

Myanmar – Japan Cooperation Programme for Structural Adjustment of the Myanmar Economy

Agriculture and Rural Economy Working Group

March 2003

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**The Government of
The Union of Myanmar**

**Japan International
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Foreword

This study was conducted within the framework of the technical cooperation programme of the Government of Japan, in response to the request from the Government of the Union of Myanmar.

The study was carried out as a joint research by taskforce teams, consisted of professionals from both Japan and Myanmar, and assisted by consultant teams from leading institutes in both countries.

The taskforce and consultant teams held a series of discussions, and conducted several field surveys. This report was prepared jointly by Japanese and Myanmar taskforce teams based on a mutual understanding.

I hope that the useful suggestions presented in this report will contribute to the formulation of policies for sustainable development of Myanmar, and it would be my great pleasure if the report would be used practically by organisations, officials and experts concerned.

I wish to express my sincere appreciation to the officials in the Government of the Union of Myanmar and to other relevant organisation and people concerned for their close cooperation and valuable input in the study.

March 2003



Takao Kawakami

President

Japan International Cooperation Agency

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Member List of the Taskforce

1. Structural Adjustments for Agricultural and Rural Economic Development in Myanmar

Final Report

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I. Introduction

Myanmar is endowed with bountiful land, water, fauna, and flora resources and the man-land ratio is still highly favourable. Industrial development is under process, but the agriculture, livestock, fisheries, and forestry sectors remain dominant. A significant portion of the population and labour force are also located in rural areas. Tangible progress has been achieved in sown acreage, production and exports, but achievements fall short of the true potential.

In order to break out of the vicious circle of stagnating production and slow changes in rural economy, and to embark on a genuine lift-off, it is imperative to undertake suitable structural adjustments in agriculture, trade and fiscal policies. Strong domestic commitment, backed by international goodwill and support, is essential.

This brief overview of the present agriculture sector clearly illustrates the necessary task. Here, the agriculture sector includes not only the crop sub-sector, but also livestock, fisheries, and forestry sub-sectors. In some context, it even includes processing and marketing industries associated with these sub-sectors. With Myanmar's abundant resources, a considerable scope exists for a substantial expansion in agricultural output, which would have a positive impact on rural economy and individual farm income, thereby contributing to the prosperity of national economy. The constraints to realising the agricultural potential are the lack of appropriate policy adjustments in land tenure, input supply, output pricing and marketing, agricultural export, and investment for/in agriculture.

A. Vicious Circle

The goal of agricultural policies in Myanmar could be summarised into three components: *Food Security*, *Export Promotion*, and *Increased Income and Better Welfare*, all of which are closely interrelated. Increased income and better welfare is the ultimate goal for any country. For the Myanmar economy to attain this goal, meeting food security needs and promoting export to earn sufficient foreign exchange are definite prerequisites. The agricultural and rural economy in Myanmar today, however, is still somewhat trapped in a vicious circle, in which these goals have not yet been fully harmonised in an efficient way. This could be due to the inadequacy of the present approaches, the *State-Led Approach* and the *Rice-Production Orientation Approach*, which have hindered the achievement of a desirable market-oriented goal. Instead, the approaches have led to institutional inflexibility and slow changes in agricultural and rural economy (Fig. 1.1).

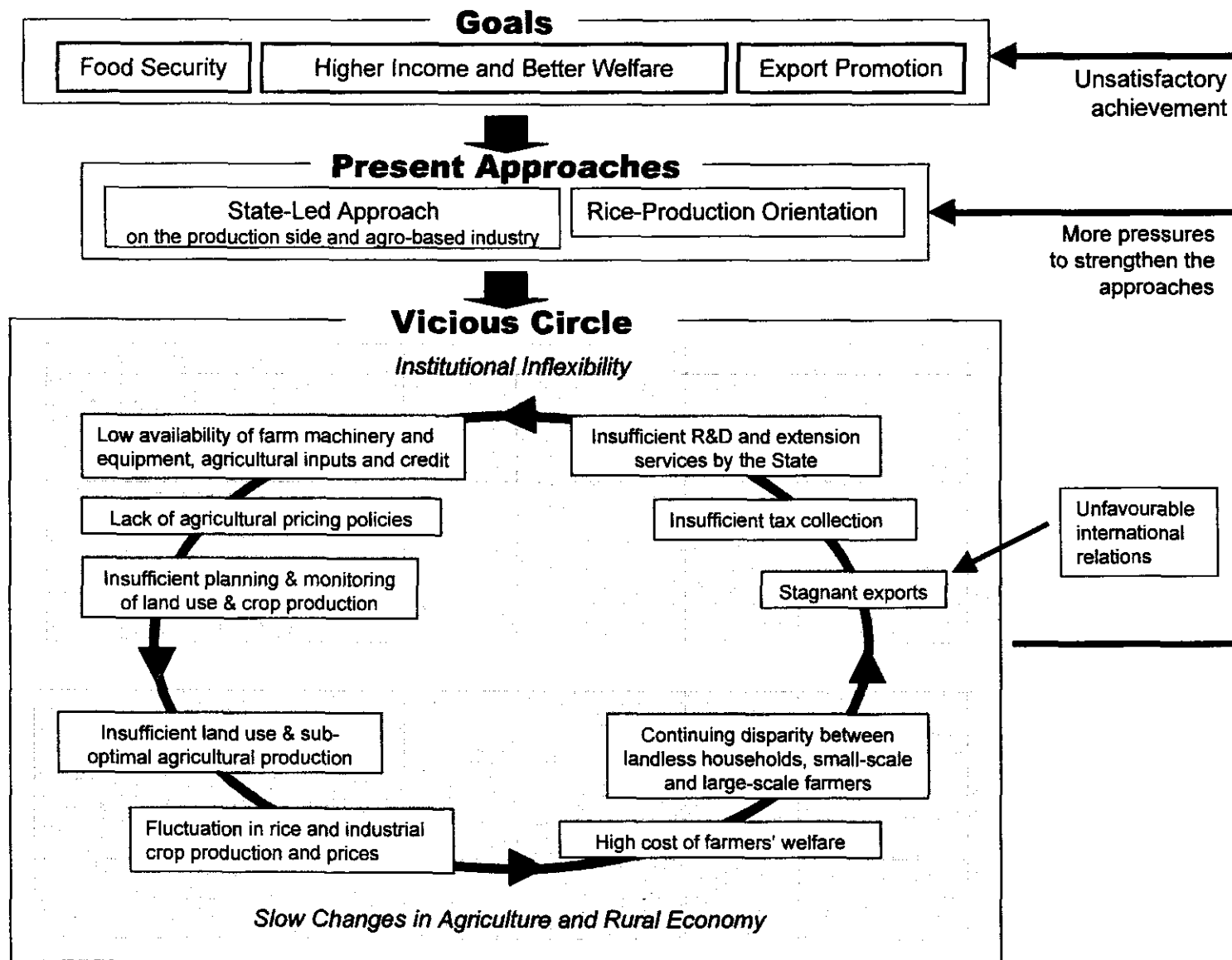


Fig 1.1 Vicious Circle of Agriculture and Rural Economy in Myanmar

This vicious circle is characterised by the necessity to (i) expand the availability of farm machinery/equipment, agricultural input and credit supply, and accessibility; (ii) establish necessary agricultural pricing policies; and (iii) strengthen planning and monitoring of land use and crop production, research and development (R&D) and extension services, etc. Due to these constraints, Myanmar agricultural and rural economy has been changing slowly with sub-optimal land use and agricultural production, fluctuating prices and output, stagnating agricultural export, insufficient collection of revenues, etc. The net results of the vicious circle are the high cost to the farmers' welfare and continuing disparity among rural classes.

B. Virtuous Circle

Turning the present vicious circle into a virtuous circle could be possible by making small changes. The present economic objective of Myanmar places reliance on agriculture as the base for all-round development and the initiative of shaping the national economy in the hands of state and national personnel. The small changes needed in order to achieve a virtuous circle can be summarised as two approaches: *State/Private Harmonised Approach* and *Rural-Welfare Oriented Approach* (Fig. 1.2)

The first is the harmonisation of state and private sectors. Under the current state-led approach, the state sector still tries to dominate every sphere of agricultural and rural economy, from planning to execution, and from general services to investment, covering both farm production and agro-based industries. In order to achieve the full potential of Myanmar's agriculture, including securing world markets, the state sector must become more flexible and responsive to changing market conditions. The spheres of its activities need to be minimised. Transforming State Economic Enterprises (SEEs), particularly those involved in procurement, trade and processing of agricultural commodities, in accordance with the changing market-oriented economy, should be implemented urgently.

At the same time, the state can improve its effectiveness in guiding the economy toward the three previously mentioned goals by expanding the role of the market and by expanding the freedom of individual farmers instead of demonstrating blanket control. This constitutes the essence of the *State/Private Harmonised Approach*, and although it calls for a limited government role, the state is still an important participant, as under the alternative approach its role in guiding the private sector becomes more critical. It would be necessary to put more resources into research and development, extension services, market information services, price stabilisation policies, management of buffer stock, etc.

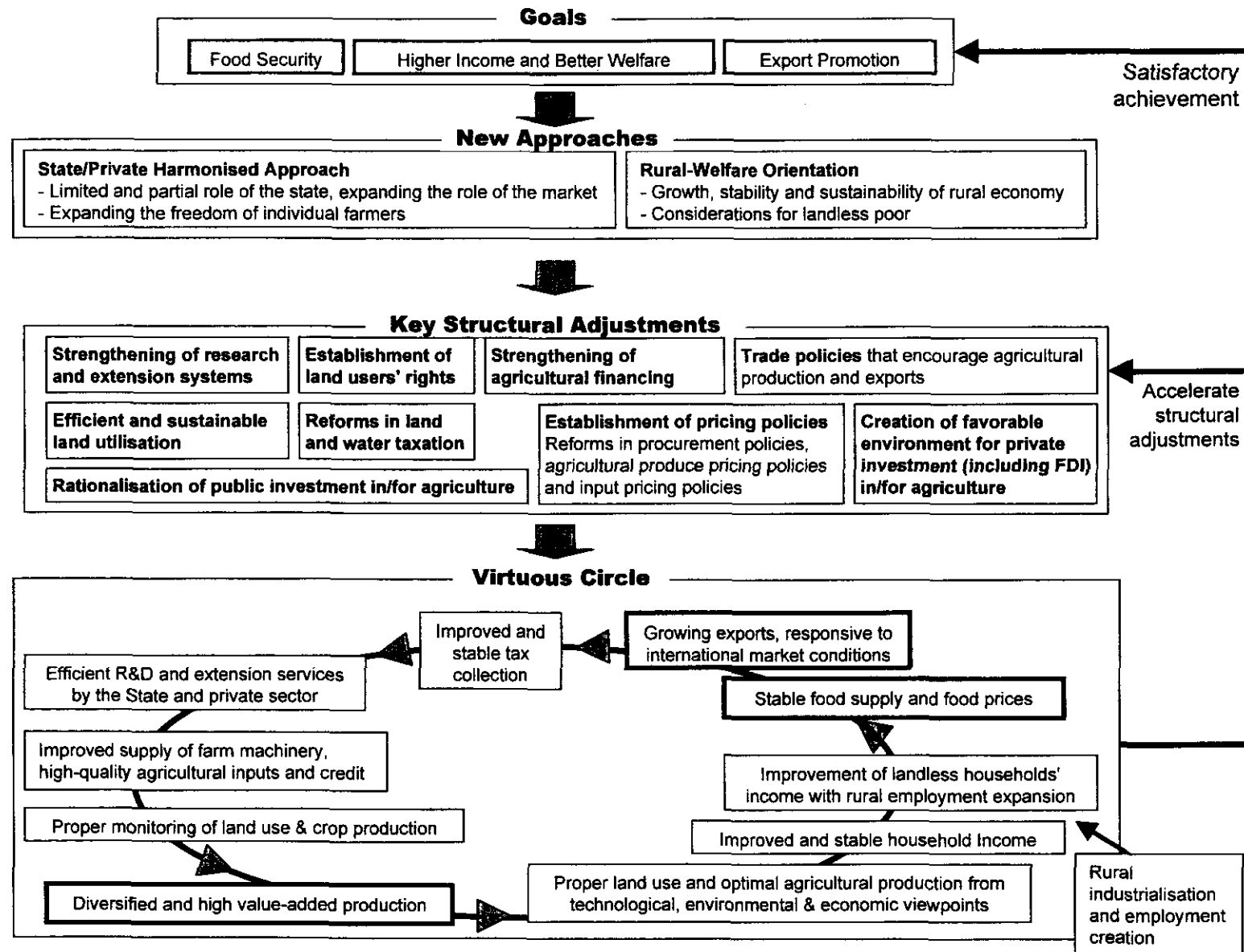


Fig 1.2 Continuous virtuous circle with new approaches

The second approach is the orientation of agricultural and rural economic policies toward the welfare of the people. The current policies place too much emphasis on production. It is income growth, its stability, and its sustainability in the Myanmar economy that are important. Production is merely a tool to achieve this objective.

Producing more rice is of course important in enhancing rural welfare for the following reasons: it creates an environment for more efficient marketing with a larger surplus from better endowed areas; it increases farm income in these areas; and it increases the macro surplus for export and for taxation. However, producing rice to the limit or even beyond the limit in marginal regions does not serve these three functions.

As concrete measures of these approaches, structural adjustments are needed in the following areas:

- (i) Strengthening of research and extension systems;
- (ii) Efficient and sustainable utilisation of land;
- (iii) Rationalisation of public investment in/for agriculture;
- (iv) Establishment of land users' rights;
- (v) Reforms in land and water taxation;
- (vi) Strengthening of agricultural financing;
- (vii) Establishment of pricing policies, including reforms in procurement policies;
- (viii) Trade and marketing policies suitable for the enhancement of agricultural production and export; and
- (ix) Creation of a favourable environment for private investment (including Foreign Direct Investment) in/for agriculture.

With these structural adjustments, desirable results are expected. Since the structural changes would contribute to the achievement of the national goals, the agricultural and rural economy in Myanmar could break away from the vicious circle and enter a virtuous circle.

II. Agricultural Production Technology

A. Land and Water Resources Management

Land and water

Myanmar has plentiful land and water resources for agricultural use. The total land area is 67.7 million hectares, of which 16% is presently under cultivation. Out of the 67.7 million hectares, about 40% is classified as either cultivable waste or buffer forest land, which remains for future use (Table 2.1). The Land Use Division of the Myanmar Agriculture Service classified soils in Myanmar into 24 types belonging to the 5 Soil-Unit groups of FAO/UNESCO.

