

**SECOND NATIONAL REPORT  
ON  
UNCCD IMPLEMENTATION  
OF  
THE UNION OF MYANMAR  
( APRIL 2002 )**

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## **1. Executive Summary**

1.1 The main purpose of this report is to update on the situation in Myanmar with regard to measures taken for the implementation of the UNCCD at the national level since its submission of the first national report in August 2000.

1.2 Myanmar acceded to the United Nations Convention to Combat Desertification (UNCCD) in January 1997. Even before Myanmar's accession to UNCCD, measures relating to combating desertification have been taken at the local and national levels. In 1994, the Ministry of Forestry (MOF) launched a 3-year "Greening Project for the Nine Critical Districts" of Sagaing, Magway and Mandalay Divisions in the Dry Zone. This was later extended to 13 districts with the creation of new department, the Dry Zone Greening Department (DZGD) in 1997.

1.3 The Government has stepped up its efforts on preventing land degradation and combating desertification in recent years. The most significant effort is the rural area development programme envisaged in the current Third Short-Term Five-Year Plan (2001-2002 to 2005-2006). The rural development programme has laid down 5 main activities. These include - Ensuring smooth transport in rural areas; Supplying sufficient water; Promoting education of rural people; Enhancing health care services; and Ensuring economic development. Particular focus is given on the supply of sufficient water to the Dry Zone in Central Myanmar where water is scarce and where rural development in these areas have been retarded.

1.4 It is estimated that altogether 2454 villages in Sagaing Division, 1469 villages in Magway Division and 4119 villages in Mandalay Division are facing water shortage.

1.5 Water supply works including the under-ground water tapping projects, irrigation works and river-water pumping projects are being carried out collectively by a number of government ministries and departments. The Development Affairs Department under the Ministry for Progress of Border Areas and National Races and Development Affairs is undertaking the task of providing adequate water supply in the rural areas. The Ministry has drawn up the 10-year water supply project and has now been implementing the project to supply water for Sagaing, Magway and Mandalay Divisions.

1.6 Provision of sufficient water supply and safe drinking water for rural areas is prioritized with first priority given to those villages where water is extremely scarce, second priority to those villages where water supply is insufficient, third to those villages which lack safe drinking water, and fourth to those villages where water is sufficient but need actions for ensuring constant supply.

1.7 During the fiscal years 2000-2001 and 2001-2002, a total of 578 water supply stations were built in Sagaing Division, 411 in Magway Division and 866 in Mandalay Division. It is estimated that over 22,000 rural areas in the Dry Zone need drinking water which meet the health standard. At present, the adequate water supply has reached nearly 3,000 villages.

1.8 The greening activities of the DZGD have also been accelerated. A comprehensive plan for reforestation of Dry Zone for 30 year-period (2001-2002 to 2030-2031) has been drafted. The plan is divided into six 5-year short-term plans. The following activities are included in the 30-year Plan.

- Establishment of forest plantation for greening the environment and for local fuelwood supply
- Protection of remaining natural forests
- Introducing and promotion of wood fuel substitutes
- Management and development of water resources

It is planned to establish 0.8 million acres of forest plantations; to protect 1.8 million acres of natural forests; and to establish 1.2 million acres of community forest during the 30-year period.

1.9 During 1997-1998, a total of 72,210 acres (29,223 ha) have been planted under the Nine-Districts Greening Project. From 1998-1999 to 2001-2002, DZGD planted a total of 131,178 acres (53088 ha) in the Dry Zone.

1.10 It has been identified that about 1.82 million acres of degraded forests and about 2.8 million acres of forests affected by shifting cultivation are in need of protection. A total of 100,000 acres of natural forests have been protected every year since 1997-1998. Up to 2001-2002 about 689,511 acres (279045 ha) of natural forests have been protected.

1.11 DZGD has constructed 429 small check dams and 702 ponds and has dug 26 artesian wells from 1997-1998 to 2001-2002. Greening of mountains in Mandalay , Magway and Sagaing Divisions have also been undertaken.

1.12 UNDP/FAO project entitled "Environmentally Sustainable Food Security and Micro-income Opportunities in the Dry Zone" has been successfully implemented in three townships of the Dry Zone namely, Chaung-U, Magway and Kyaukpadaung townships with community participation. Small-scale Afforestation and Reforestation projects are also been undertaken jointly with some international NGOs such as Yomiuri, Organization for Industrial, Spiritual and Cultural Advancement-International (OISCA-International), Japan International Forestry Promotion and Cooperation Agency (JIFPRO) and Korean International Cooperation Agency (KOICA).

