other schemes, it is clear that a policy change in this area could yield substantial benefits. The Agricultural Marketing study[3] shows that summer paddy provides one of the lowest cost/benefit ratios of any major crop in Myanmar. Irrigated sesame, by contrast, achieves a ratio of costs to benefits that is more than twice as high.

14.67 While it is understandable that security of access to rice is a central concern of any Government in Myanmar, it is important to question whether that security can not be more readily delivered through a careful monitoring of projected future harvests and current stocks, combined with the purchase (where necessary) of additional rice supplies on international markets. Indeed,

1 See Working Paper 4.
2 Covering 43,000 ha.
3 See Working Paper 8.

in a liberalized market with an open trade regime, private sector traders will rapidly fulfil this function themselves, as any shortage of rice in domestic markets will create upward pressure on prices and thereby create opportunities for production.

14.68 Similar considerations apply to cotton and sugarcane. Directed production is only required if producers will not otherwise choose to grow the crop in question. This may be the case because it is inherently unattractive in comparison with alternatives crops, or it may be that constraints exist which render the crop unpopular. If other crops are simply more profitable, directed production will lower the income of small producers while benefitting state enterprises purchasing the output, and thus exacerbate rural poverty. If, however, there are significant disincentives to production, such as restricted markets or controlled prices, resolving such issues would eliminate the need for directed production.

Land and Water Rights

14.69 Although more difficult to quantify than liberalization of directed production, the issuance of land rights to all farmers could have equally large benefits in the long-term. In general, land rights - whether they be ownership, leasehold or some form of transferable usufruct – provide users with three key benefits; (i) the right in of itself confers security of tenure and provides assurance to the farmer that investment made in the land will not be lost; (ii) the cost of any capital improvements made can be recovered at the time of sale or disposal of rights to another party, and; (iii) the right of access to the land can be used as security for loans.

14.70 In Myanmar only the first of these advantages is present, at least formally, as farmers do not have the right to use land as collateral for loans, or to sell their land. Yet the ability to use land as security for loans may be key to sector development, as it would facilitate improved access to financing for both production and investment. This possibility does not currently exist in Myanmar. Over the longer term, the ability to recoup investments in such areas as small-scale irrigation and drainage through eventual sale of the improved land is also likely to prove of considerable importance.

14.71 It is should be noted that while the ability to sell and purchase land is a key right, the creation of ownership, lease holding or other guarantees would not necessarily imply a future concentration of land ownership. Legislation can limit farm sizes (as indeed they presently do), or restrict the type of purchaser.

14.72 Water rights may also become increasingly important, if successful small-scale borehole or river extraction development occurs. It will be necessary to clearly define the conditions under which individual landholders are able utilize water beneath or adjacent to their holdings. Here a balance needs to be struck between over-exploitation, as is occurring in Bangladesh, as a result of weak or absent controls, and the restriction of development, arising from time-consuming and complex approval measures.

International Trade

14.73 Despite the recent important moves in liberalizing the rice market, considerable barriers exist to open trade in agricultural commodities. The export of a number of commodities is not permitted (e.g. edible oils), and even rice exports under the newly liberalized approach will

apparently be subject to a lengthy and onerous set of procedures; including the loss of half of both the foreign exchange and the gross margin on the sale[1]. Leaving aside the issue of the exchange rate (discussed below), traders face a standard 10% export tax that is in stark contrast to the policy of import-based revenue collection favoured by most countries.

14.74 Prior to this year's rice market liberalization, the substantial steps take towards a market-based economy in the late 1980s have not generally been followed-up on, and the policy with regard to exports has in fact tended towards increased restrictions in the last few years, including the prohibition on private sesame seed exports in 1998, the ban on niger seed exports in 2001 and the temporary introduction of compulsory purchasing for some pulses in 2000.

14.75 The restriction or prohibition on exports of agricultural products may ensure increased national supplies in the short term, but by eliminating access to international markets it will lead to lower prices for producers, and increased rural poverty. In the long run, export controls will often lead to a reduction in output, as growers switch to alternative crops, or reduce input usage in order to save costs.