Table 2.1 Changes in Land Use

Type of land	(unit: 1,000 ha)					
	1983/84		1993/94		2000/01 (Provisional)	
Cropland						
Net area sown	8,124	(12.0)	8,510	(12.6)	9,909	(14.7)
Current fallow	1,934	(2.9)	1,556	(2.3)	686	(1.0)
Actual (Sub-total)	10,058	(14.9)	10,076	(14.9)	10,595	(15.7)
Cultivable waste	8,520	(12.6)	8,173	(12.1)	7,205	(10.7)
Total	18,578	(27.5)	18,249	(27.0)	17,800	(26.3)
Forest land						
Reserved forest	9,950	(14.7)	10,241	(15.1)	12,914	(19.1)
Buffer forest	22,209	(32.8)	22,142	(32.7)	19,786	(29.2)
Total	32,159	(47.5)	32,383	(47.8)	32,700	(48.3)
Others	16,922	(25.0)	17,028	(25.2)	17,159	(25.4)
Total	67,659	(100.0)	67,659	(100.0)	67,659	(100.0)

Source: Settlement and Land Records Department, Ministry of Agriculture and Irrigation.

Remarks: Numbers in parentheses are percentages of the total area. "Net area sown" is exclusive of area trespassed. "Others" is land unsuitable for crop cultivation.

Myanmar abounds with water resources. The annual runoff is estimated at 1,082 billion cubic metres and groundwater storage approximately 495 billion cubic metres. The Government has been eager to invest in irrigation development in order to use freshwater resources more effectively and to increase paddy production. The Irrigation Department has completed 140 irrigation projects covering benefited areas of about 2.0 million acres (0.8 million hectares) since 1988. This increased the irrigation ratio, the proportion of irrigated area to the net sown area, from 12.2% in 1989/90

to 19.0% in 2000/01 (Table 2.2). An overwhelming proportion of irrigated land, over 70% in this decade, is used for paddy cultivation (Table 2.2).

Table 2.2 Trend in Irrigated Area Expansion and Irrigated Paddy Cultivation

Year	Net area sown (1,000 ha)	Irrigated area			
		Net irrigated area (1,000 ha)	Irrigation ratio (%)	Gross irrigated area (1,000 ha)	Proportion of paddy cultivation to the gross irrigated area (%)
1984/85	8,359	1,085	13.0	1,280	67.3
1989/90	8,209	1,005	12.2	1,162	73.3
1990/91	8,324	1,003	12.1	1,162	74.8
1991/92	8,339	998	12.0	1,163	71.8
1992/93	8,714	1,110	12.7	1,308	73.2
1993/94	8,738	1,337	15.3	1,621	82.6
1994/95	8,951	1,555	17.4	1,911	83.3
1995/96	9,168	1,757	19.2	2,142	82.5
1996/97	9,277	1,556	16.8	1,866	82.3
1997/98	9,278	1,592	17.2	1,922	81.0
1998/99	9,673	1,670	17.5	2,080	76.6
1999/00	10,135	1,841	18.2	2,347	77.5
2000/01 (P.A.)	10,476	1,910	18.2	2,437	76.5

Source: Settlement and Land Records Department, Ministry of Agriculture and Irrigation.

Remarks: "Net area sown" is inclusive of area trespassed.

Agro-ecological zone

According to the combination of land and climatic conditions, the country can be divided into five agro-ecological zones: 1) coastal region, 2) delta region, 3) semi-arid or dry zone region, 4) valleys and plains, and 5) mountainous plateau.

The temperature varies according to the topography and elevation. It has a strong seasonality in the central dry zone with a range between 10 and 40 degrees Celsius, while it is almost constant throughout the year in the coastal strips of Rakhine, Ayeyarwaddy, and Tanintharyi. The northern hilly region and the Shan plateau are characterised by a cold climate all year round due to high elevation.

Most of the rainfall comes from the monsoon throughout the country, but its spatial variation is

Box 1 Crop Risk in Rain-fed Farming and Irrigation Investment

Rain-fed farming in two study village tracts of the Rural Micro Survey in the Magway District is subject to high crop risk, especially that of the yield of sesame, the farmers' main cash crop. Our survey results in the village tract in Taundwinggyi Township in 2001 were seriously affected by consecutive sesame crop failures. Fortunately, when we re-visited the village for the supplementary survey in September 2002, we found that the 2002 crop turned out to be a good harvest. Because of this, both farm and non-farm households were much better off than in the previous few years. This suggests that the welfare level of the villagers is not only low on average but also varies substantially.

In contrast, a complete sesame crop failure is rarely observed in the other village tract in Magway Township, although the yield level fluctuates to some extent. This is due to the variability of rainfall and soil quality. Because of this advantage, together with other factors, the villagers' welfare level in the Magway village tract is not only higher on average than that in the Taundwinggyi village tract but also less variable. Therefore, our finding from the 2001 survey that the village economy in the Taundwinggyi village tract is poorer than that in the Magway village tract, with contrasting impacts of crop risk, was confirmed.

In both study sites, new irrigation schemes were in progress at the time of the re-survey in 2002. Generally, irrigation development in such rain-fed areas contributes to the enhancement of rural welfare through stabilising crop yields and enabling farmers to grow high-valued crops. Nevertheless, we found a troublesome situation in the field because of too much emphasis placed on producing paddy. For instance, in the Taundwinggyi study site, with the completion of a dam and irrigation canals, farmers were asked to adopt a new cropping pattern: pre-monsoon sesame - monsoon paddy - summer paddy. This combination is too labour intensive and may not be economical from the viewpoint of the farmers, thereby being detrimental to their welfare.

One option that is worth consideration is to allow farmers to freely choose crops to grow with new irrigation water. If the water fee is appropriately priced, this decentralisation approach can lead to better utilisation of irrigation water and to improvement in the villagers' welfare. If growing paddy were economically efficient, farmers would be willing to expand the area for paddy with the new irrigation water. If it is not, farmers will allocate the water to stabilising the yields of upland crops or to increasing the areas for other crops.

also very large. The coastal regions are exposed to heavy rains directly from the northwestern monsoon so that the annual precipitation reaches 150 to 200 inches. In contrast, the central dry zone receives less than 40 inches of rainfall because the western mountain range blocks monsoon storms.

Land laws and land holding

Subsequent to Independence, the Land Nationalization Act (1948), and later the Land Nationalization Act (1953) came into existence, designating the state as the ultimate owner of all land, disallowing the mortgage, sale, transfer, or division of land.

In 1991, the State Law and Order Restoration Council (SLORC) formed the Central Committee for the Management of Cultivable, Fallow and Waste Lands for the purpose of granting substantial cultivation rights to the private sector. The committee is authorised to provide concessions up to 1,000, 3,000, and 5,000 acres for annual crop production, orchards, and perennial crop production, respectively. Whenever cultivation of perennial crop production is completed on the said 5,000 acres, an additional 5,000 acres at a time, up to a total of 50,000 acres, is provided. It is also authorised to provide concessions up to 500 and 5,000 acres for developing poultry and livestock breeding, respectively, and up to 2,000 acres for aquaculture. Many companies and associations have taken advantage of this opportunity, and grants for about 1.3 million acres have been authorised.

The current institutions for land and water resources management are becoming obsolete due to the shift of Myanmar towards a market-oriented economy. It is urgently required that current laws and regulations be modified in order to protect the legal rights and economic well being of the land users. Protection should include the right to exchange, transfer, inherit, and mortgage their land. The modified institutions would provide the basis to establish appropriate supervision and taxation by the government agencies.

Farm size

Farm size is generally small in Myanmar. Farmers with less than 5 acres of land account for 63% of the total farmers, whereas 2.4% of the total farmers hold more than 20 acres of land and they occupy 15.6% of the cultivated land (Table 2.3).

Table 2.3 Land Area Cultivated by Size of Holding, 2000/01 Provisional

Holding size	Peasant family & societies		Total area cultivated	
	(000)	% of total	(000 ac)	% of total
Less than 5 ac	3,005.2	62.6	7,544.4	27.7
5-10 ac	1,187.0	24.7	8,505.8	31.3
10-20 ac	491.8	10.3	6,916.0	25.4
20-50 ac	109.3	2.3	3,124.3	11.5
50-100 ac	3.0	0.1	195.6	0.7
100 ac or more	1.9	0.0	913.4	3.4
Total	4,798.2	100.0	27,199.5	100.0

Source: Settlement and Land Records Department, Ministry of Agriculture and Irrigation.

Land classification

The current system of land categories and classification generally dates back to the cadastral survey by the Land Records Department during the British occupation period. Since then, land use has changed in some areas of the state. Conversion of forestland into agricultural land has occurred in mangrove areas of the coastal region. Recent expansion of residential and industrial areas, mostly in the cities, is proceeding as required for the economic development of the state. The current system of land categories and classification faces numerous difficulties incorporating these changes.

In this context, it is crucial to update land categories and classification to fit the present land use status and future land use planning. It is also necessary to implement distinct demarcation of the land and to record the information on maps. Designating the buffer zone between production-oriented land (such as cropland) and environmental conservation-oriented land (such as reserved forestland) should be the focal point in the new land classification. Newly developed technology, such as remote sensing (RS) and the geographic information system (GIS), can be utilised for accurate monitoring of vegetation and land use, and proper planning of agricultural and rural development.

Land tax

In spite of a steady increase in Myanmar's GDP, the tax-to-GDP ratio has continued to decline. This is a perturbing concern considering the widening fiscal deficit in Myanmar in general. The present land revenue system is based on land revenue regulations dating back to the British period, with a series of adjustments, calibrations, or readjustments to the mode of taxation

practiced. There are maximum and minimum rates for areas inside and outside settlement operations and for special crops such as sugarcane, onions, and betel leaves. In addition to the respective land revenues, certain crops are also subject to commercial as well as income tax.

This is the appropriate time to execute taxation reform from the perspective of rationalising the system and increasing revenue, particularly in combination with updating land categories and classification. The land revenue system should be based on the appropriate means and ways of the land policy, and the rate needs to be increased. If the increase in land taxation rates is associated with the envisaged new regulations in land use, rights, and concessions, as well as reforms in agricultural procurement and subsidies, it is anticipated that cultivators will welcome the reform package.

Water tariff

The Irrigation Department (ID) and Water Resources Utilization Department (WRUD) decide the water tariff for agricultural use. The ID charges a flat rate of 10 kyats per acre per annum to irrigable areas and 5 kyats per acre to flood-protected areas. The water tariff of the WRUD is summarised in Table 2.4.

Table 2.4 Water Tariff of the Water Resources Utilization Department

Mode	Paddy (2nd crop)	Paddy (rainy season)	Other crops (any season)
Electric pumping from river sources	1,500	1,200	750
Diesel pumping from river sources	3,000	2,500	1,500
Electric pumping from groundwater sources	1,500	1,200	750

Source: Water Resources Utilization Department, Ministry of Agriculture and Irrigation.

The water tariff of the ID is much lower than the rates required for cost recovery. In 2000/01, the total water charge collected from the benefiting farmers covered only 2.3% of the total operation and maintenance cost of the ID irrigation systems. It is, therefore, necessary to increase the water tariff to a rational level. It is also important to promote the farmers' participation in planning and managing irrigation systems in order to inspire a willingness to pay higher water charges and to decrease the cost of operation and maintenance.

B. Present Status of Agricultural Production

Agriculture, including livestock, fisheries, and forestry, is the main source of livelihood for nearly 73% of the rural population in Myanmar. In 2000-2001, this sector accounted for 43% of the GDP and 35% of export earnings, and provided employment to about 66% of the labour force. Since 1988, the agricultural GDP has grown at a rate exceeding 4% per year.

Crops

A wide variety of tropical and subtropical crops are grown in Myanmar due to the diverse agro-ecological conditions. The main crop is obviously paddy. Other crops include wheat, maize, millets, and pulses. Oil seeds, industrial crops (such as cotton, jute, rubber, coffee, mulberries, and palm oil), and horticultural crops are also grown (Table 2.5). The crop sub-sector accounted for 34% of the real GDP in 2000/01.

Cropping intensity increased from 126% in 1992/93 to 144% in 2000/01. The launching of the Summer Paddy Program in 1992/93, together with placing more emphasis on small-scale pump irrigation, significantly changed cropping patterns and increased multiple cropping. Expansion of pulse production during the last decade also contributed to higher cropping intensity.

The use of agricultural inputs is still very low in Myanmar. Production and supply of quality seeds have been promoted since 1978, mainly with the financial assistance of various international organisations, although the supply is not sufficient. The amount of agrochemical inputs used in Myanmar, such as chemical fertiliser and pesticide, is much smaller than that of neighboring countries (Table 2.6). Farm mechanisation is also underdeveloped.

Paddy, the most important crop, is cultivated in as much as 50% of the total cultivable land and its production and per-area yield have been increasing (Table 2.7). More significant increases in 1975-80 and 1990-95 could be due to price incentives, institutional modifications, and technical innovations. The increase in paddy procurement pricing in 1973/74 and the introduction of high-yielding varieties and improved cultivation practices in the late 1970s caused the first jump in 1975-80. The decontrol of paddy market prices in 1987 and the introduction of summer paddy with pump irrigation started in 1992/93, resulting in the second jump in 1990-95.

Table 2.5 Harvested Area, Yield, and Production of Main Crops, 1994/95 and 2000/01
(P.A.)

Crops	Harvested area (000 ha)		Yield (kg/ha)		Production (000 tons)	
	1994/95	2000/01	1994/95	2000/01	1994/95	2000/01
Cereals						
Paddy	5,743	6,302	3,168	3,383	18,195	21,324
Wheat	107	80	833	1,167	89	94
Maize	167	211	1,706	1,731	284	365
Pulses and beans						
Black gram (Matpe)	362	611	789	870	285	532
Green gram (Pedisein)	377	706	721	736	272	519
Butter bean	38	52	813	974	31	50
Red bean (Sultapya)	41	67	608	823	25	57
Soybean	60	114	833	968	50	110
Chick pea	122	164	634	726	77	119
Pigeon pea (Pesinngon)	234	358	621	896	145	320
Other pulses	459	799	601	742	276	593
Oilseeds						
Groundnut	497	586	1,008	1,247	501	731
Sesame	1,132	1,311	269	325	304	426
Sunflower	179	494	652	543	117	268
Industrial Crops						
Cotton	178	300	484	508	86	153
Jute	37	44	924	953	35	42
Rubber	52	62	526	575	27	36
Sugarcane	53	133	44,603	44,382	2,357	5,894
Myanmar tobacco	28	28	1,244	1,693	35	48
Virginia tobacco (green)	3	5	5,572	5,918	18	29

Source: Settlement and Land Records Department, Ministry of Agriculture and Irrigation.

Table 2.6 Amount of Fertilisers and Pesticides Used in Myanmar, Thailand, and Vietnam

Country	Fertiliser* (MT in thousands)	Pesticides** (MT)
Myanmar	210	892
Thailand	1,550	24,092
Vietnam	2,097	34,544

*: The data is from 2000 according to FAO Stats.