1.13 The underlying causes of land degradation in Myanmar, particularly the Dry Zone are both natural and man-made. To address the situation, collaborative efforts among the ministries concerned, local community and international agencies are essential. To date, the efforts for combating desertification and drought in Myanmar are mainly undertaken by the Government with its own limited resources.

1.14 Myanmar is now in the process of preparing the National Action Programme. The First Workshop on Preparation of the National Action Programme was held in Yangon, Myanmar on 20-21 December 2001. A national level Coordination Committee; a national level Working Committee; and State, Division, District, Township and local level Working Committees will be formed to formulate and implement the NAP. The NAP will integrate the present 30-year Afforestation Plan, the activities outlined in Myanmar Agenda 21 and the recommendations of the National Workshops.

## **2. Background**

2.1 Myanmar is a tropical country located between latitudes 9°28' and 28°29' and longitudes 92°10' and 101°10'. The length from northern to southern tip of the country is about 2060 kilometers and because of the long stretch of land and the topography, the country has several variant climate zones ranging from the temperate region of the north to the Dry Zone in central Myanmar and the monsoonal belts in the northwest, west and south.

2.2 The rainy season extends from May to late October. The weather is generally dry in the rest of the year. The coastal regions, the delta region and the northern part of the country get the annual rainfall of about 5000 mm. However, the annual rainfall in the central part of Myanmar known as the Dry Zone is less than 600 mm. According to the rainfall pattern the Dry Zone has an area of about 21,000 square miles (54,390 square kilometers) or about 10 per cent of the country. It comprises Lower Sagaing, Mandalay and Magway Divisions. There are altogether 13 districts and 57 townships in the Dry Zone. (See Maps – 1&2) The Dry Zone suffers intense heat of monthly temperature ranging from minimum of 10° C in the cool months to maximum of above 40°C in dry months.

2.3 The Dry Zone is prone to droughts. According to characteristics of identified drought using rainfall series, the worse drought that hit the area was during 1979 and 1980. The second worse drought that hit lower Sagaing and Mandalay took place during 1982 and 1983. The third worse drought hit the whole area of the Dry Zone during 1993 and 1994.

2.4 The Dry Zone is a vast semi-arid low land between two higher regions, the Shan plateau on the East and the Rakhine Yoma and Chin hills on the west. These higher regions provide sharp geographical boundaries as well as climatic boundaries of the Dry Zone. Two major rivers, the Ayeyarwady and the Chindwin flow through the Dry Zone from North to South connecting it to the Deltaic region in the South. The hills in the Dry Zone with the exception of Mount Popa are low (about 1000 feet high). They serve as local watersheds. Most of the local streams have water only immediately after the rain. The original vegetation of central Dry Zone is described as Savannah woodland which consisted short deciduous trees often widely spaced and a ground flora composed of different species of grass. However, until recently, as a result of increased population, shifting cultivation, fuelwood extraction and other human activities, very little of the original natural vegetation remains and a degraded form of trees were found in many places of the Dry Zone. In the absence of forest cover on the watersheds, severe floods sometimes occur causing great damage on both property and human lives. During 2001 rainy season because of high rainfall and flash floods of the sandy streams, several villages were swept away by severe flood water.

## Photograph

### *A denuded hill in the Dry Zone*

2.5 About 34 percent of the total population live in Sagaing, Magway and Mandalay Divisions. Eighty percent of the Dry Zone population live in rural areas. The major cash crops grown in the Dry Zone are cotton, sesame, pulses and beans. Seasonal vegetables such as onion, garlic, chillies, tomatoes are also grown on some alluvial soils on the banks along the Ayeyarwady river. Poorer farm families and agricultural labourers supplement their incomes by cutting fuelwood or making jaggery both of which contributed to overexploitation of forest resources and deforestation. Increasing population in combination with unfriendly climatic conditions triggers the rapid misuse of the land and natural resources.

2.6 Farm households in the area are constrained by low and unreliable rainfall, thin soils, and denuded ground and forest cover. Most of the soil in the Dry Zone is sandy and is vulnerable to wind and water erosion. Soil erosion is high, particularly during the destructive intensive storm which characterize Dry Zone rainfall patterns. Most erosions occur on the cultivated land in the form of sheet, rill and often gully erosion, rapidly curtailing yields and income levels as a consequence of it.