14.76 That the influence of trade restrictions can be substantial is clear from the example of the pulses, which increased output fourfold once the export market was liberalized in 1988. Pulses increased at least partially at the expense of oilseeds and yet, at international prices, oilseeds may constitute a more financially and economically attractive option. Recent analyses conducted by FAO indicates that the farm-gate price of sesame seed would more than double if it was freely tradable in seed and oil form on international markets[2]. Furthermore, lower prices do not only affect farmers. Increased supplies of oilseeds, for example, would also benefit processors and traders, as well as livestock and aquaculture operators who rely on oil cake as a feed constituent.

14.77 Ironically, the evidence indicates that prohibition on trade may not even benefit the consumers who are the intended beneficiaries. In the case of edible oils, approximately one third of the total national market is supplied by palm oil, imported to make up the deficit in national sesame, groundnut and sunflower oil output. Largely due to import restrictions, however, palm oil wholesales in Yangon at twice the world market price[3]. This cost would be considerably reduced under a more open trade regime.

14.78 Overall, however, it should be understood that the greatest risk arising from the control of international trade is that it impedes the productive sector from responding to market signals from the international economy. With only limited linkages to the global economy[4], little incentive exists for producers and other system participants to respond to changes in international supply and demand. Limited production resources, such as water and fertilizer, are not used in the most productive manner. Yields stagnate or decline. The agricultural sector becomes less and less able to compete with the outside world and national economic growth is severely reduced or even declines.

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1 As of January 2004, private sector exports of rice have been suspended.

2 Myanmar Oilcrops Sector Development Project Formulation Report. FAO Investment Centre, February 2004.

3 During the first half of 2003, with average Malaysian FOB palm oil prices quoted at US$421/tonnes, the wholesale price in Yangon was US$920/tonnes at prevailing market rates of exchange.

4 Even where exports do occur, they are often only permitted through State channels, which remove most surpluses, often explicitly limiting the return that private participants can earn, and capturing the benefits for the Government.

14.79 Were markets to be truly liberalised (and directed production eliminated) there is little doubt that Myanmar would see a substantial and far reaching change in cropping patterns over the next decade. The area devoted to paddy would decline, but those areas remaining would be far more productive. Farmers and exporters would rapidly respond to areas where Myanmar has a competitive advantage, as they have already done for pulses, resulting in extensive growth in the area and yields of crops such as horticulture, rubber and some oilseeds. Export earnings would rise substantially, more than compensating for increased imports of commodities for which the country has no competitive advantage (palm oil, wheat etc.), Farm incomes would rise and national growth would be accelerated.

Financial Policies

14.80 As agriculture and agro-industry are inherently seasonal in nature and frequently generate much of their income in restricted periods of the year (e.g. at harvest time), agriculture is particularly affected by the availability of financing for working capital. Capital is also needed for investment, as in other sectors. As a result, policies respecting the financial services sector are of major importance to the future development of agriculture in Myanmar, although they also affect other sectors, and lack of access to financing was one of the most common constraints to development raised across all sub-sectors studied. Chief among the constraints is the cap on interest rates, particularly those imposed on MADB and MLFB. Rates for Government lending institutions are held at 15%, and even the micro-finance institutions are restricted to approximately 40%. With inflation in Myanmar estimated to exceed 50% in late 2002, such policy restrictions have three principal effects:

- They lead to a decapitalization of the lending institution, as the interest charged is not sufficient to maintain the real value of the funds managed by the bank.

- They reduce the overall funds available, as commercial sources are obviously inaccessible when returns are lower than inflation (even before taking into account transaction costs).

- They force those needing capital to obtain it through informal sources charging much higher rates of interest. Money lenders and pawn shops frequently charge rates as high as 10% per month.

14.81 Other policy restrictions that are impacting the agricultural sector include the restriction on the expansion of the few existing micro-finance institutions, and the official discouragement of private banks from lending in the agricultural sector.

State Economic Enterprises

14.82 The influence of State Economic Enterprises on the agricultural sector is substantial, particularly for agro-industry and for those crops in which they play a major role, such as cotton and sugarcane. Much of this impact is derived from policies which support these agencies while imposing restrictions on their activities. Most SEEs operate under price controls, which affect not only the price they pay for raw materials, but also the price they receive for their output.