** : The data is from 1995 according to Agricultural Strategy for 2000 to 2030, MOAI.

Table 2.7 Increase in Production and Yield of Paddy, 1960-1965 to 1995-2000

Period	Annual compound rate of growth in production (%)	Growth in production attributed to area (%)	Growth in yield (%)
1960-1965	2.81	3.01	(0.20)
1965-1970	(0.26)	(0.62)	0.36
1970-1975	2.52	1.24	1.27
1975-1980	6.35	(0.77)	7.18
1980-1985	1.33	(0.49)	1.83
1985-1990	(0.51)	0.35	(0.86)
1990-1995	4.30	4.00	0.30
1995-2000	2.06	0.35	1.67

Source: Ministry of Agriculture and Irrigation.

Remarks: Figures in parentheses indicate a negative number.

Myanmar was the largest rice exporter in the world prior to World War II and during the 1950s, exporting more than 2 million tons of rice annually. The amount of rice exported, however, has decreased since 1960/61. It was around 0.1 million tons during that time, although it jumped up to 1 million tons in 1994/95 when Myanmar enjoyed a bumper paddy harvest. The current policy on rice procurement and export undoubtedly influenced both the quantity and quality of rice production and export.

Oilseeds and pulses follow paddy in terms of cultivated area. The main sources of edible oil are groundnut, sesame and sunflower. Domestic production and import of edible oil in 2000/01 were 378,000 and 205,000 tons, respectively. Under the domestic self-sufficiency policy for edible oil, the Government promotes local palm oil cultivation and annual oilseed crop production. Production of pulses has increased rapidly since the agricultural liberalisation in 1989. The sown area was about 1 million hectares in 1988/89 and increased to more than 2 million hectares in 1995/96 and 2.9 million hectares in 2000/01. The export of pulses, the most important agricultural product for export, reached 831,000 tons in 2000/01, which was traded mainly by the private sector.

State Economic Enterprises (SEEs) play an important role in the production and processing of main industrial crops. Myanma Sugarcane Enterprise (MSE) coordinates the production and marketing of sugar and its by-products. MSE recently constructed nine new sugar factories and now holds 17 factories in total. MSE implements a sugarcane cultivation plan in areas around the factories, which is enforced on the farmers. Myanma Cotton and Sericulture Enterprise

(MCSE) coordinates cotton production and sericulture. Presently, cotton is produced mainly in the dry zones of the country, providing important raw materials for the weaving and textile industries. However, cotton production has not increased as planned due to poor pricing policies. MCSE is also undertaking a sericulture project to establish mulberry plantations to be run by hill farmers in Mandalay, Chin, Kaya, Kachin, and Shan States, with a project to develop small- and medium-scale silk reeling industries. Myanmar Jute Industries (MJI) coordinates jute and kenaf cultivation and processing. Due to a global decline in the demand for jute, production has declined in recent decades. The area under jute cultivation decreased from more than 100,000 hectares in the late 1970s to around 40,000 hectares in recent years. Jute export has also declined, resulting in its diversion into paper products. On the other hand, the area under kenaf cultivation has reached 20,000 acres and the establishment of kenaf paper factories is under progress.

Myanmar Perennial Crops Enterprise (MPCE) is responsible for promoting production of perennial crops, such as rubber, palm oil, and cashew nuts. MPCE develops and manages its own plantations for these crops as well as being engaged in processing and marketing of the products. MPCE also provides the private sector with extension services, inputs (planting materials and fertilisers), and marketing assistance. To enhance private investment in plantations of perennial crops, land leases of up to 50,000 acres for up to 30 years are arranged by MPCE. The tenure can be extended for an additional 30 years. A total of 1.3 million acres, including 20,000 acres for rubber and 300,000 acres for palm oil, have already been granted to private entrepreneurs. Myanmar Farms Enterprise (MFE) is responsible for promoting commercial production of agriculture, livestock, and aquaculture. MFE contributes to farm development by establishing demonstration and extension farms and estates, in addition to promoting coffee production by encouraging small holders of plantations and commercial estates.

Livestock and fisheries

Livestock farming and fisheries are important sources of domestic food supply and cash income. The annual per capita consumption of meat was 4.7 kg in 1993/94 and increased to 8.7 kg in 2000/01. The total meat production in 2000/01 was 444,000 tons, of which poultry, pork, and beef occupied 54%, 27%, and 16%, respectively. Livestock is also the principal source of draft power. There were 12 million head of cattle in 1993/94, of which 6.6 million head were draft cattle.

Myanmar has abundant fishery resources, based on an ecological setting of more than 2,800 km of coastline, 8.2 million hectares of inland water bodies, and 0.5 million hectares of swamp area

along the coast. There is considerable potential for increasing all types of fisheries. Fish catch has been increasing for more than two decades. The annual growth rate was 2.7% during the period from 1981/82 to 1990/91, and accelerated to 4.5% in 1992/93 and 16.8% in 1999/2000. In 2000/01, the fish catch reached 0.92 million tons and fish exports made up 10% of the total export earnings, while the annual per capita fish consumption was 25.3 kg.

Although the livestock and fisheries sectors have huge potential, the technology used for breeding and the farming/catching system is less developed. One of the few trials is a three-year shrimp-breeding programme managed by the Fisheries Department with the participation of the private sector. There is an urgent need to establish research and extension systems in the field of livestock and fisheries. It is also important to give more consideration to environmental aspects. Granting of fishing rights to foreign fishing vessels has been suspended since 1994 in order to restrain over-fishing and to conserve marine resources.

Forestry

The forest cover was 32.7 million ha as of 2000/01, approximately 48% of the entire country, of which reserved forestland occupies 39% (Table 2.1). Myanmar and Thailand have a significant quantity of the most valued high-quality teak, but Myanmar is becoming the sole supplier of this kind of teak as Thai production declines. In addition to teak and other hardwoods, Myanmar produces forest products such as bamboo and rattan. The forestry sub-sector earned more than 30% of the total export in the early 1990s, but this decreased to less than 20% in the late 1990s because export earnings of other sectors increased.

In order to conserve forest resources, a sustainable logging system, called the Myanmar selection system, was adopted. In addition, the Government recently updated certain policies and legislation to reflect its commitment to international obligations and to the country's specific conditions. The 1902 Forest Act was revised in 1992 and a new forest policy was adopted in 1995. New criteria and indicators for sustainable forest management were established in 1999. The authority also replaced the 1936 Burma Wildlife Protection Act with the Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law in 1994.

The 1995 Forest Policy mandated an increase in reserved forests and protected areas. However, the trends of deforestation and environmental deterioration have continued since then, particularly in buffer forests and cultivable wasteland. The most affected region is the central dry zone, for which the Government has drawn up a large-scale rehabilitation programme, currently under

implementation.

C. Directions of Technology Development

Typical Myanmar agriculture is the low-input and low-return type, and is not very technologically advanced. The technology used in growing fruits, raising livestock, and managing fisheries and aquaculture requires modernisation and has a large potential for improvement. In contrast, the cropping system, particularly in the dry zone, is technically sophisticated in the context of Southeast Asia. Considering the current situation, the intensification of production and diversification of farming systems should be the strategy of agricultural technology development, which would effectively upgrade rural welfare, as well as increase agricultural production and export.

Intensification of agricultural production with environmental soundness

The intensification of agricultural production means a shift from low-input and low-return type farming to high-input and high-return type farming. This shift must be environmentally sound and economically feasible. Hence, it should be an effective measure in areas where the environmental capacity is large enough and for crops with favorable market conditions. In this sense, pulse production in the upper parts of the Ayeyarwaddy and Sittaung Deltas and oil crop production in the alluvial lands of central Myanmar are most promising. It is necessary to develop appropriate technology for a cost-effective cropping system that suits the soil and climate, to achieve of particular areas. Fruit such as durian, mango, and rambutan that are grown along the eastern coastal areas, and temperate fruits in the mountainous areas, also have enormous potential. Lowland paddy is undoubtedly the most important crop and suitable to the natural environment of Myanmar. Although the government sector, in cooperation with local farmers, has made huge efforts in terms of improving technology and investing in infrastructure, a great deal of room remains for increases in yield and production. Creating favorable economic and market conditions is the most crucial prerequisite for achieving this goal.

Permanent success in the intensification strategy, i.e., the promotion of high-input and high-return technology, requires careful and continuous consideration for the natural environment and resources. The “high” input level should be kept at a level which as environment-friendly as possible. Adverse effects on the natural environment that are caused by excessive application of chemical fertilisers and pesticides could be minimised through area-specific nutrient management, instead of blanket standardised management, based on soil fertility and natural supply, Integrated

Box 2 Eco-tourism in Olango

The Olango Birds and Seascape Tour (OBST) is an eco-tourism business venture on the island of Olango, Cebu Province, Philippines. Residents of Suba, a fishing village on Olango Island, own and operate the business in cooperation with partners off the island. The business successfully integrates the elements of full community benefit and participation, contribution to environmental conservation and education, product differentiation and marketability, economic viability, and promotion of local culture.

OBST started in March 1998 and was made possible through the Coastal Resource Management Project (CRMP) implemented under the leadership of the Ministry of Environment and Natural Resource Management. The goals of the project were to develop an environment-friendly livelihood alternative for resident fishermen, to model sustainable tourism development on the islands by local stakeholders and to promote local cooperation in the conservation of natural protected areas.

Olango Island is located about 4 km from the east coast of Mactan Island in the city of Lapu Lapu, Cebu Province. Mainland Olango's flat and elongated dry land measures about 1,000 ha. The inter-tidal wetland, known as the Olango Island Wildlife Sanctuary (OIWS), extends the island further south by 904 ha and is recognised as an important wetland for birds belonging to the East Asia Migratory Flyway.

The fisheries of Olango and its six islets have declined considerably due to over-fishing and the destruction of coastal habitats by cyanide and dynamite fishing, transformation of wetlands in the reclamation process, and coastal pollution. Declining resources and high population density contribute to the low level of income and education in Olango. Bird watching, coastal trekking, canoe paddling, snorkeling, swimming, visiting seaweed farms, and island hopping are recreational activities offered to tourists with the active participation of islanders. The volume of tourists to OBSP increased by 30% in 2000.

Eco-tourism is one of the promising ways to create non-farm income for the people living in the fragile eco-system and to relieve the pressure on natural resources such as forest and wetlands.

Pest Management, etc. Conservation of genetic resources, which has been carried out mainly by the Seed Bank of the Central Agricultural Research Institute (CARI), should continue to be practiced, in parallel with expanded provision of improved crop varieties. The "high" return level, especially in fisheries and forestry, should also be kept at a level sustainable by natural resource monitoring and management. Additionally, management of both forest conservation and agricultural/non-agricultural activities need practical monitoring of protected and non-

protected forest lands, under closer cooperation between the Ministry of Forestry, the Ministry of Agriculture and Irrigation, the Ministry of Livestock and Fisheries, particularly for coastal mangrove regions, and other related authorities.

Diversification of farming system

The target of diversification of the farming system is not only to realise a greater variety of crops but also to introduce and create new types of mixed farming systems for crop production, animal raising, and aquaculture. Although such farming systems are less developed in Myanmar at present, they should be highly emphasised in future agricultural development for the following two reasons. First, *in situ* resources such as land, water, nutrition, and labour would be optimally utilised by adopting mixed farming. Second, farmers would have a wider range of products to sell, which offers protection from the risk of market price fluctuations. In this sense, a mixed farming system is effective and practical particularly for small-scale farmers and during the transition period from the subsistence-oriented economy to the market-oriented one. Combining crop production with animal raising, including poultry, throughout the country and with aquaculture in the coastal areas, particularly the lower part of the Ayeyarwaddy Delta, should be promoted in order to expand the mixed farming system. To promote the diversification of the farming system, closer cooperation and linkage among the related authorities, private sectors, and farmers is needed.

Area-specific approach

Toward intensification and diversification as mentioned above, it is of vital importance to develop area-specific technology on agricultural production and the farming system. The technology must be suitable to local soil, water, and climatic conditions, be economically feasible for the farmers, and meet the market demand. The direction of technology development, therefore, must shift from standardisation at the national level to the area-specific approach. In order to promote area-specific technology development, the following four issues should be considered.

i) Flexible cropping plan

A cropping plan would serve as a basic tool to design food security at the national and state/division levels. The current cropping plan implemented by the government functions well for its primary purpose, but limits the farmers' choice of farming and works as one of the constraints on potential intensification, diversification, and commercialisation of farming. Flexible implementation of a cropping plan should be seriously considered, together with issues concerning the system for land rights, taxation, and procurement. The cropping system should be harmonised

with agro-ecological conditions and market demand and supply.

ii) Investment in infrastructure and energy supply

Upgraded infrastructure, particularly road and telephone networks, and a stable supply of energy, including diesel oil and electricity, are essential for improving the economic and market conditions of the areas and for providing a wider choice of farming systems to each area. Priority should be given to a farm-level water management system, land development including proper drainage and irrigation systems, and access to market with adequate farm roads.

iii) Decentralisation of research and extension system

Research and extension agencies need to supply broad farming options to farmers and to support their flexible crop planning. Creating a multi-functional research and extension system should be a key factor in introducing the area-specific approach into research and extension works. Research agencies at the higher level should focus on extremely modern technology development including biotechnology, and research and extension agencies at the local level should concentrate on the selection and development of technology suitable to the natural, economic, and market conditions of each area. Although all the works of the research and extension agencies must be well coordinated and linked, autonomy in decision-making would provide strong motivation to the researchers and extension workers at the different levels.

iv) Capacity building and networking of farmers

A wide range of trial and error of various types of intensive and/or mixed farming is necessary for the success of the area-specific approach. Taking the entire responsibility of these challenges is beyond the ability of the state sector, and sharing it with the private sector is essential. The farmers have the best knowledge of *in situ* resources. They are also in a better position than the government to assess the economic feasibility of potential farming systems. In order to connect the farmers' potential with rapid and steady agricultural development, capacity building of farmers is of critical importance. This could be achieved by providing resource farmers with wider-ranging and more thorough agronomic knowledge, updated market information, and more freedom in decision-making. It is also important to activate a network of farmers in order to distribute and share useful information and to integrate the wisdom and experience of the farmers.

III. Rural Economy

Seven districts from different agro-ecological zones were selected for the establishment of GIS and for conducting the Rural Micro Survey. The selected districts were the Myaungmya District (Ayeyarwaddy Division), Taunggyi District (Shan State), Kyaukse District (Mandalay Division), Magway District (Magway Division), Bago District (Bago Division), Myeik District (Tanintharyi Division), and Thahton District (Mon State).

The Technical Group and the Economic Group each conducted a Rural Micro Survey. The purpose of the survey by the Economic Group was to obtain in-depth understanding of rural economy by collecting and analysing household-level data. To attain this objective and given the time and budget constraints, only one or two village tracts (VTs) were selected from each district (except for Thahton). In total, eight VTs were selected from Myaungmya Township (Myaungmya District), Nyaungshwe and Kalaw Townships (Taunggyi District), Kyaukse Township (Kyaukse District), Magway and Taundwingyi Townships (Magway District), Bago Township (Bago District), and Myeik Township (Myeik District).