Photograph

Photograph

*Examples of gully erosion in the Dry Zone*

2.7 Water supply has been a problem until lately. The Government is currently making intensive effort to turn the Dry Zone to a Green Zone through various measures including reforestation and afforestation schemes and water supply works.



### **3. The Strategies and Priorities Established within the Framework of Sustainable Economic Development Plans**

#### **3.1 The Third Short-Term Five Year Plan (2001/2002-2005/2006)**

Soon after the assumption of state duties in 1989, the Government gave priority to restoring stability and consolidating national solidarity. During the three-year period from 1989-90 to 1991-92, it also laid down and implemented plans to halt the economic down-turn and to stabilize the economy. The private sector was provided with a wide range of opportunities to realize its full potential. As a firm infrastructure is required in building the political, economic and social systems, the Government has made efforts with greater momentum to build the economic infrastructure after achieving peace and stability in the nation.

In implementing a Four-Year Short-Term Plan from 1992-93 to 1995-96, the economy grew by 7.5% annual against the target of 5.1%. On the basis of the already-achieved progress, a Second Five-Year Short-Term Plan running from 1996-97 to 2000-2001 was implemented. It was targeted to achieve annual economic growth by 6%. In fact, the economy grew by 8.4% surpassing the plan target. This achievement can be attributed to the implementation of the plan in every sector and every region, the effective use of human resources of the nation, participation of the people and the abundance of natural resources.

The Third Short-Term Five Year Plan (2001/2002-2005/2006) has been formulated to further consolidate the gains achieved on the preceding Second Short-Term Five Year Plan (1996/1997-2000/2001), and to lay firm foundation for the future development of the country.

With a view to promoting further economic growth of the nation, the Third Five Year Short-Term Plan aims to:-

- expand the establishment of agro-based industries,
- develop the electric power sector and the energy sector in keeping with the expansion of industries,
- expand the agriculture sector and the livestock and fishery sector for domestic sufficiency and export promotion,
- strive for all-round development of other sectors,

- expand the education and health sectors with the aim of developing human resources; and
- develop rural areas.

### 3.2. Plans and Projects to Combat Desertification

The Third Short-Term Five Year Plan is the national plan which is comprised of a number of sectoral plans including a plan for the Forestry Sector. Within the Forestry Sector Plan, plans and projects relating to greening and combating desertification have been formulated.

Greening work has been carried out in Sagaing and Monywa Districts in Sagaing Division, Myingyan, Maiktila and Yemethin Districts in Mandalay Division, Magway, Pakokku, Minbu and Thayet Districts in Magway Division. Although originally intended for nine districts, greening work has been extended to 13 districts. According to the project, over 200,000 acres of forest plantations have been established, and over 600,000 acres of remaining actual forests have been conserved and protected. Furthermore, the tasks for extension of use of wood substitute fuel and water supply have been carried out.

The arid zone greening work is being done in accordance with a 30-year master plan. During the implementation period, 7.5 million acres of green and lush forests will emerge. The Greening Project will prevent desertification of dry regions.

### 3.3 Myanmar Agenda 21

Myanmar Agenda 21 formulated by the National Commission for Environmental Affairs in 1997 also serves as a basis for the integration of environment and development. It contains a Chapter on Integrated Management of Land Resources which highlights the following activities relating to preventing land degradation and desertification in the country.

- (i) Prepare Soilmaps
- (ii) Encourage soil conservation programme
- (iii) Promote soil reclamation
- (iv) Promote application of organic and biological fertilizers
- (v) Undertake planning and management of watershed
- (vi) Develop and implement national action programme to combat desertification

## **4. Institutional Measures Taken to Implement the Convention**

### **4.1 National Coordinating Body**

The National Commission for Environmental Affairs (NCEA) was established in February 1990 to advise the Government on environmental policies, to act as a focal point and as a coordinating body for environmental affairs; and to promote environmentally sound and sustainable development in Myanmar. The NCEA also serves as the focal point for all the environmental conventions joined by Myanmar. It is the National Coordinating Body (NCB) for implementing the United Nations Convention to Desertification (UNCCD). The preparation of the first national report on UNCCD implementation was initiated by the NCEA in cooperation with all departments, agencies and local authorities concerned. Formulation of a National Action Programme (NAP) is now in process with the holding of the first national workshop on NAP organized by the Ministry of Forestry on 20-21 December 2001 in coordination with the NCEA and all the organizations concerned.