14.83 When SEEs are constrained to purchase raw materials at prices below those being paid in the open market, they experience difficulties in accessing sufficient quantities of inputs. In some SEEs processing cotton, for example, utilization rates are as low as 4%[1]. This introduces huge inefficiencies into their operations and frequently leads to compulsory procurement and other coercive measures to obtain supplies. This in turn depresses the prices received by farmers, reducing their incomes and removing incentives for productivity growth.

14.84 Shortages of raw materials often combined with low output prices (generally the case where the SEE is supplying a public sector buyer) results in major cash losses. In the year 1999/00, the latest for which such figures are available, agricultural SEEs alone accumulated cash losses of MYK 17.7 billion (approximately US$52 million at prevailing market rates of exchange). Not only does this level of losses distort the market by permitting SEEs to compete for supplies with more efficient, but unsubsidised, private sector operators, but it also diverts Government resources from other purposes. The losses in 1999/00 were equal to the total budgets of the Ministries of Agriculture, Livestock and Fisheries and Forestry combined.

Integrated Extension Services

14.85 The current organization of extension services in Myanmar is sub-optimal in a number of ways. Due to the structure of the line Ministries concerned, agriculture is separated from livestock and fisheries and each Department (MAS, LBVD and Fisheries) thus must maintain and equip their own extension staff. Although MAS has a considerable number of extension workers, those for LBVD are restricted almost entirely to animal health, and Fisheries has no extension staff at all. Equally importantly, this separation fails to reflect the reality that the farm household and its land comprise a single entity. Decisions on crops may depend on livestock or fisheries activities, and all may be influenced by off-farm employment. There is no doubt, for example, that the type and status of draught animals owned by a farm household is of critical importance in determining cropping options, but no account is taken of this in crop-based extension messages.

14.86 Even within the crop production area covered exclusively by MAS, messages are almost always restricted to a single crop, which is treated independently of other components of the overall rotation pattern on that farm. Only a single researcher at Yezin was found to be looking at overall farming systems aspects, and no work in this area appears to have reached extension staff.

14.87 The absence of a national policy promoting a single integrated extension service focusing on overall farm production issues (and even non-farm activities) is a serious policy constraint to improved extension performance and increased agricultural productivity.

E. THE RELEVANCE OF THE BROADER ECONOMIC AND POLICY ENVIRONMENT

14.88 It is not the purpose of this review to examine in detail the impacts on the agriculture sector of wider macro-economic policies applied in Myanmar. Nevertheless, it is important to

[1] See Working Paper 6.

realise that a number of these do have a direct relevance to the sector. Among the most important of these can be mentioned the following:

- The maintenance of controlled and multiple exchange rates which effectively reduce export earnings and render it difficult to maintain transparency. As many as eight separate exchange rates can be identified, ranging from the non-essential import rate of exchange (MYK 1,150/US$ in July 2003), through the essential import rate, the transfer rate, the U.S. dollar cash rate, the FEC rate, the UN rate, and the Government fixed rate for import duties, to the official exchange rate of MYK 6.90/US$.

- The high rates of national inflation, which reduce the real income of rural populations subject to costs that increase more rapidly than earnings.

- Poor regulation of the banking and finance sector, resulting in limited lending, institutional failures and high operating costs.

- Poor terms of service for Government staff, reducing both the capacity and the incentives for effective delivery of public goods across all levels of Government.

- The general role of Government in relation to economic production. In most open-market economies, the role of the Government is seen as focusing on two essential roles: (a) the establishment and enforcement of norms, standards and procedures necessary for the efficient and equitable functioning of the economy, and; (b) the provision of public goods, that is those for which the private sector can not readily realise a return on their investment. Public goods not only include infrastructure such as roads, but also items such as agricultural research, defence and security, information and basic social services.

14.89 It is not expected that the development of the agricultural sector will, on its own, provide the justification for changes in these factors. However, given the important role of agriculture in the national economy, it is likely that this sector would be one of the major beneficiaries of improvements.