The Economic Group also selected 40-100 households from each VT and conducted an intensive interview with household heads, using questionnaires. The number of rural households interviewed was 521, of which 341 (65.5%) were farm households and 180 (34.5%) were non-farm households. Note that the total households in the eight VTs was 4,868, of which 2,032 (41.7%) were non-farm households. Considering the importance of collecting data from farm households, proportionally more farm households were selected for the survey.

The survey started in June 2001 at Ayeyarwaddy and moved on to Shan in July, then to Mandalay, Magway and Bago in August-September and finished at Tanintharyi in October of the same year. Thus the data collected is basically for the year 2000/01. Note that the following cost and return analyses are all based on the study year's data, reflecting the price situations in that particular year, whereas prices usually fluctuate year to year (see Box 3).

A. Farm Management

1. Production cost of major crops

Production cost of major crops is a convenient way to summarise farm management at the household level. Currently, the Myanmar Agricultural Service (MAS) estimates the production

cost of major crops and publishes its summary tables. The information is valuable but is lacking in detailed information at more disaggregated input levels, input-output quantity information, and diversity information according to farm size and agronomic differences. The analysis here is the first step toward filling this gap.

Conceptually, the production cost of agricultural commodities can be divided into three parts: the current input costs, the paid costs of hired production factors, and the imputed costs of family owned factors. By subtracting the current input costs from the gross value of production, value-added is obtained. Then, by subtracting the paid costs of hired production factors from the value-added, income for the farm household is obtained. Further, by subtracting the imputed costs of family owned factors from the income, the amount of surplus or profit is obtained. Note that in Myanmar where farmland is owned by the state, the cost of land factor is not officially incorporated into the production cost estimates, so that it is included in the surplus or profit. The procurement prices of Myanmar Agricultural Produce Trading (MAPT) and other government organisations are based on the estimated production cost, not including the cost of land factor. This is one of the reasons why the procurement prices are usually far below the market prices.

It should be noted that income and surplus (or profit) from agricultural production should be considered key indicators from the viewpoint of the new approach that emphasises increased income and better welfare of the people rather than increased production. In addition, the cost of land factor should somehow be estimated in the future and incorporated into the cost of production, which is closely related to the recommended policy reform for strengthening the land user rights of farmers.

Paddy

Rice is the principal food in Myanmar and is strategically important for the survival of both producers and consumers. Major findings from the estimates and analysis of its cost of production are as follows:

— Per basket cost of production (current inputs + hired & family owned production factors, except for land) for monsoon rice in the major rice-producing areas of Myaungmya, Kyaukse, and Bago was 355 kyats, 398 kyats, and 269 kyats, respectively. In the study year, farmers in these areas were severely hit by the collapse of the price of rice and received only 413 kyats, 558 kyats, and 420 kyats per basket, respectively, leaving a very small surplus. The cost of current inputs, especially imported materials such as chemical fertilisers and diesel oils, was extremely

Box 3 Collapse of Rice Price in 2000/01

Many diesel engines for water pumps, wheels of bullock carts, iron harrows, bicycles, etc. In late June 2001, during the time the survey was being conducted, there were so many pawned items crammed into the storeroom of a pawnshop located in a small town near the study village in Ayeyarwaddy Division. Aside from gold, farmers had to submit these “basic” production assets as a pawn to get a loan and pay 3% interest per month in order to continue paddy cultivation.

Rice has always been at the centre of agricultural policies in Myanmar. However, policy measures necessary for the benefit of producers have not always been adopted. On the contrary, many adopted measures place pressure on the producers.

An illustrative example is the case of summer paddy production in the Ayeyarwaddy Delta in 2001. In the study village, summer paddy production started in the mid-1990s using diesel pumps for irrigation. New varieties appropriate for summer paddy were introduced and farmers also started using more fertiliser. As a result, overall paddy production drastically increased and the local economy enjoyed smooth sailing for some time.

Then, the price of rice fell abruptly, starting from November 1999. The price peaked at 800 kyats per basket in November 1999 and plunged to 400 kyats per basket by August 2000. It remained at an abnormally low level, taking more than one and a half years to recover in October 2001. The summer paddy production that required a large amount of purchased inputs suffered a serious blow by the price collapse. Many farmers, who received hardly any surplus from the monsoon paddy harvest in 2000, hesitated over whether or not to cultivate summer paddy in the next season.

However, the government instructed farmers to continue the summer paddy cultivation as planned. The farmers, knowing that they might be unable to recover not only the family labour cost but even the cash expenditure for the current inputs, could do nothing but follow the instructions. Some showed a humble “resistance” by reducing the sown area or cultivating the field in a rough manner. However, the majority of farmers did actually cultivate the summer paddy and suffered losses.

Generally speaking, the price of rice tends to increase during the monsoon rice planting period. By contrast, it begins to decline in November due to the supply of newly harvested monsoon rice. In the year 2000/01, the domestic market price started to decline sharply in September and showed a continuous declining trend. In other words, the price of rice

Continued

collapsed in the domestic market. Traders were reluctant to buy the new harvest of monsoon rice in the major rice-producing areas. However, the government (MAPT) purchased its quota of paddy from farmers at 320 kyats per basket. Afterwards, traders paid a slightly higher price to farmers for their rice marketing. The most important thing is why the price of rice collapsed in the domestic market and what has been learned from the event. In this case, an oversupply situation led to the collapse.

Year	Sown Area (000 ac)	Yield (bsk/ac)	Paddy Production		Rice Export (000 MT)
			(Million bsk)	(Million MT)	
1998-1999	14,230	60.7	818	17	120
1999-2000	15,528	62.9	965	20	55
2000-2001	15,713	65.6	1,022	21	251

Sources: SLRD, Ministry of Agriculture and Irrigation; Selected Monthly Economic Indicators, July-August 2002, CSO.

Thus, the national level of rice production should be harmonised with the demand, including that for domestic consumption, seed and waste, emergency food stock and volume of rice exports.

The government could not respond to the rice price collapse promptly and appropriately. One possible option for the government sector would have been to buy the paddy (or rice) abundant in the domestic market in order to support the price level. Paddy (or rice) thus purchased could be exported or stored in the government warehouses. Instead of taking such a price supporting measure, the sole responsible agency for paddy procurement continued to purchase paddy in the usual way, which was only for distribution to government employees. Private export remained prohibited. In essence, the government dared to encourage or force paddy production even under unfavourable circumstances, resulting in a huge loss for the farmers. Price stabilisation of rice, the staple food in Myanmar, is important not only for consumers but also for producers. It is high time for the government to have policy instruments for the purpose of stabilising the price of rice.

high comprising 32%, 47%, and 27% of the total cost, respectively, due mainly to the rapid decline of purchasing power with the depreciation of Myanmar currency. If private traders had been allowed to export rice during such periods of extremely low domestic rice prices, the farmers could have benefited from the depreciated currency, and would have been at least partially compensated for their losses.

— Per basket cost of production for summer rice, on the other hand, was 395 kyats, 438 kyats, and 299 kyats in Myaungmya, Kyaukse, and Bago, respectively, while the average price received

by the farmers was 402 kyats, 610 kyats, and 414 kyats. The difference between production cost and price (= surplus) was narrower than that of monsoon rice, and nearly zero in Myaungmya mainly because of the same problem of low product price with high input cost. The share of current input costs to total costs was 53%, 43%, and 26%, respectively. Myaungmya is often regarded as an area suitable for summer rice cultivation because of the availability of water during the dry season. However, the field survey shows that the actual cost of lift pump irrigation is very high, especially under the current conditions of an extremely weakened Myanmar currency. It should also be noted that in Kyaukse and Bago, where canal irrigation is developed, the cost of production was relatively low, because canal water is priced less than its social value, implying a high rate of hidden government subsidy.

— Per basket cost of rice production in other peripheral areas was generally higher than in the major rice-surplus areas. Namely, it was 595 kyats (monsoon) and 592 kyats (pre-monsoon) in Nyaungshwe, 664 kyats (monsoon, Le) and 781 kyats (monsoon, Ya) in Kalaw, 448 kyats (monsoon) and 364 kyats (summer) in Taundwinggyi, and 447 kyats (monsoon) and 528 kyats (summer) in Myeik. As a result, farmers in these areas earned a very small or even negative surplus from rice production, although they received much higher prices for rice than in the above rice-surplus areas. Interviews indicate that under the government's current regional rice self-sufficiency policy, the farmers are persistently encouraged to grow rice even if they could grow other more remunerative crops. The policy not only brings about losses to farmers in the rice-deficit areas but it also discourages farmers in rice-surplus areas by facilitating lower domestic rice prices in Myanmar.

— Regression analysis indicates that there is no evidence of the existence of scale economy in rice production in Myanmar. Rather, in some cases such as monsoon rice in Myaungmya and summer rice in Kyaukse, smaller farmers are significantly more efficient, suggesting that under the current partially mechanised conditions there is no reason to promote and support large-scale rice farming in Myanmar. A careful analysis is required to investigate whether or not the scale economy exists in more mechanised paddy farming under commercially oriented enterprises.

Other crops

The survey on the cost of production also extended to non-rice crops including black gram, green gram, sesame, groundnut, sugarcane, cotton, rubber, chili (dry), potato, cabbage, cauliflower, tomato, and so on. Major findings from the estimates and analysis are as follows:

— Vegetable production was generally profitable, and the accelerated growth and urbanisation of Myanmar economy since the 1990s is basically attributed to such a development. In particular, chili (dry) in Kyaukse, cabbage, cauliflower, potato, and others in Kalaw, potato, tomato, and others in Nyaungshwe are the leading crops, promoting agricultural development and increasing income in each VT. Nevertheless, the government extension neglected these crops to a certain extent, concentrating on rice and other ‘strategic’ crops.

— Pulses and beans were also profitable, especially green gram in Magway and black gram, green gram, and cowpea in Bago. Needless to say, this is mainly due to the high demand from foreign countries, such as India, under the free trade regime for these crops. The estimates show that the average income per acre of land in Bago was 17,781 kyats for green gram and 18,962 kyats for black gram, compared with only 9,014 kyats for summer rice. Based on the new approach emphasising increased income and better welfare of the people rather than increased production, it is of vital importance to revise the current stance of placing too much emphasis on rice production without considering the benefit to the farmers.

2. Farm income and profit

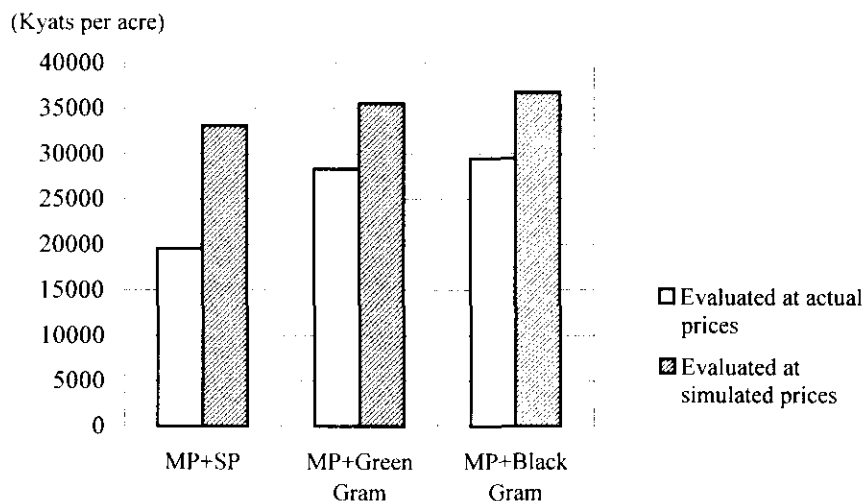
In Kyaukse and Bago, farmers can grow non-rice crops on Le land (paddy field) during the dry season. In the study year in Kyaukse, the MP (monsoon paddy)-SP (summer paddy) combination was highly inferior to the MP-chili combination in terms of per-acre income or profit. The MP-SP combination was also highly inferior to the MP-pulse combination in Bago (see Box 4). In Myaungmya, the MP-SP combination resulted in a high cost to the welfare of the farmers because the cropping pattern was labour intensive but the income from it was far from satisfactory. Even taking into consideration the unusual low price of rice in the study year, the cultivation of rice, especially summer rice, is generally becoming less profitable in Myanmar, particularly when compared to non-rice crops. Two major implications can be drawn from this fact. The first is that irrigation development through construction of dams and reservoirs for expanding summer rice cultivation, the major agricultural development policy in Myanmar since 1988, should be reconsidered, or at least should be planned with due consideration to the cost-benefit of each irrigation project. Second, the cost-benefit ratio of irrigation projects would improve substantially if the rice trade monopoly by the government is relaxed and the domestic price of rice rises, approaching the international price.

Per-acre farm income, which is also estimated separately for small and large farms in each VT, is higher for small farms than for large farms in all the regions, except for Magway. In Myanmar,

Box 4 Monsoon Paddy - Summer Paddy versus Monsoon Paddy - Pulses

In the study village of the Bago Division, farmers can grow non-paddy crops on Le land (designated paddy field) during the dry season after growing monsoon paddy (MP). Green gram (GG) and black gram (BG) are the most popular crops because of their high market demand. The competing crop is summer paddy (SP) under irrigation. Estimation results for per-acre income are shown in the white bars in the chart below, based on data from the Rural Micro Survey.

Income per acre from the MP-GG combination was 45% higher and that from the MP-BG combination was 51% higher than the MP-SP combination. If profit per acre is used instead of income per acre, the superiority of the pulse-MP combinations becomes stronger, 89% and 107% higher, respectively. Because the study year was severely affected by the rice price collapse (see Box 3), a simulated case was used with a counterfactual rice price at the expected 'normal' level of 600 kyats per basket instead of the actual prices of around 410-420 kyats per basket. The shaded bars in the chart above show the results. The inferiority of the MP-SP combination did not change: a 7 to 11% higher income was attributable to the pulse-MP combination than for the SP-MP combination.



Farmers' Average Income from Cultivation

These figures cast doubts on the economic justification for the current policy of summer paddy promotion at any cost. If farmers had been allowed a more liberal choice in cropping, they would have reduced the production of summer paddy and increased the area under pulses. Consequently, the export revenue from pulses would have been larger and the collapse of rice prices would have been mitigated.

small farmers achieved higher per-acre income by choosing crops with higher per-acre income, the same as in many other countries in the developing world. The estimates of per-household annual farm income, on the other hand, range from 43,619 kyats (Taundwinggyi) to 153,826 kyats (Nyaungshwe) for small farms and from 99,402 kyats (Myaungmya) to 411,765 kyats (Magway) for large farms, with an overall average of 156,883 kyats.