### **4.2 Implementing Agencies**

Even before Myanmar became a party to the UNCCD, greening of the arid zone has always occupied a place of priority in Myanmar environmental protection endeavours. When Myanmar became a party to the Convention, these efforts have been further enhanced with the establishment of the Dry Zone Greening Department in 1997. This Department together with the Myanmar Agriculture Service, Irrigation Department, and Water Resources Utilization Department of the Ministry of Agriculture and Irrigation, Ministry for Progress of Border Areas and National Races and Development Affairs and Ministry of Livestock and Fisheries act as the principle agencies for implementing UNCCD.

### **4.3 Conventions Ratified**

Myanmar ratified the Convention on Biological Diversity (CBD) and the United Nations Framework Convention on Climate Change on 25 November 1994. Myanmar acceded to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) on 11 September 1997 to protect certain endangered species from over-exploitation by means of a system of import/ export permits. It also became a party to the United Nations Convention to Combat Desertification on 2 April 1997. These Conventions play an important role to combat

desertification and mitigate the effects of drought through effective action supported by international cooperation and partnership arrangements in the framework of an integrated approach which is consistent with Agenda 21.

#### 4.4 Policy Framework

##### (a) National Environment Policy

The National Environment Policy of Myanmar formulated by the NCEA has been proclaimed on 5 December 1994. The Policy calls for harmony and balance between environmental development through the integration of environmental considerations into the development process. National Environment Policy forms the basis for developing environmental strategies, programmes and plans.

##### (b) Agriculture Policy

The Union of Myanmar is an agro-based country. Hence, the national development depends on the agricultural development of the nation. All-out efforts are thus made in the direction of developing the agriculture sector.

One of the Four Economic Objectives laid down by the State is "Development of agriculture as the base and all-round development of other sectors of the economy as well."

To develop agriculture sector, the Ministry of Agriculture and Irrigation has laid down three objectives. These are:

- to produce surplus paddy;
- to be self-sufficient in edible oil;
- to boost production of beans and pulses and industrial raw material crops.

To meet these targets, the following five reforms are being carried out;

- extension of arable land;
- adequate supply of water;
- farm mechanization;
- change of cultivation method; and
- production and utilization of quality seeds.

Adequate water supply is the basic requirement for boosting the production crops. Hence, six means for exploiting water resources are being applied by the Ministry of Agriculture and Irrigation. The six means are:

- (i) Construction of new dams and reservoirs;
- (ii) Storage of water flowing from watershed areas;
- (iii) Renovation of existing dams and reservoirs;
- (iv) Damming of creeks and rivers when they are in spate;
- (v) Pumping water from rivers and creeks; and
- (vi) Utilization of underground water.

(c) Forest Policy

The Myanmar Forest Policy (1995) has been formulated to be in line with the Forest Principles adopted at the United Nations Conference on Environment and Development (UNCED), which suggest a holistic and balanced approach to environmental conservation and development. The Policy is structured on need-based approach. It underlines sustainable forest management without impairing the production capacity, while meeting the social and community needs, and conserving the biological diversity and environmental stability. The Forest Policy (1995) has identified six imperatives which the Government must give the highest priority in order to achieve broader national goals and objectives. These are:

- i. Protection of soil, water, wildlife, biodiversity and environment;
- ii. Sustainability of forest resources to ensure perpetual supply of both tangible and intangible benefits accrued from the forests for the present and future generations;
- iii. Basic needs of the people for fuel, shelter, food and recreation;
- iv. Efficiency to harness, in the socio-environmentally friendly manner, the full economic potential of the forest resources;
- v. Participation of the people in the conservation and utilization of the forests;
- vi. Public awareness about the vital role of the forests in the well being and socio-economic development of the nation.

In Myanmar Forest Policy 1995, it is mandated to increase the area of Reserved Forest (RF) and Protected Public Forest (PPF) up to 30% and the area under Protected Areas System (PAS) up to 5% of the total land area, scheduled to be achieved by the year 2010.

The Government of Myanmar has enacted the Forest Law in 1992 as the Forest Act of 1902 has become no longer adequate to address the changing nature of the forestry socio-economic environment. The Forest Law (1992) aims at implementing plans relating to conservation of water, soil, biological diversity and environment, sustained yield of forest produce and protection of forest covered land, the establishment of forest plantation, village firewood plantation and extraction and transportation of forest produce. The new Forest Law emphasizes the importance of peoples' awareness and participation in the conservation and sustainable utilisation of forest resources, of the collection and updating the resource information, of planning and continuous monitoring of all forest operations and of ecological balance and environmental stability. The Law also lays down precise rules and a procedure for extraction of forest produce from reserved forests and open forest and empowers stiff penalties for violations.