F. CONCLUSIONS AND RECOMMENDATIONS

14.90 The Government of Myanmar has made it clear that it recognises the crucial importance of a dynamic, liberalised agricultural sector to the country, describing it as the ‘base’ for national economic growth and calling for the evolution of a ‘market-oriented economic system’ as a key economic objective, while the first policy declaration of the MOAI is ‘to allow freedom of choice in agricultural production’. Yet more than a decade after the commencement of the transition from the previous Socialist regime, many aspects of the agricultural and rural economy remain substantially under Government control or influence, including the choice of crops to be planted, priorities for agricultural research and extension, access to inputs, processing and international trade.

14.91 The enormous potentials inherent in the agricultural and rural economy of Myanmar outlined in this document will continue to go unrealised unless the liberalisation process started in the late 1980s is encouraged to fully evolve. Although moves such as the liberalisation of rice marketing in 2003 should be welcomed, their impact is often reduced by a subsequent tightening of state controls – as indeed has been the case with the reintroduction of the prohibition on private sector exports of rice just a few months later. This study has identified a number of important technical issues that need to be addressed in order to facilitate the growth of the sector[1], however, it must be understood that the impact of investment in the rural sector will be greatly lessened in the absence of continued liberalisation measures.

14.92 The three policy areas which are exerting the greatest influence on sector development at this time are those relating to rural financial services, international trade and directed production. The liberalisation of rural finances is critical because state-controlled structures (e.g. MADB) are currently unable to provide farmers and other rural entrepreneurs with access to the financing they need to increase productivity. This lack of financing reduces the use of inputs, limits the adoption of new technologies, constrains the development of unutilised land and encourages low cost/low output production. Furthermore, by forcing rural populations to use much higher cost credit from informal sources it is, without doubt, a major factor in increasing rural indebtedness and poverty. Limitations on access to international markets are almost equally important, as they prevent the sector from identifying, and responding to, those opportunities which will provide the greatest returns, both for their families and for the country as a whole. The result has been to distort production patterns towards perceived national priorities, at the expense of economic growth. Finally, the continued use of directed production for perceived strategic crops limits the ability of the agricultural sector to seek out and adopt the most productive and profitable activities, effectively preventing its evolution in a rapidly changing world.

14.93 The temptation to solve economic problems through direct intervention is an age old one, and it is not surprising that the Government sees intervention as an effective instrument for achieving short-term goals, such as maintaining low consumer prices, guaranteeing supplies, or reducing expenditure of scarce foreign currency – even when this is in conflict with its own broader national policies. Nevertheless, action in one area has inevitable consequences elsewhere, many of which may not be anticipated. As many countries have discovered, one intervention often requires another intervention to resolve an unintended side-effect. Consequently, such intervention should be used very sparingly, if at all, and alternative approaches, which do not conflict with basic national policies should be sought instead.

14.94 With ASEAN integration now a likely prospect in the medium term, growing pressures from international globalisation, and strong indications of increasing poverty in rural areas, a continuation of the partial liberalization regime effectively in place at the moment will prove difficult to maintain and is likely to further constrain economic growth and development. Myanmar may ultimately have to choose between broad choices: To return to the socialist model of the 1970s and 1980s, and in so doing effectively disconnect the country from the international and regional economic system; or to push forward with existing national policies of economic liberalisation and realize the great potential of Myanmar as an agricultural producer and exporter. While the second choice will bring with it many challenges, few doubt that the agricultural sector in Myanmar can be a competitive force in the world economy, and the growth that such

[1] See Volume 2.

competitiveness would bring could both reduce rural poverty and catalyse the development of the rest of the economy.

14.95 Finally, it is worth noting that experience across a broad spectrum of developing countries has shown that food security is most prevalent when national policies influencing the productive sectors of the economy have a marked pro-poor orientation. In a predominantly rural economy such as that of Myanmar, agricultural growth provides the most opportunities for pro-poor development, as long as the poor are central to the process. This requires not only access to appropriate technical, financial and physical resources for production, as well as associated services such as health, sanitation, water supply and education, but also an economic and policy environment which enables rural households to respond to market demand and benefit from their contribution to national growth.