3. On the official agricultural statistics

Agricultural statistics, particularly crop production statistics, are collected regularly and reported in a well-organised manner in Myanmar. However, the system has several deficiencies. One is that the local (village tract and township) level data is usually only available at each local level, not in Yangon. This is one of the major obstacles that hamper policymakers in obtaining local-level detailed information, which is indispensable for more appropriate, timely, and effective policy-making and implementation. The other is that there is a rather strong tendency both for farmers and local-level government officials to over-report the acreage and yield of crop production, which casts serious suspicion on the reliability of the statistics. Note, at the same time, that there exists the reverse possibility of farmers under-reporting production, especially in the case of livestock and fisheries. Availability and easy access to reliable data is the minimum requirement for policy dialogue, so that improvement of the situation is extremely important. The most effective measure would presumably be to reduce and stop administrative pressure on farmers and local-level officials to achieve increased and targeted agricultural production, and instead give priority to increased income and better welfare.

The establishment of a more efficient processing system of collecting data utilising GIS techniques, for example, should also be emphasised here, which would require additional endeavours for human resource development.

B. Economy of Rural Households

1. Farm households

The total annual income for farm households was estimated in each VT separately for small and large farms. On average, the total household income is estimated at 211,820 kyats, which comprises 156,883 kyats (74.1%) for farm income (66,025 kyats for rice and 90,858 kyats for non-rice), 10,292 kyats (4.9%) for farm hired labour income, and 44,646 kyats (21.1%) for non-agricultural income. The high dependency of farm households on farm income in rural Myanmar is evident. The dependency ratio ranges between 71-89%, except for 42% in Myeik, where non-agricultural

job opportunities are relatively well developed. In terms of per capita income, Magway was the highest (53,123 kyats) followed by Kyaukse (52,254 kyats), Nyaungshwe (47,772 kyats), Kalaw (42,257 kyats), Myeik (40,578 kyats), Bago (35,925 kyats), Myaungmya (27,930 kyats), and the lowest was Taundwingyi (20,054 kyats). With the exception of Magway, an especially good 'model' village, there is a clear tendency in the peripheral regions such as Shan (Nyaungshwe, Kalaw) and Tanintharyi (Myeik) to obtain a higher income than in Myanmar Proper areas such as Ayeyarwaddy and Bago.

When sample households were classified into large- and small-scale farms, per capita annual income ranged from 10,609-42,069 kyats for small farms and 24,947-62,995 kyats for large farms. Income from off-farm earnings such as agricultural wage income and non-farm income are much more important for small farms. Especially in Kyaukse and Magway, where the average income is the highest, the share of off-farm income for small farms is around 45% while that of large farms is only 10%. The availability of off-farm earning opportunities is another reason for the higher welfare in these study areas. If the poverty line is set at 20,000 kyats per capita income (50% of income spent on rice, assuming a per capita rice consumption of 200 kg and a rice price of 100 kyats/pyi), the share of farm households below the poverty level is 33.3% on the grand average, ranging from 29.0-91.7% for small farms and 7.7-41.7% for large farms.

2. Non-farm households

Although all farmland belongs to the nation and consequently all rural households are landless in the strict sense, there is a clear distinction between land-owning farm households and landless non-farm households in rural Myanmar. There are no official statistics on the percentage of rural households that are landless, but it is estimated to be around 40%. In the socialist period, farm households were almost as poor as landless households because of the government's exploitation of nearly all the agricultural surplus through the procurement system. However, after the liberalisation of agricultural markets in 1987, with the exception of a few products, the situation began to change. The issue of income distribution in rural areas is important and further in-depth study is necessary, especially from the viewpoint of social stability.

Sample households from the landless in eight village tracts were classified into three types: tenant farm households, agricultural labour households, and non-agricultural labour households. Here, agricultural labour households are defined as households whose income from agricultural hired labour is more than 50% of the total income. The other households with no rented-in farmland are defined as non-agricultural labour households. Among the total 180 landless

Box 5 Without Off-Farm Employment Opportunities, It Is Not Easy

Myeik, located in the coastal area of the Tanintharyi Division, offers various off-farm employment opportunities. There is a similarity to the rural areas in Japan, where part-time farm households are the majority. Off-farm income sources are diverse due to Myeik's location and their contribution to the living standard of the rural population is remarkable.

In a study village not far from the town of Myeik, the major farm activities were rubber and orchard plantations and paddy cultivation. However, many village households were engaged in various types of off-farm jobs. The dependency on on-farm income sources was rather low compared to other areas of the country.

Followings are examples of off-farm jobs engaged in by both farm and non-farm households, observed in the Rural Micro Survey of 2001. There were more than 30 grocery shops in the village, earning 100,000 to 300,000 kyats a year. This income level was regarded as high, although it has decreased somewhat due to intensified competition among the stores in recent years. Some household members were engaged in carpentry or working in saw mills, earning wages that ranged from 500-800 kyats per day, depending on the skill of workers. Those working in the transportation business between the village and towns were making a good profit. One driver earned nearly 200,000 to 300,000 kyats per year. There were more than 24 small rice mills in the village providing an income of 100,000 to 200,000 kyats per year. The number of rice mills in a village far exceeded the number we found in the average villages in other parts of Myanmar. In this village, jaggery, made from toddy palm liquid, was also a good income source, earning around 100,000 kyats per year. Away from the work in the villages, some young household members went to work in marine processing factories or fruit plantation companies located in the town of Myeik. Wages for factory workers ranged from 7,000 kyats to 25,000 kyats per month, depending on the worker's experience. If a male worker went to work on fishing boats, he earned 10,000 kyats per month, with three meals provided every day.

The availability of multiple employment opportunities also raised the general wage level of on-farm jobs in the study village, ranging from 250 to 400 kyats per day depending on the work. This was much higher than the wages observed in other parts of the country. For example, the wage rate in the Ayeyarwaddy region was 150 to 200 kyats per day for the same work.

In the study village, both farm and off-farm households were relatively well off compared to other areas in the country due to the availability of off-farm employment opportunities. The promotion of non-farm employment opportunities will be a key factor in the future development agenda of rural economy.

households surveyed, tenant farm households, agricultural labour households, and non-agricultural labour households accounted for 7.2%, 56.7%, and 36.1%, respectively. The share of agricultural labour households was particularly high in Bago (72.5%), Magway (75.0%), and Taundwinggyi (75.0%). In Asia, as off-farm employment opportunities in rural areas increase, landless households highly dependent on agricultural wage income are becoming scarce, but in Myanmar they are still dominant.

Non-agricultural labour households have a much higher income per capita, almost the same as or sometimes more than that of small farm households. The major off-farm job opportunities for rural landless are: fishery, shop-keeping, trading, vending, daily labour, transportation, livestock, and carpentry, etc. Opportunities were, however, far from plentiful except in the VT in Myeik, where the income level of non-agricultural labour households was the highest among the rural community. Labour mobility was generally very low, with extremely low rates of seasonal migration to Yangon or Mandalay. Only in the VT in Magway, were a few instances of such seasonal migration observed.

The estimates of income, on the other hand, indicate that in general, agricultural labour households are the poorest in the village community. The average per capita income of agricultural labour households were: 16,296 kyats in Myaungmya, 29,561 kyats in Nyaungshwe, 11,496 kyats in Kalaw, 20,710 kyats in Kyaukse, 15,978 kyats in Magway, 12,118 kyats in Taundwinggyi, 22,893 kyats in Bago, and 21,028 kyats in Myeik. Assuming a poverty line at 20,000 kyats per capita income as before, on average, 53.5% is below the poverty level. The head count ratio ranges from the highest at 100% in Kalaw, followed by 81.8% (Taundwinggyi), 75.0% (Magway), 72.2% (Myaungmya), 66.7% (Myeik), 46.7% (Kyaukse), and 31.0% (Bago), to the lowest at 12.5% (Nyaungshwe). The serious poverty situation is depicted by the tendency to borrow money when needed. Workers are often obliged to borrow from employers at abnormally high interest rates, the last resort for those with neither collateral nor reliable friends or relatives (see Box 6).

Box 6**Who Can Afford Credit?**

In the same study village of Box 3 in the Ayeyarwaddy Division, landless households were poorer on average than landed households. The difference was apparent simply from a quick look at their clothes. The questionnaire for the Rural Micro Survey has a long section on formal and informal loans.

“Do you currently have debts from institutional sources?” asks the investigator to an apparently poor landless labourer. In our sample, there were no cases in which landless, agricultural labour households replied “Yes” to this question. They had no access to credit from financial institutions that request collateral for their loans with an interest rate of 1.25% per month.

“Do you currently have debts from informal sources such as private pawn shops, friends, relatives, and others?” Some of our samples in the landless labour households replied “Yes,” but only rarely. Villagers were able to borrow money at an interest rate of 3 to 5% per month if they could provide collateral. But the majority of agricultural labour households did not own assets worth collateral. Without collateral, the informal lending rates in the village were around 10% per month. Several examples were observed of such credit transactions among poor farmers, but rarely among the landless. The landless labourers without assets were often denied access to such loans because they are not regarded as creditable in financial transactions.

In the study village, the predominant agricultural wage rate for landless labourers was 150 kyats per day. With this low wage, they often ran into the problem of having no money on hand (a liquidity problem). So there is a need for informal loans. How they can survive the liquidity problem?

“Do you sometimes need to borrow wages in advance?” Here comes the question for the landless labourers. Quite a high portion of the sample households replied “Yes” to this question. When a labourer borrows his wage of 150 kyats/day two months in advance, he obtains only 100 kyats. Therefore, the implicit interest rate is 25% per month – usurious, isn’t it? But without such credit, the labourers could not survive. This is the reality of rural credit markets, which evaluate the creditworthiness of potential borrowers and the opportunity cost of capital with a cool head.

If a micro-credit scheme extends the lending to such labourers at an interest rate of, say, 4% per month, it would be a huge improvement in their access to credit. However, fellow villagers may not be willing to extend no-collateral micro-credit loans to such persons because their inclusion may worsen repayment prospects. An institutional design is required to include the poorest of the poor into micro-finance schemes.

IV. Agricultural Support Services

A. Research and Extension System

Research and extension of agro-ecologically suitable and economically feasible technology for agriculture, livestock, fishery, and forestry is undoubtedly a prerequisite for accelerating agricultural development in Myanmar.

Myanmar has established a good research and extension system with the following agencies. The Myanmar Agricultural Service (MAS), under the Ministry of Agriculture and Irrigation (MOAI), is responsible for research and extension of annual crops. MAS has three research agencies: the Central Agricultural Research Institute (CARI), the Vegetable and Fruit Research Development Center (VFRDC), and the Central Agricultural Research and Training Center (CARTC). CARI has accomplished several influential achievements such as breeding high-yielding varieties and producing hybrid varieties. The Seed, Plant Protection, and Land Use Divisions of MAS also play crucial roles in the respective fields. The MAS has local offices down to the township level. The activities of 11,000 MAS field extension staff penetrate into the village tract and village levels.

Myanmar Sugarcane Enterprise (MSE), Myanmar Cotton and Sericulture Enterprise (MCSE), Myanmar Jute Industries (MJI), and Myanmar Perennial Crops Enterprise (MPCE) also have research stations for their mandatory crops and carry out extension works, although in a limited way. The Forest Research Institute, under the Ministry of Forestry, undertakes research and development activities in forestry and forest products.

The performance of these research and extension agencies is, however, far below the level required to achieve rapid agricultural development. Moreover, an organized research and extension system is lacking in the field of livestock and fisheries, although these are promising fields for future agricultural development.

There are several factors behind the unsatisfactory performance of the existing system for research and extension.

- 1) The budget is insufficient. With very few international and bilateral projects in this field, the cost of research and extension must be born by the central government. Because the

government budget situation is not favourable, this implies an insufficient research and extension budget.

- 2) Human resources are poor. The number of degree holders working at the research agencies is quite small. Quantified training courses are rare and access to overseas information is very limited. Therefore, the staff members of research and extension agencies have little opportunity to upgrade their knowledge and skills.
- 3) The majority of research and extension works are done on a single-crop basis and aimed at increased yield, improved quality, pest resistance, and tolerance to salinity and deep water. The farming system approach, which requires knowledge covering agriculture, livestock, fishery, and agro-forestry, is missing. The cooperation of research and extension agencies of different fields is crucial to the farming system approach.
- 4) The information flow between the research sector and the users, in which the extension sector is expected to play the major role, is impeded by administrative inflexibility. This results in a lack of perspective of economic feasibility by the research and extension sectors.
- 5) Cooperation between the government sector and private enterprises is not well coordinated. Both sectors work separately and pay little attention to each other. Private enterprises are strong in technology development and extension of commercialised farming such as vegetables and livestock. It is the role of the government sector to promote these enterprises by establishing the necessary institutional arrangements.
- 6) Participatory approach and capacity building of farmers are lacking in the extension works. Appropriate utilisation of indigenous knowledge and a community-level network is indispensable for effective and practical extension works under resource-limited conditions.

B. Agricultural Inputs

The availability of inputs necessary for production is critical for increased yield and improved quality of produce. The stable supply of farm inputs has been a major challenge for Myanmar agriculture.

The main government organisation that distributes agrochemicals is the Myanma Agriculture Service (MAS) under the Ministry of Agriculture and Irrigation. Subsidies on these farm inputs were removed in 1993. Since then, distribution by the private sector has been encouraged and agrochemicals can be imported tariff-free. As shown in Table 4.1, the total import increased slightly in the late 1990s. However, the level of private import is still insufficient, constrained by the lack of a distribution network, prevailing import and export regulations, and scarcity of

foreign exchange. Compound and organic fertilisers are available locally to supplement the insufficient amount of chemical fertiliser.

The dosage of chemical fertiliser is presently estimated far below the requirement. The average fertiliser application per hectare ranged between 21.0 kg and 53.5 kg in 1995/96-1999/00 (Table 4.1). This fertiliser dosage level is the lowest in Asia, and well below the optimum application level of 100 kg/ha suggested by the Ministry of Agriculture and Irrigation.

Table 4.1 Changes in Fertiliser Supply and Utilisation, 1995/96-1999/2000

	1995/96	1996/97	1997/98	1998/99	1999/2000
Total Fertiliser Supply (thousand MT)	274	189	480	283	468
Domestic Production (thousand MT)	143	117	123	131	139
Import (thousand MT)	131	72	357	152	329
Total Net Sown Area (thousand ha)	8,917	9,006	8,976	9,305	9,681
Calculated Fertiliser Dosage (kg/ha)	30.7	21.0	53.5	30.4	48.3
Memorandum Items					
Total Net Sown Area of Paddy (ha)	6,142	5,880	5,789	5,763	6,289
Fertiliser Utilisation: Paddy (kg/ha)	49.7	44.6	25.9	35.4	14.2

Notes: The figure for fertiliser utilisation for paddy is based on the supply from the state sector.