The Protection of Wild Life and Wild Plant and Conservation of Natural Areas Law, enacted in 1994 substitutes and repeals the Wild Life Protection Act of 1936. Although the Forest Law (1992) contains general provisions regarding wild life, this new Law is a specific law on wild life, wild plants and natural areas. The Law provides for implementing the policy of protecting wild life and wild plants and conservation of natural areas, carrying out in accordance with international conventions adopted by the State in respect of the preservation of wild life, wild plants, living and non living organism and migratory birds, protecting wild life and wild plants liable to the danger of extinction and the habitats thereof, contributing towards works of natural scientific research and protection of wild life and wild plants, and establishment of zoological gardens and botanical gardens. For giving guidance towards the successful implementation of the objectives of this Law, a National Committee, headed by the Minister for Forestry has been established.

The issuing of Community Forestry Instructions (CFI) in 1995 was a major breakthrough in the history of Myanmar forestry. It aims at decentralization in forest management, addressing the basic needs of the local people through participatory approach and environmental restoration.

The Forest Department issued Community Forestry Instructions in 1995 with objectives to attain environmental stability; and meet the basic needs of rural communities. Following CFI, about 15,000 ha of community-owned forest plantations have been established by 1999 throughout the country. Community forestry will be strengthened further.

(d) Livestock and Fisheries Policy

The development of the livestock and fisheries sector is also important for the country as it provides employment and food supply for the growing population.

The Ministry of Livestock and Fisheries is a body responsible for promotion and development of livestock and fisheries sector in the country. To carry out those tasks, the following main objectives were laid down by the Ministry:

- (i) To promote all around development of meat and fish in the Union;
- (ii) To achieve self-sufficiency of meat and fish for domestic consumption and export the surplus to earn foreign exchange;
- (iii) To acquire investment in livestock and fisheries sector;
- (iv) To improve living standard of livestock and fish/shrimp farmers.

The Ministry has laid down short-term and long term plans and associated strategies for the prevention of environmental degradation and conservation of resources relating to livestock and fisheries sector.

Myanmar Agenda 21 also outlines measures for promoting sustainable development of livestock and fisheries sector. These include- integrated coastal zone development programmes; conservation and sustainable use of marine reserves; and promotion of livestock development. Appropriate programmes for livestock development especially the promotion of breeding of draught cattle to meet national requirements; measures to ensure an adequate supply of animal foodstuff and medicines, distribution of pedigree livestock, undertaking of preventive and curative measures on a cost recovery basis with private breeders; maintenance and extension work on the development of new pasture lands are also recommended in Myanmar Agenda 21.

## **5. Measures Taken or Planned to Combat Desertification**

### 5.1. Dry Zone Greening Project and the Dry Zone Greening Department

5.1.1 Among the measures taken by the Government to combat desertification, "Greening project for the Dry Zone" is significant and most effective. The Greening Project is being implemented by the Dry Zone Greening Department. The Department is entrusted with the following objectives:

- (1) To green the Central Dry Zone of Myanmar
- (2) To promote and conserve the environment as a whole, and land and water resources in particular.
- (3) To provide the basic needs for forest products of the rural people.
- (4) To enhance the socioeconomic development of rural people on a sustainable basis.
- (5) To raise local people's awareness of the value and beneficial effects of forest and trees.
- (6) To enhance knowledge and promote participation of public on environmental conservation and sustainable development.
- (7) To improve micro- climate conditions of the environment so as to support sustainable productivity of agriculture.
- (8) To prevent desertification.

The major tasks to be implemented by the Dry Zone Greening Department have been set as follows:

- establishment of forest plantation
- protection and rehabilitation of remaining natural forests:
- initiating development and utilization of wood fuel substitutes and
- development of water resources



### 5.1.2 Targeted activities for Dry Zone Greening Department

#### (a) Establishment of Forest Plantations

From 2001-2002 to 2005-2006 it is targeted to plant a total of 105,000 acres, comprising 28,035 acres of village forests, 25,535 acres of watershed plantations, 8845 acres to green mountains, 80 acres for research purpose and 12,505 acres of wood lots.

#### (b) Protection of Natural Forests

In 2001-2002 DZGD protected 200,000 acres. It is scheduled to protect 200,000 acres, in 2002-2003, 150,000 acres in 2004-2005, 100,000 acres in 2005-2006.

#### (c) Natural Regeneration Method

During 2001-2002, 20,000 acres were regenerated. It is scheduled to implement natural regeneration method on 20,000 acres in 2002-2003, 20,000 acres in 2003-2004, 20,000 acres in 2004-2005 and 20,000 acres in 2005-2006.