Source: CSO, Statistical Yearbook 2002, Myanmar Agricultural Statistics (1999, 2001)

The main reason for the limited usage of chemical fertiliser lies in the relative price of fertiliser to agricultural commodities. The prices of agricultural commodities are often too low for farmers to ensure a profit from the usage of the appropriate amount of chemical fertiliser. As farmers persistently face financial constraints, they are apt to reduce the dosage of chemical fertiliser to save on the production cost. An illustrative example of this can be found in the summer paddy cultivation in 2000. The relative prices have worsened in recent years as the price of fertiliser rapidly increases, reflecting the high import price under depreciation of the kyat. If this situation continues, the fertiliser application rate can not be expected to rise in the near future.

The demand for other agrochemicals, such as pesticides, is also low compared to neighboring countries. The annual usage is only around 800 metric tons. Due to the limited local production capacity, the majority of pesticides in the market are imported, but there have been cases in which imported chemicals did not satisfy the safety standard. To control their quality, legal measures have recently been introduced, the effectiveness of which must be closely monitored.

Presently, quality seeds are provided mainly by the Seed Division of MAS with the cooperation of MAS's Extension Division and the Central Agricultural Research Institute (CARI). MAS's Extension Division is responsible for organising the contact farmers for multiplication of certified seeds. CARI is responsible for the development of new varieties and multiplication of a class of breeder seeds. The Seed Division is mainly responsible for the foundation seed production and seed quality control. The present system needs improvement in three areas: 1) human resource development; 2) enactment of a seed law and a plant variety protection law; and 3) introduction of biotechnology for seed production and variety improvement.

The participation of the private sector should be further encouraged in order to facilitate market-oriented production by the farmers. Imports of seeds remain limited and unstable due to foreign exchange constraints and various import controls. Domestic seed industries have yet to be developed in Myanmar. Close cooperation between the private sector and the government agencies is necessary to achieve smooth and effective dissemination of quality seeds in the domestic market.

C. Agricultural Mechanisation

Draft power is presently the major means of cultivation in Myanmar. However, the government began encouraging farm mechanisation in the early 1990s to increase crop intensity and to ensure high quality produce. The Agriculture Mechanization Department (AMD) was established in 1972 under the Ministry of Agriculture and Irrigation. This department is responsible for promotion of farm mechanisation at the field level. Both government and private companies produce farm machinery locally, supplemented by imported machinery.

The government sector once dominated the distribution of farm machinery. However, as shown in Table 4.2, distribution by the government sector has been on a declining trend. The private sector, for both production and import, now plays a much larger role in distribution.

However, the usage of machinery remains limited. The primary reason lies in the lack of economical viability of farm mechanisation under the present economic status of the farmers. It is very important to note that farm mechanisation can only be promoted when its benefit to the farmers exceeds its cost. If farm mechanisation were promoted without consideration to economic profitability, it would be harmful to the farmers' welfare without benefiting the entire rural population. The optimal level and pace of farm mechanisation in Myanmar must be investigated

carefully, taking into consideration the prime objective of increasing farmers' income and welfare.

Table 4.2 Distribution of Farm Machinery by the State Sector*, 1994/95 - 1999/2000

Farm Machinery	1994/95	1995/96	1996/97	1997/98	1998/99	1999/2000
Tractor	1,252	-	31	131	500	-
Power Tillers	5,167	2,570	5,600	3,080	3,408	4,000
4 Inch Water Pump	3,200	2,091	602	489	17	-
Threshers	15	1,462	392	298	275	20
Paddy Dryers	135	806	-	-	-	-
Sprinkler	6,526	-	-	-	-	-

Source: CSO, Myanmar Agricultural Statistics, (1999, 2001)

*: State sector includes the AMD, the Ministry of Industry (2), and the Ministry of Cooperatives.

The farm mechanisation scheme must be specific to local conditions with different cropping patterns. The state sector has a large role in finding suitable (including the economic variability) machinery for each area. For example, in the paddy double-cropping area, threshers and paddy dryers would be in high demand because cutting the time of post-harvest operation contributes to minimising losses. The expansion of tillage services by government and private sectors may be welcomed in the pulse cultivation area where early tillage operation is necessary for high yield. To support further promotion, institutions for effective utilisation of machinery are necessary, such as a maintenance training scheme, an easily accessible loan scheme for purchases, and a promotion policy of domestic private production of machinery.

D. Agricultural and Rural Credit

There are various types of institutional/formal lending available for rural households. They include the Myanma Agricultural Development Bank (MADB), the Myanmar Livestock and Fisheries Development Bank (MLFDB), licensed pawnshops, savings & credit cooperatives, national non-governmental organisations (NGOs), and international NGOs.

MADB, which is a state-owned bank under the Ministry of Agriculture and Irrigation, is the major source of agricultural credit. There are three types of loans that MADB provides: seasonal crop loans, term loans, and area development loans. The total amount disbursed under the seasonal crop loans was 12.124 billion kyats in 2000/01. Under the term loans, 6.126 billion kyats were disbursed and under the area development loans, 38.7 million kyats were disbursed, as of March

2000.

Seasonal crop loans are the major source of funding for farmers. They are repayable within one year, and cover major crops such as paddy, groundnut, sesame, some pulses, long staple cotton, jute, etc. However, in practice, the coverage of crops and amount of the loan for each farm household is different from region to region and year to year. The problem is that the crop loan covers less than 10% of the actual production costs on average.

MADB also provides term loans: short-term for 2 to 4 years and long-term for 5 years and above. The term loans are for investment for farm development. For example, the loans are used for purchase of farm implements, orchard plantation, solar salt production, establishing small livestock and fish farms, etc. These loans are disbursed only with security. Utilisation of this loan is not pervasive thus far.

MADB's inadequate outreach in terms of number and depth is due to its loan disbursement and loan recovery policies. It prioritises repayment capacity, demand and production orientation of the client farmers in loan disbursement, but does not tolerate loan delinquency in recovery. The majority of client farmers are generally poor but they are not the poorest of the rural populace. MADB has 205 township branches throughout the country, with over three thousand staff members and one hundred thousand group leaders having completed in-house training courses. MADB considers the expansion of its branches in townships depending on cost-effectiveness. If the interest rate policy is sufficiently favourable for savings mobilisation and increased revenue of client farmers, MADB's outreach can be extended in terms of number and depth.

Shortage of funds is the most critical problem. The reasons for MADB's insufficient funds may include its interest rate policy, its limited capacity for savings mobilisation, and also its dependence on the scarce government budget for additional loan sources.

The interest rates of MADB are currently determined by the prescription of the Central Bank of Myanmar. The lending rate is presently 15% while the savings rate is 9% per annum. Both imply negative interest rates in real terms, given the current inflation rate estimated at 20-30% per annum. The negative interest rates are partly responsible for the insufficiency of MADB funds. Raising interest rates would automatically increase the revenue from lending, while attracting savings to some extent. Although the appropriate lending rates must be determined after close examination, the hike may not affect farmers, provided that the loan amounts available to farmers

would increase from the present level.

As a measure for savings mobilisation, a voluntary savings scheme was launched in 1993. However, farmers have little interest in saving at banks due to the negative real interest rate. If the client farmers have surplus, they would rather invest in agricultural produce, gold, jewelry, or cars. In order to attract the rural population to save in banks, long-term development plans must be designed. The savings can then be diversified and utilised effectively for the development of the national economy.

The role of institutional lending agencies other than MADB is also limited in terms of coverage and loan amounts thus far. For the livestock and fisheries sector, MLFDB is the responsible agency. It was only recently established by the government in 1996 and provides loans for entrepreneurs in livestock and fisheries sectors. The bank provides short-term, mid-term, and long-term loans at 15% per annum. The amount of loans provided by the bank was 365.9 million kyats in 1998/99 and 4829.7 million kyats in 2001/02. The scope of loans is still confined and MLFDB faces problems similar to those of MADB, such as shortage of funds, negative interest rates, and lack of savings mobilisation.

Due to the limited availability of formal credit, producers, especially those who are without a solid financial background, have to rely on informal lending sources such as relatives, friends, and traders, by paying high interest rates ranging from 5 to 15% per month (see Box 6). *Repayment of the interest for these informal loans often squeezes the slight profit that farmers earned from production.* Along with the improvement of MADB operation, promoting the involvement of private banks in agricultural financing and designing small-scale credit schemes for agriculture-related financing would benefit the rural population considerably. Expansion of institutional loans that are easily accessible to the rural people is of vital importance.

E. Agricultural Marketing

1. Overview

Agricultural marketing plays a vital role in enabling the smooth flow of agricultural commodities for domestic utilisation and for external trade. In Myanmar, agricultural marketing was regulated by the state under the centrally planned economic system. After the adoption of the market-oriented economic policies in 1988, the government introduced several reform measures to reduce its direct involvement in the national economy, including the area of agricultural marketing. The

private sector now plays a much larger role compared to the previous period. The current marketing system is broadly categorised into two areas according to the major marketing participants (Table 4.3).

Table 4.3 Types of Marketing Systems

Type	Domestic Transaction	External Trade		Commodities (examples)
A	Private	Private, Government	Export	Pulses and beans, Oil seeds, Fruits, Vegetables, Fishery and livestock products
			Import	Palm oil, Wheat flour
B	Government, Private	Government		Rice, Sugarcane, Cotton, Jute, Rubber

Domestic marketing

Generally speaking, the share of the private sector in domestic marketing is high. Private agents market pulses, oil seeds, fruits, vegetables, livestock, and fishery products. The number of marketing agents engaged in agricultural commodity transactions is increasing year by year. These agents compete with each other, in a market where there is minimal room for monopolistic behaviour. The present system of domestic marketing by the private sector is reliable for the smooth flow of commodities, although room for further development still exists. For example, standardisation of units and measures, dissemination of prompt market information, infrastructure development, and establishment of a systematic wholesale market are required for further improvement.

Domestic marketing of certain commodities is still under the partial control of the government. Such commodities include paddy, cotton, sugarcane, jute, and rubber. There are specific state enterprises responsible for the procurement of each of these commodities. The common problem is the disparity between government and market prices. The government price is generally lower than the market price and as a result, procurement bodies incur large administrative costs to maintain the system, while growing farmers must face a kind of implicit taxation without transparency.

Export

Export of agricultural commodities is one of the important sources of foreign exchange revenues of the country, accounting for 18.9% in 2000/01. If the export of marine, livestock and forest products is included, the proportion increases to 33.3% for the same year. The current major

agricultural export commodities are pulses, rice, maize, sesame, niger, onion, and dried chili.

Among these commodities, pulses and beans are the sole ones left largely free for the private sector. Black gram, green gram, and pigeon pea are the major exported varieties, mainly to India, Singapore and Indonesia. Presently, Myanmar is one of the biggest pulse exporters in the world.

On the other hand, the export of other major commodities is still under government control in some way or another. The major reasons for the high level government intervention are: 1) concern for food security; 2) requirement of foreign exchange revenues for the state sector; and 3) supply of raw materials to the state sector. The concern for food security (or self-sufficiency) is reflected by the restriction placed on rice and sesame export by the private sector. In order to obtain foreign exchange earnings, the central government allots a quota of foreign exchange earnings to each ministry and organisation every year. Additionally, an export tax is levied on the total export value on government (8% tax rate) and private (10%) exports.

The private sector makes intense efforts to find markets and commodities to export that can compete in the international market. However, the combination of the export tax, restrictions on private export of promising commodities, and frequent changes in trade policies hinders further expansion of trading activities. Any change in trade policies should be consistent with the overall objectives of the market-harmonised approach and should be transparent.

2. Marketing of paddy/rice

Myanmar has a surplus in rice when judged at the national level. However, because some areas (central Myanmar, hilly regions and the Tanintharyi Division) are deficient in rice, there is a regular flow of bulk rice from the surplus areas (Ayeyawaddy, Bago and Yangon Division) to these rice-deficient areas. The private sector handles this marketing from farm gate to consumers.

At the farm level, the government procures a certain portion of paddy directly from the farmers. The executing agency for paddy procurement is Myanma Agricultural Produce Trading (MAPT) under the Ministry of Commerce. The main purpose of paddy procurement is to supply rice to government employees, hospitals, and other social welfare institutions at a subsidised price. The procurement price is usually about half the market price. As a result, the present scheme leads to the production of low-quality rice, which creates a disadvantage for export and domestic consumers. Moreover, in order to maintain smooth operation of the procurement system, the government bears the huge cost, which includes the costs of making contracts with individual

farmers, enforcing the contracts, monitoring the procurement operations, arranging rice milling, storage, and distribution, etc. Not only the monetary costs, but also the human resource costs spent in these activities, are immense. Therefore, other schemes should be explored to benefit consumers and producers, such as purchasing rice from traders at market prices.

The current policy of increasing rice production places a big strain on the farmers (especially in the case of double cropping of paddy), because the paddy price is low and countervailing subsidies are missing. It should also be noted that encouraging rice production throughout the country irrespective of the suitability of the specific area (i.e. regional rice sufficiency policy) inevitably pulls down the price, given the demand for rice. The downward pressure on rice prices functions as an implicit taxation on the farmers in the major rice producing areas whose dependency on rice income is high. Therefore, a measure is required to stabilise the price of rice at a level that assures profit to producers while remaining affordable to consumers.

One way to achieve price stability to benefit producers would be to increase the level of rice export from the current level. Needless to say, increasing the export will also contribute to earning foreign exchange. In this case, rice production in line with the international market demand is critical. Market research, market information, improvement of rice milling and storage, quality control, and standards weights and measures are indispensable.

The disparity between international and domestic rice prices has been quite large. If the domestic wholesale prices in Myanmar for 1997-2001 are converted at the market exchange rate, the prices of medium class rice range from 37-67% of the price of Thai broken rice. Therefore, full-scale rice export liberalisation would definitely increase the domestic price in the short run. The price increase, however, would certainly stimulate rice production in more quality-sensitive way. The contribution to the foreign exchange would also be higher. However, the short-run price increase could have a negative impact on the welfare of consumers, especially for those in the low-income class. Therefore, a gradual export liberalisation measure, taking care not to affect the living standards of the low-income class, should be designed.

The private rice-milling sector needs further development. While the number of small mills in rural areas has increased dramatically in the 1990s, most large mills with a capacity of 25-50 tons per day suffer from outdated facilities and deteriorating milling quality. For those mills that handle milling for government-procured paddy, the high transaction costs with the government and the low milling charges can be somewhat of a burden to their business. Gradual export

liberalisation associated with changes in the procurement scheme would encourage private rice mills to invest in their facilities, leading to higher-quality rice.

3. Marketing of oil seeds/edible oil

The government considers edible oil as the second most important food item after rice in Myanmar. Oilseed crops, such as groundnut, sesame, sunflower, niger, and mustard, are produced as raw materials for edible oil as well as for some traditional diets. As the main processing area of edible oil is located in central Myanmar and Yangon, the domestic supply of oilseed flows from the production regions to central Myanmar and Yangon, and then the supply of edible oil flows from central Myanmar and Yangon to other parts of the country. The domestic flow is handled entirely by the private sector.

Since domestic production of edible oil is insufficient for the requirement of domestic consumption, *palm oil is imported from neighboring countries, mainly from Malaysia. The major importer of palm oil is Myanmar Economic Holdings Ltd. (MEH). The annual import of palm oil in 2001 was 132,007 metric tons, while the domestic production is estimated at 48,800 tons. Palm oils produced domestically are yet to be processed into edible oils due to the absence of refinery plants for commercial production. The import of palm oil amounts to approximately 60% of the export revenue from pulses in the past 10 years.*

Prices of edible oils in general fluctuate widely. This is because both the domestic production oilseeds and the import volume of palm oil fluctuate. Especially in 2002, due to the foreign exchange constraint, the import of palm oil declined compared to previous years, resulting in a surge in prices for edible oils, which increased by about three times compared to the same period of the previous year.

Given the high preference in Myanmar for meals cooked with a large amount of edible oil, stabilisation of its price is an important policy issue. Importing cheaper edible oil while promoting the export of oil seeds to earn foreign exchange for the import would be a possible policy option. In this regard, it is important to remember that Myanmar sesame seeds once obtained a reasonable share in the international market. It may be worth considering the possibility of allowing the private export of sesame at full scale, which would certainly provide incentives to increase production both for domestic and foreign markets.

Not only the increase of oilseed production, but also the improvement of processing facilities is

important. Encouraging the renovation of aged oil mills, for instance through low interest loans, is worth consideration for improving productivity. At the same time, solvent extraction plants and modern refineries are required to produce other vegetable oils such as soybean oil, cotton seed oil, and rapeseed oil. These edible oils may have potential in the domestic markets.

4. Marketing of industrial crops

Cotton, sugarcane, jute and rubber are also under the government procurement schemes. The responsible agencies for the procurement of these crops are Myanma Cotton and Sericulture Enterprise (MCSE), Myanma Sugarcane Enterprise (MSE), Myanma Jute Enterprise (MJE), and Myanma Perennial Crops Enterprise (MPCE), respectively. They are all under the Ministry of Agriculture and Irrigation. The main objective of the procurement of these industrial crops is to provide a continuous supply of raw materials to the state-owned factories at low prices and also to contribute to foreign exchange earnings.

For cotton and sugarcane, farmers in the designated zones are instructed to cultivate these crops and they must meet the quota levied upon them every year. The prices offered by the government are usually below the market prices. The disparity between private and government prices is sometimes large enough to force the farmers to switch to more profitable crops. If this happens, the responsible agencies face numerous difficulties in enforcing the contract. In the case of sugar, several sugar mills have been established recently in the state sector utilising foreign assistance, and failure to achieve the procurement target (= production target) would affect the repayment schedule that is due in the form of sugar at the prevailing international price. The procurement system needs to be revised with more flexibility in the procurement price level in order to minimise the disparity between procurement and market prices.

The present procurement scheme also has an adverse effect on the private sector, particularly in the case of cotton and sugarcane. For cotton, the procured amount from farmers tends to be short of the government target. In an effort to meet the target, the responsible agency makes arrangements to buy cotton from traders for the prescribed amount in return for the provision of a trading license. The price paid to the traders is the same as the government price paid to the producers, meaning that the traders have to face the loss. In the case of sugarcane, the establishment of new sugarcane factories and the expansion of procurement zones in the late 1990s forced private traders to search for a new supply area, resulting in an unstable supply of raw material.

F. Agro-Industries and Rural Industries

Agro-industries in Myanmar are composed mainly of processing and manufacturing of agricultural products, i.e. rice milling, oil milling, sugar factories, flour milling, and many other industries. They also include processing industries for industrial raw materials such as cotton, jute, rubber, and palm oil. The production of medicinal plants and forest products may also be included in the agro-industry group. Agro-industries could be defined in a wider sense as well, to include agro-related industries such as manufacturing of agricultural machinery and equipment, and manufacturing of food processing machinery and equipment. Agro-industries that are located in rural areas are defined as rural industries, focusing more on their linkage with rural economy and rural industrialisation.

Among the existing agro-industries, foodstuff industries form the largest group with rice milling and oil milling occupying the most important positions as essential food items. There is an increasing consumption of wheat flour with the establishment of modern flour mills in the private sector. There are also state-owned flour mills. Although wheat is grown in Shan State and the Sagaing Division, it must be imported to meet the domestic demand. Production of fish and meat products are also increasing, including processing of marine fish and prawns for export.

Nevertheless, detailed information on agro or rural industries in Myanmar is still lacking. Therefore, a sample survey of 620 food industries was conducted in 2001 in collaboration with the UMFCCI, in order to determine the current situation of the industry and to identify constraints faced by the industry. To cover non-food industries that have strong connections to the rural economy in Myanmar, an additional sample survey was conducted in 2002, covering approximately 200 rural industries engaged in copper casting/striking, lacquer ware, hand-weaving textiles, etc.

The sample surveys revealed the following problems faced by these industries:

- Lack of adequate infrastructure, particularly electric power;
- Difficulty in procurement of raw materials, both of local and foreign origin;
- Lack of foreign currency to import machinery, spare parts, and raw materials;
- Need for stable government policies and regulations;
- Lack of access to banks and other low-interest loans;
- Lack of up-to-date technology and modern machinery and equipment;

- Shortage of skilled labour with proper work attitudes, and other labour problems, including job hopping;
- Lack of management capabilities, especially in marketing and productivity management;
- Inadequate research and development for innovations and higher-quality products;
- Lack of following other infrastructures:
 - (a) Good transportation and communication systems
 - (b) Improvement of water supply and sewage systems
 - (c) Supply of sufficient fuel, such as diesel oil.

There are obviously many policy measures to be adopted and new state and private institutions may have to be formed to provide necessary assistance and support for the rapid development of agro and rural industries. The government ministries and departments concerned with the development and control of these industries are numerous, such as the Ministry of Agriculture and Irrigation (sugar, rubber, palm oil, cotton, jute, silk, tea, coffee, etc.), the Ministry of Commerce (rice mills, bran oil mills, animal feed mills), the Ministry of Industry (1), the Ministry of Industry I and II, (2), and the Ministry of Cooperatives. Further coordination in industrialisation policies is desirable among the concerned agencies. Other government support measures are as follows:

- (1) Institution of an organisation for promotion and marketing of products from rural and small-scale industries;
- (2) Linkage of rural industries with SMEs in towns and cities;
- (3) Locating of larger industries near promising rural areas;
- (4) Formation of industrial clusters at township levels;
- (5) Creation of training centers including holding of seminars and workshops for rural industries;
- (6) Enactment of laws for promotion of rural industries;
- (7) Support for the creation of rural industry associations;
- (8) Allocation of land for promotion of rural industries.

From the sample surveys, the huge potential in developing agro and rural industries was clarified. Some of the actions that can be taken in the near future include encouraging the establishment of modern rice mills in the private sector for high-quality rice export, expanding modern storage and processing facilities for agricultural commodities, establishing an entrepreneurship training center for enhancing the management capabilities of entrepreneurs, drafting master plans for development of agro-industries by a group of consultants, etc. Feasibility research for new agro-industries, such as starch products or dairy industries, etc, is also promising because there is a

large variety of agro-industrial products that could be manufactured not only for local consumption but also for export. Economically viable projects should be chosen and developed.

G. Monitoring Agricultural and Rural Economy (GIS)

To monitor national agricultural activities, every department, agency, and enterprise under the Ministry of Agriculture and Irrigation (MOAI) individually collects agricultural information relating to its responsible activity. But the resolution of data available in each central office varies from land parcel level to division/state level, depending mainly on its administration network of local offices and organisational responsibility. For example, the Myanmar Agriculture Service (MAS) has a nationwide network of local offices at the township level, whereas the Department of Agricultural Planning (DAP) has no local offices.

As a leading planning department under the MOAI, the DAP has been regularly collecting and reporting agricultural statistics for many years, but systematic integration of data by lower-level local administration units has not yet been organised. Under the Structural Adjustment Programme, task force members of both Myanmar and Japan found that there was an urgent need to integrate precise information on rural areas through spatial distribution. However, as of April 2001, there was neither GIS-oriented computer facilities nor experienced personnel in the DAP.

As GIS development is one of the critical solutions, the GIS room was launched in the DAP, and the pilot phase of an exhaustive nationwide rural survey covering demography, agricultural input and output, social infrastructure, rural economy, and so on, was designed. Data on Myanmar agriculture, collected from seven districts, was compiled into the very first GIS: the Myanmar Agricultural and Rural Economy Study (GIS-MARES).

Integration and sharing are important principles of successful and progressive GIS development. Like hard infrastructures such as railway, road, and irrigation systems, basic geo-reference information for the GIS including administration boundaries, railways, roads, rivers, coastal lines, etc. should be recognised as a national infrastructure since it is both a labour-intensive and capital-intensive task.

Seasonal decision-making by officers and farmers can be achieved based on the accurate and timely information born from an organised network of GIS management. There are two stages to the GIS. One is the development of an overall framework, that is to say, establishing routines for

collecting data, integrating data, and creating outputs. The other is the creative feedback to academic, administrative, and practical discussions. The stages affect each other and stand simultaneously in the process of GIS development.

At present, the DAP is accumulating experience with GIS application in a general way. A semi-official committee for users interested in GIS under the MOAI was organised for the exchange of opinions, technical issues, and practical collaboration. It is a remarkable step since inter-departmental collaboration is an indispensable key to developing a competent GIS on agriculture. This direction needs to be further promoted.

V. Major Challenges: Issues and Necessary Structural Adjustment

Myanmar's agricultural sector has a huge potential to achieve sustained production growth of over 5% per year in the next 10-15 years, thereby contributing to the national economy in improving people's welfare on a continuing basis. In achieving this target of agricultural production, due consideration should be given to major factors such as land development, proper irrigation management, and concerted actions to increase per-hectare yields. Technically, these goals will be achieved through the following elements: sound selection of land use and cultivation practices for different agro-ecological zones; usage of quality seeds of high-yielding varieties; acquisition and usage of appropriate fertilisers and other chemicals in the right dosage and at the right application time; proper cultivation, harvesting, and marketing practices including post-harvest technology, milling, and processing, etc.

To realise these goals, adjustment of certain policies and strategies is of vital importance because the above-mentioned elements cannot be delivered solely by the state without coordinating efforts by individuals. Individuals make sincere efforts only if they are given proper incentives. Farmers need security and freedom in agricultural production so that they can reap the full rewards of an improved production environment. Traders require a foundation of fair and active competition so that they can serve the role of intermediary efficiently. Consumers need flexibility in their choices without the fear of undue fluctuations in the price and supply of essential commodities. Capital and market information must circulate smoothly through the entire economic chain. Areas in which structural adjustments are needed were summarised in the introductory section of this report together with Figure 1.2. In the final part of this report, these areas are listed again with emphasis on concrete measures in agriculture itself.

Box 7 Booming Rural Villages - Examples of Market-Driven Development

The introduction of market economy in the late 1980s surely had a positive effect on the rural economy in parts of the country.

Several good examples were observed in the field surveys: vegetable production in Kalaw and Nyaungshwe, poultry production in Taunggyi, and chili (dry) production in Kyaukse. There is literally no government intervention or control over production and sales of these commodities. Market-driven demand for these commodities stimulates the local economy, providing a valuable source for cash income to the rural population. Let us take a closer look at these examples.

Continued

Box 7 Booming Rural Villages - Examples of Market-Driven Development

In the case of vegetables, the production boom occurred in the mid-1990s, along with the expansion of consumer markets in large cities, supported by the improvement of infrastructure. Farmers introduced new varieties of cabbage, tomato, cauliflower, etc. that sold well in the market. They used seeds in colorful packages, mostly imported through normal or border trade from Thailand. Although the production of vegetables incurred high production costs, the farmers managed to cover it by using credit from traders and wholesalers. Producing vegetables brought sufficient profit to the growers even though they were forced to rely on informal credit with interest rates at 4 to 6% per month. The number of traders/brokers engaged in the vegetable trade has also increased in the past few years. Every morning, bullock carts fully loaded with vegetables arrived one after another at the brokers' house. Brokers are kept busy checking the volume and handing receipts to the farmers. One of the brokers recently opened his own shop in the Mandalay market to reduce the transaction costs and used his own pick-up truck to send the purchased vegetables every day. After the increase in vegetable production, farmers constructed new houses or renovated their old ones. Many of the houses were surrounded by huge homesteads, in which various types of vegetable were cultivated.

Dry chili production in Kyaukse has also increased since 1993/94, driven by the export demand. In the study village in Kyaukse, farmers with increased income from chili could afford to use common electricity-generating facilities only a few years ago. Villagers could now enjoy CD-oke in their leisure time. Fewer farmers were interested in the meager amount of a crop loan provided by the state bank. Villagers were less interested in low-wage work such as rice transplanting. Instead, migrant labourers came to work in the village for a particular season or work. Similar to the case of vegetables, the number of brokers has rapidly increased in the last few years, providing wider income earning opportunities. Infrastructure improvement, such as roads and telecommunications, also contributed to market expansion. As a result, the total volume of transactions quickly increased in the area. One broker in the study village was able to expand his business and started to deal directly with wholesalers in Yangon.

In the case of poultry production near Taunggyi, a private foreign company has been making contracts directly with farmers since 1997. Once an agreement was reached, what farmers had to do was build the poultry house designed by the company, costing 30,000 to 40,000 kyats per house, and provide the water, land, and labour. The company provided the chicks, feed, medicine, feeder (the cost of the feeder was deducted from the profit later), and overall technical guidance, which included the timing of feeding, temperature control, vaccination, etc. As the instructions of the company were finely textured and not too difficult to follow, more and more villagers seemed became interested in the business with the expectation of earning a high income. The estimated annual income was 100,000 to 900,000 kyats, depending on the type of production. In one sub-village along the road, 13 households out of 30 were engaged in this type of poultry production. The amount of chicken meat production was still just enough to meet the local demand. Thus, there is further room for expansion of poultry production in the area.

A. Land Policy and Land Resource Development

The establishment of a land policy for farmers, guaranteeing clear and transparent land rights that allow liberal land use by the farmers and that enables the government to rationalise land taxation, is a fundamental need for agricultural development in Myanmar, even when the state continues to function as the ultimate owner of all natural resources, including land. More freedom in land use and clearer land-use rights protected by a legal system are prerequisites for farmers to invest in their land and to improve their productivity.

In addition, legally protected land-use rights permit the transfer of these rights and the use of land lease as collateral for loans. The legal transaction of users' rights contributes to a situation in which more efficient farmers are able to produce more volume. The use of land rights as loan collateral would reduce credit constraints faced by producers throughout the country.