#### (d) Promotion of Fuelwood Substitute Utilization

Total number of efficient stoves scheduled to be distributed from 2001-2002 to 2005-2006 will be 15,0000. About 22500000 of briquettes and 60000 tons of agricultural residues will also be distributed and all the necessary arrangements have been undertaken.

#### (e) Development of Water Resources

It is scheduled to construct about 700 ponds, 680 small check dams and dig 40 artesian wells from the year 2002-2003 to 2005-2006.

### 5.1.3 Implemented Activities by DZGD

#### (a) Establishment of Forest Plantations

The DZGD has carried out tree plantations in Sagaing Division, Mandalay Division and Magway Division. Establishment of forest plantations from 1994/95 to 2000/2001 is as follows.

## Establishment of forest plantation (1994-95 to 2000-2001)

(Acre)

Sr.	Year	Sagaing	Mandalay	Magway	Total
1.	1994-95	2,300	5,900	7,650	15,850
2.	1995-96	3,650	6,150	9,300	19,100
3.	1996-97	3,200	6,300	13,830	23,330
4.	1997-98	3,555	4,320	14,955	22,830
5.	1998-99	7,625	12,062	15,600	35,287
6.	1999-2000	7,329	12,712	15,000	35,041
7.	2000-2001	7,325	12,675	15,650	35,650
Total		34,984	60,119	91,985	187,088

Photograph

*Establishment of Forest Plantation*

Photograph

*Site Preparation in Mountaineous Area*

Photograph

*One of the successful forest plantations*

Photograph

*Plantation along road side*

(b) Protection of Natural Forest

Regarding the protection of natural forest, the DZGD has undertaken following activities in Sagaing Division, Mandalay Division and Magway Division.

Protection of Natural Forest(1994-95 to 2000-2001)

					(Acre)
Sr.	Year	Sagaing	Mandalay	Magway	Total
1.	1994-95	-	-	-	-
2.	1995-96	-	-	-	-
3.	1996-97	-	-	-	-
4.	1997-98	685	2,695	12,841	16,221
5.	1998-99	18,720	16,564	59,144	94,428
6.	1999-2000	12,835	13,778	21,248	47,861
7.	2000-2001	17,167	19,112	31,614	67,893
Total		49,407	52,149	124,847	226,403

Photograph

*Degraded forests before protection*

Photograph

*Degraded forests after protection*

## (c) Initiating Development and Utilization of Wood Fuel Substitute

Aiming to reduce felling of trees for fuel wood which is one of the causes of natural forest degradation, the DZGD has endeavored to promote utilization of wood fuel substitutes. Data are shown in the following tables.

## (i) Distribution of fuel efficient stoves

The DZGD has distributed 47,861 A-1 cooking stoves in 1999/2000 and 67,893 A-1 cooking stoves in 2000/2001.

## Distribution of fuel efficient stoves

					(Nos)
Sr.	Year	Sagaing	Mandalay	Magway	Total
1.	1994-95	-	-	-	-
2.	1995-96	-	-	-	-
3.	1996-97	-	-	-	-
4.	1997-98	685	2,695	12,841	16,221
5.	1998-99	18,720	16,564	59,144	94,428
6.	1999-2000	12,835	13,778	21,248	47,861
7.	2000-2001	17,167	19,112	31,614	67,893
Total		49,407	52,149	124,847	226,403

## (ii) Promotion of fuel briquette production and utilization

To substitute the fuelwood utilization, the DZGD distributed 25,856 tons of fuel briquette in 1999/2000 and 20,366.7 tons in 2000/2001.

## Distribution of fuel briquette

					(Nos)
Sr.	Year	Sagaing	Mandalay	Magway	Total
1.	1994-95	-	-	-	-
2.	1995-96	-	-	-	-
3.	1996-97	-	-	-	-
4.	1997-98	20,000	1164,796	723,911	1908,707
5.	1998-99	691,000	1623,000	6210,613	8524,613
6.	1999-2000	1410,000	3500,000	4092,891	9002,891
7.	2000-2001	1953,960	4257,483	6002,649	12214,092
Total		4074,960	10545,279	17030,064	31650,303

Photograph

*Production of Fuel Efficient Stoves*

Photograph

*Briquettes Making Industry*

Photograph

*Briquettes on Sale*

Photograph

*Production of Rice-husk Stoves*



## (iii) Utilization of agriculture residues

As another alternative for fuelwood, utilization of residues of agricultural crops such as stalks of sesame, pea, cotton, peanut husks and etc are also encouraged. In 1999/2000 nearly 26,000 tons of agricultural residues were used and in 2000/2001 20,000 tons are used as fuel.

## Utilization of agriculture residues

					(Tons)
Sr.	Year	Sagaing	Mandalay	Magway	Total
1.	1994-95	-	-	-	-
2.	1995-96	-	-	-	-
3.	1996-97	-	-	-	-
4.	1997-98	11654	400	-	12054.0
5.	1998-99	2153	2530	28655.8	33338.8
6.	1999-2000	2315	2697	20844.0	25856.0
7.	2000-2001	2489	4248	13629.7	20366.7
Total		18611	9875	63129.5	91615.5

## (d) Rural water resources development

Due to low annual rainfall, water is scarce in the Dry Zone. This constitutes the biggest obstacle to green the Dry Zone. It is thus imperative to construct check dams and ponds to collect rain water, and to tap underground and river waters by pumping in order to assist greening activities and the local needs.

In 1999/2000, 170 ponds were constructed and in 2000/2001, 170 ponds were constructed. A total of 171 check dams were constructed in 1999/2000 and 214 in 2000/2001. Altogether 6 tube wells in 1999/2000 and 7 tube wells in 2000/2001 were constructed.

## (e) Water distribution through pumping system

DZGD has been implementing the rehabilitation activities for the greening of the following mountains where forests are degraded and denuded.

- (1) Mandalay Division  
Shwe-Tha-Layaung, Padamya, Shwe Min Wun, Menyo, Minson, Kokke, Taungtha, Kyauktalon, Myinsaing and Tuyin.
- (2) Magway Division  
Tant kyi, Shin Ma Taung, Tetma and Minbu Mountain Range.
- (3) Sagaing Division  
Minwun, Kyaitkar-Shwemyintin, Phowin Mountain

Photograph

*A New Pond under Construction*

Photograph

*Tube well Drilling Site*

Photograph

Bullock cart ready to go to the distribution site

Photograph

*Collecting water at the newly renovated lake*

Photograph

*Tankyi Mountain water pumping station using Ayeyarwady River*

Photograph

*Tree Planting Activities on Tuyin Mountain*

## Photograph

### *Greening of Sagaing Mountain*

#### 5.1.4 International Cooperation

UNDP/FAO project entitled "Environmentally Sustainable Food Security and Micro-income Opportunities in the Dry Zone" has been successfully implemented in three townships of Dry Zone namely Chaung-Oo, Magway and Kyaukpadaung townships with community participation.

In addition DZGD has been implementing the following projects in cooperation with:

- (i) Yomiuri NGO from Japan in Afforestation Project in Nyaung-Oo District;
- (ii) Japan International Forestry Promotion and Co-operation Agency (JIFPRO) in Afforestation Project in Nyaung-Oo District;
- (iii) Korea International Co-operation Agency (KOICA) in Dry Zone Greening Project in Nyaung-Oo District; and
- (iv) Organization for industrial Spiritual and Cultural Advancement International (OISCA- International) in Greening Project in Pakkoku District.

## Photograph

*Opening ceremony of Myanmar-Japan Friendship Afforestation Project*

### **5.2 Dry Zone Water Supply Programme**

The Dry Zone in the central part of Myanmar is a low-rained area. In some parts of the area, water is scarce and local people are facing difficulty for water supply because of seasonal drought occurrences. The Government of the Union of Myanmar therefore initiated the water supply programmes and projects in the Dry Zone to combat desertification in Myanmar.

The Dry Zone Greening Department of the Ministry of Forestry is the main implementing agency for the greening of central Dry Zone and to prevent desertification. The Dry Zone Greening Department has been implementing the development of water resources programme which is one of the four main tasks of the department. Under this programme it has constructed a number of ponds and check dams to collect rain water; tube wells to tap underground water; and river water pumping stations to pump water from Ayeyarwady river. From the 1997-1998 to 2001-2002, the department had been able to construct 702 ponds, 26 tube wells and 429 check dams in Sagaing, Magway and Mandalay Divisions. (Table 5.2-1)

Table 5.2.1 Water Supply Works

( numbers )

N o.	year	Sagaing Division			Magway Division			Mandalay Division		
		Ponds	Tube Wells	Check Dams	Ponds	Tube Wells	Check Dams	Ponds	Tube Wells	Check Dams
1	1997-1998	20	-	-	-	-	-	13	1	-
2	1998-1999	29	1	-	78	7	-	68	4	-
3	1999-2000	54	2	54	45	1	45	71	3	72
4	2000-2001	51	1	51	48	3	48	71	3	36
5	2001-2002	50	-	35	44	-	68	60	-	20
	Total	204	4	140	215	11	161	283	11	128

Source : (Dry Zone Greening Department )

Plans are underway to construct 700 ponds, 680 small check dams and 40 artesian wells in this area from the year 2002-2003 to 2005-2006.