The role of private entrepreneurs in developing land resources needs to be evaluated carefully in the interest of efficiency and suitable growth. The results from the Rural Micro Survey conducted under this project (see Section III) show the superiority of small farmers in paddy production. A well-designed land development policy is required, involving (i) large private estates, (ii) peasant farmers (both small- and large-scale), and (iii) settlement of landless labourers on newly reclaimed land. Such a policy should encourage cost bearing by beneficiary farmers in land development.

Box 8 FELCRA in Malaysia

FELCRA (Federal Land Consolidation and Rehabilitation Authority) is a government organisation concentrating on the rehabilitation of idle land and estates, which used to be developed by numerous programmes and authorities including FELDA (Federal Land Development Authority). It is a profit-making organisation carrying out social obligations with a citizen-friendly approach. The objectives of FELCRA are as follows:

- To generate higher returns on projects being developed;
- To upgrade the quality of life in the rural community;
- To improve the productivity level through efficient and state-of-the-art technology;
- To expand the technology of land consolidation and management to foreign countries;
- To improve the economic value-added of the organisation.

Continued to Box 8.1

Box 8.1 FELCRA in Malaysia

The activities of FELCRA are very unique in Malaysia's plantation industry, because besides striving hard to create a flourishing plantation sector, other goals include enriching new business areas in and outside Malaysia in addition to improving the lives of small holders.

A FELCRA project in Jeniang, 80 km away from the city of Alor Setar near Penang, has been dealing with plantation crops, namely rubber, covering 749 acres and palm oil covering 91 acres. In that project, the land is owned by small holders who were able to obtain loans, technology, and farm machinery from the project after signing the contract, but were required to provide their land as collateral to the project. The grace period for the loan is 5 years for rubber and 3 years for palm oil. Moreover, repayment is very flexible especially during the initial years because of the low yield at that stage. The repayment rate is 100% for all participants in the project, which also takes care of the marketing.

FELCRA created access to money, technology, proper equipment and market for small holders in Malaysia.

B. Irrigation and Water Resources Development

The establishment of a comprehensive water policy is required, covering not only agricultural irrigation but also other uses of water resources. Although it has increased substantially in recent years, the share of irrigated land to total cropped area in Myanmar is still low in the Asian context. Under the current system of an irrigation fee at the nominal sum of 10 kyats per acre, further expansion of irrigation through 100% public investment places a huge burden on the national treasury. Through the rationalisation of the irrigation tariff structure and the promotion of farmers' irrigation management including the promotion of water users' associations, this subsidy should be shared by all the stakeholders, particularly the beneficiary farmers. The resources made available from these adjustments can be utilised in improving the system losses, expanding the area under irrigation, and updating farm-level facilities. The programme should cover all types of irrigation, flood protection and drainage including simple low-lift pumps that are inexpensive, immediately operational and mobile and usable in several locations. An in-depth review of water taxation, particularly irrigation tax, is essential.

C. Agricultural Support Services and Input Supplies

The entire range of support services, covering research, extension, input supply including seeds,

agro-chemicals, credit, and training for technical staff, as well as farm and agri-business entrepreneurs, should be analysed and reviewed in respect of required maintenance and upgrading to ensure reliability and effectiveness. As the first step, an in-depth review and preparation of detailed project/programme proposals should be undertaken.

(i) Research & development and extension. In research & development (R&D), the intensification of production and diversification of farming systems should be the strategy of agricultural technology, which would be effective if the technology is developed in a way that is suitable to the local conditions of soil, water, and climate, and economically feasible for the farmers meeting the market demand. Placing more emphasis in R&D in agricultural diversification necessitates a shift of attention from rice to non-rice crops and from crops to livestock and fishery. In extension, the main points to be covered are staff/farmer training and field demonstrations. The extension system should avoid paying too much attention to increasing production. Rather, it should be designed to enhance the income of the farmers and the welfare of the rural population.

A National Agricultural Research System should be set up that consists of organisations and institutions created or funded by the government or both, to generate improved production technologies and provide for a national programme of agricultural development, the size and organisation of which must be compatible with the nation's development objectives and available resources.

(ii) Chemical fertiliser and seeds. The current level of fertiliser use (ranging between 21.0 kg and 53.5 kg per ha during the past 5 years) is well below the optimum level of application. Distribution of farm inputs such as chemical fertilisers, pesticides and seeds that were formerly handled solely by the Myanmar Agriculture Service (MAS) is being dramatically transferred to the private sector while subsidies on farm inputs are being removed. However, lack of sufficient incentives, lack of credit, and inappropriate extension services place constraints on the farmer's ability to use the optimum level of fertiliser. The private sector is permitted to import and distribute fertiliser but its ability to do so is restricted by the lack of a distribution network, prevailing import and export regulations, and scarcity of foreign exchange. Amelioration of the stagnating circumstances needs to be addressed. The current level of quality seed provision is also well below the desired level. In this area, the harmonisation of the private and state sectors is necessary to enhance the supply capacity. Due consideration to a seed industry development policy should be given to the international standard for intellectual property rights.

(iii) Agricultural credit. Availability is the biggest problem. The prevailing credit constraints are observed not only in the crop sub-sector but also in the livestock and fisheries sub-sectors. For example, the present seasonal crop loan is less than 10 percent of the production cost of a typical paddy farm. The institutional framework as well as that capital funds must be strengthened, including lending by the Myanmar Agricultural Development Bank (MADB). It is also of critical importance to create an appropriate environment to facilitate greater involvement by private banks. For these purposes and for savings mobilisation, the removal of interest rate regulations could become a key policy adjustment. The option of making small-scale agricultural credit an ingredient of micro-finance projects is worth consideration.

D. Procurement Policy and Government Revenues

According to the Rural Micro Survey conducted under this project (see Section III), the present procurement procedures for paddy place a heavy burden on the farmers. There is also evidence that export restrictions on rice imply a huge additional export tax, which does not go to the treasury as they are an implicit tax. The present quota system for procurement leads to the production of low-quality rice that is often not acceptable for export or for urban consumption. Therefore, it is recommended that measures be taken to stabilise rice prices at a level that assures profit to the producers while remaining affordable to the consumers.

Given the detailed land records maintained by the Settlements & Land Records Department of the Ministry of Agriculture and Irrigation, land revenue based on the value of land would be more feasible and would overcome the cumbersome procurement policy that is less preferred by the producers. An alternative procurement system, in which milled rice would be purchased from traders and millers at market price, is worth further investigation. Procurement from rice-deficient areas does not have economic rationale, considering the farmers' burden and home-consumption orientation in such areas. The rice-oriented policy with the goal of achieving regional rice sufficiency in these marginal areas would be better off suspended.

Given Myanmar's potential for agricultural production, there is little risk of gradual export liberalisation leading to domestic shortages. This is evidenced by the experience in export-oriented pulse production. In fact, as shown by the recent experience of Vietnam, export liberalisation can lead to a substantial increase in production and export of rice, without any adverse effect on food security for the country. Trading, taxation, and fiscal policies should compliment each other. If necessary, a measure could supplement such a policy mix, in which rice prices are

Box 9 A True Story of the Rice Export Boom in Vietnam

Although Vietnam was a rice-importing country until 1988, it suddenly became the third largest rice-exporting country in 1989. It is well known that this change was caused by the 1986 policy reform called Doi Moi in Vietnamese. There is no doubt that various policies implemented as Doi Moi have promoted the increase of rice production and export.

However, in a more detailed look at what the policy actually contributed to the increase of rice production, the picture is not as simple as it originally seemed. One example is the relationship between agricultural growth and policies to scrap a group farming system managed by the cooperatives and then to give land-use rights to farm households. As the national level of rice production and export has rapidly increased since 1989, it is often said that because long-term land-use rights were given to farmers and households became the unit of farm management, high incentives for farmers to produce resulted in a marked increase in agricultural productivity.

In the Mekong Delta in the southern part of Vietnam, however, cooperatives had been practically scrapped since the early 1980s and individual farmers have managed their own farmland since then. They could sell the surplus of products and rice production increased gradually.

Better infrastructure for rice production is also essential. In the Red River Delta, the irrigation and drainage system was substantially improved even in the 1960s when there was heavy aerial bombing during the Vietnamese war. This improvement enabled double cropping of rice in the entire delta area in the 1970s. In the Mekong Delta, irrigation and drainage facilities were improved in the 1980s. One of the most famous places is a vast area called Dong Thap Muoi. Until the 1980s, this was an unproductive area where farmers were only able to grow floating rice varieties because of acid sulfate soil and deep water. The improvement of water facilities and introduction of new cultivation techniques drastically changed the area into a highly productive one with double cropping of rice. Improvement of infrastructure for rice cultivation had been going on in both the north and the south before Vietnamese rice created a sensation in the international market in 1989.

Under these conditions, the Vietnamese government introduced a market-oriented economy under Doi Moi, and the result was the export boom of rice in 1989. This was not caused by a single policy, but by an accumulation of various efforts. The government of Vietnam has carried out trial and error procedures during the process of socialisation since the 1950s. Simply speaking, it was a process of searching for how to harmonise the state and private sectors. The sensational increase of rice export and production in Vietnam is a good example for the state sector's two important roles: investing steadily in basic infrastructure and promoting the private sector through incentives, not through instructions.

stabilised at a level that assures profit to the producers while remaining affordable to the consumers.

For other crops, especially cotton and sugarcane, the current procurement system with rigid quotas on farmers needs to be re-considered. The role of state enterprises should be minimised in accordance with the state/private harmonised approach (see Section I).

E. Infrastructure Access, Agricultural Mechanisation, and Agricultural Processing Facilities

Due to the shortage of funding, Myanmar's agricultural sector is faced with an insufficient and low-quality supply of infrastructure access, agricultural machinery, and agricultural processing facilities. The problem is better understood by distinguishing two dimensions of agricultural investment: (1) investment in agriculture vs. investment for agriculture, and (2) public vs. private investment (farmers and private enterprises).

Investment in agriculture includes land and water resources development, R&D, agricultural input industries, and agricultural mechanisation. The first three have already been discussed where the role of the public sector is the highest in R&D. Enhancing farm mechanisation with appropriate technology is a pre-requisite for both horizontal and vertical expansion of agricultural production. The role of the farmers (actual investors) and private enterprises (developers and suppliers) should be more significant in this area, requiring proper policy and strategy for the *development of agricultural mechanisation*.

Investment for agriculture includes transportation, communication, and electrification. Rural as well as farm roads are in extremely poor condition, which hampers access to markets and processing facilities. Better communications are a must for all sectors. Electrification in Myanmar, both urban and rural, is also lagging behind all other Asian countries. Therefore, more resources should be allocated to investment for agriculture. Since the role of public investment should be larger in these areas, a careful re-examination of the current budget allocation among the sectors is required.

Investment in agricultural processing facilities lies between investment in and for agriculture. Most of the facilities in Myanmar are inadequate in terms of both quantity and quality, which seriously affects competitiveness and prices obtained by farmers as well as export earnings. Rice

milling, oil extraction, and other agricultural processing facilities are presently in poor condition due to long years of inadequate maintenance and modernisation, a result of a lack of liberalisation and funding. A comprehensive assessment of agro-based industries is needed to determine the requirements for modernisation and expansion programmes. This should also cover opportunities for agricultural and rural diversification, including the livestock and fisheries sector (including fishponds). The assessment should be implemented under the state/private harmonised approach, leaving the role of main investor to the private sector.

Box 10 Diversification of Rural Economy in Shifting-Cultivation Areas

Shifting cultivation is the principal mode of farming in the villages in Chin State visited by the taskforce team in September 2002. Local people produce corn as their staple food. Each household produces 20 to 50 baskets of corn from 1 to 2 acres of shifting-cultivation fields. This production is about 30 to 80% of their home consumption, so that their farming is not self-sufficient. Shifting cultivation is, generally speaking, difficult to intensify and its maximum yields are 1.5 t/ha of upland rice and 2 t/ha of corn. The major reason why people in Chin cannot be self-sufficient is the size of their farms; they are smaller than in other mountainous regions in Southeast Asia. This finding implies that supplemental cash income is indispensable for Chin people to maintain their living.

There is a wide range of diversified farming activities and promotion of these activities should be a major focus of agricultural development of Chin State. Promotion of the expansion of *terrace paddy fields* should be the first priority of agricultural development, although reclamation of terraced fields and producing lowland paddy under the current conditions are not environmentally sustainable. *Animal raising* such as Indian bison and cattle could be the most promising source of on-farm income generation. Chin State has a vast amount of cultivable waste land, of which fallow land after shifting cultivation is estimated to occupy more than half. The vegetation of this land is mostly grassland with scattered short trees such as pine. This land is suitable to grazing bison and cattle, and the impact of animal raising on forest vegetation does not seem to be negative. The existing constraints on the expansion of bison and cattle raising are reproduction, protection from disease, and lack of financial support.

Tea cultivation and sericulture are being promoted by government agencies in the villages visited. Effective and sufficient technology transfer by providing training to resource farmers is indispensable for substantial expansion of tea cultivation. In the case of sericulture, economic feasibility should also be raised because it is not economically attractive to farmers at the current price of cocoons.

Continued

Chin State produces various fruits, such as apples, grapes, and oranges, and vegetables, such as potatoes, cauliflower, and cabbage. Cultivation of these crops is technically feasible and economically advantageous. Chin Hill can produce fruits and vegetables originating in the Temperate Zone. The elevation of Chin Hill is around 2,000 meters above sea level, higher than that of Kalaw area in Shan State. It can also produce tropical fruits and vegetables during the pre-harvest season. Judging from field observation and the quality of the products, the existing technology for vegetables is satisfactory, but that for fruits has a large potential for improvement. Improvement of roads and exploitation of markets are, needless to say, the focal points for the promotion of fruits and vegetables.

Besides the activities mentioned above, more attention must be paid to developing off-farm sectors and to providing local people with off-farm job opportunities in order to upgrade the rural welfare of Chin State. Although there is some possibility of increasing cash income by diversifying on-farm activities, the natural setting of Chin Hill characterised by a cold climate and steep slopes is its principal constraint. Promising off-farm sectors include agro-industries and eco-tourism. Agro-industries include dry meat production, tea processing, silk spinning, fermented vegetable production, etc., manufactured as small-scale cottage industries. Eco-tourism has a big potential. The climate is much colder than that of the lowlands, the forest landscape is still abundant, and towns such as Falam and Tiddim are attractive. Chin Hill will surely appeal not only to domestic but also to foreign tourists.

To realise the potential, flexibility in administration and development of infrastructure are of vital importance. Since natural, economic, and social conditions of Chin State are rather different from those of the other parts of Myanmar, special attention is necessary, even in implementing national-standard regulations. The present local governments seem to recognise this point and have made adjustments to some regulations, which seem to be effective. Finally, needless to say, infrastructure development such as roads, electricity, and telephones is a prerequisite of the above-mentioned economic development. The current conditions are far from satisfactory.