To combat desertification in Myanmar, the Ministry of Agriculture and Irrigation, especially the Irrigation Department and Water Resources Utilization Department have been implementing drinking water supply and irrigation water supply programme through judicious utilization of water from surface, rivers and creeks and groundwater sources for food sufficiency and promotion of crop-productions in the Dry Zone.

#### Drinking Water Supply

To address the problem of the shortage of drinking water supply, the Water Resources Utilization Department has installed the following drinking water supply facilities in Sagaing, Magway and Mandalay Division till late 2000 to promote the socio-economic status of rural communities. (Table 5.2-2)

Table 5.2-2 Rural Drinking Water Supply facilities and beneficiaries (people in number)

Sr. No	Types of water supply facilities	per	Sagaing Div.		Magway Div.		Mandalay Div.		Total	
			Qty	beneficiaries	Qty	beneficiaries	Qty	beneficiaries	Qty	beneficiaries
1.	Groundwater (Deep Tube well and sludge well)	No.	4576	2134875	4454	2027718	4266	2254055	13296	6416630
2.	Pipe Water Reticulation	No.	6	24193	14	56450	9	36290	29	116933
3.	Gravity Flow	syst	6	26871	11	21181	7	9798	24	57850
4.	Tapping Dam	No.					7	18241	7	18241
5.	River Pumping	No.					1	110000	1	110000
Total			4588	2185939	4479	2105349	4290	2428384	13357	6719654

Source: (Water Resources Utilization Department )

Water Quality Monitoring and surveillance programme in collaboration with UNICEF currently concluded, covered 19 townships in Sagaing, 14 townships in Magway and 15 townships in Mandalay , encompassing the parameters of turbidity, Ec, pH, Fl, Cl, NO<sub>3</sub>, Fe, Ca, As, total Coliform and Faecal Coliform. A total of 765 samples in Sagaing, 643 in Magway and 578 in Mandalay Division were tested.

The Ministry for Progress of Border Areas and National Races and Development Affairs is also undertaking the tasks of ensuring smooth transport and adequate water supply in rural areas with the ten-year water supply project. According to the survey conducted in 1999-2000, altogether 8,042 villages are in need of pure drinking water. Water supply projects for these villages has been under implementation starting from the year 2000-2001 with the assistance of local authorities at different levels.

Wellwishers are invited to make cash donations for the water supply projects for rural areas under the sponsorship of the Ministry for Progress of Border Areas and National Races and Development Affairs. At present, the adequate water supply system has reached nearly 3,000 villages.

#### *Irrigation Water Supply*

The agricultural production is one of the main sources of food security in Myanmar. Irrigation water supply facilities both from river and groundwater sources have been under implementation in the above three divisions where semi-desert conditions prevail.



The Irrigation Department has been implementing the construction of new dams, weirs and flood protection works showing Government's committed priority to agriculture and rural development. (Table 5.2-3 & 5.2-4)

Table 5.2-3 Irrigation projects (Completed)

No	Division	Dams		Weirs	
		Qty	Beneficiaries (Acres)	Qty	Beneficiaries (Acres)
1.	Sagaing Division	2	508000	-	-
2.	Magway Division	9	105700	-	-
3.	Mandalay Division	6	13250	1	5000
	Total	17	626950	1	5000

Source: (Irrigation Department)

Table 5.2-4 Irrigation Projects (Ongoing)

No	Division	Dams		Weirs		Embankment Works		Preparation and Maintenance		Extension irrigation system	
		Qty	Beneficiaries(acres)	Qty	Beneficiaries(acres)	Qty	Beneficiaries(acres)	Qty	Beneficiaries(acres)	Qty	Beneficiaries(acres)
1.	Sagaing	-	-	-	-	1	4795	2	-	1	-
2.	Magway	5	21800	1	-	-	-	-	-	-	-
3.	Mandalay	7	55700	-	-	-	-	-	-	-	-
	Total	12	77500	1	-	1	4795	2	-	1	-

Source: (Irrigation Department)

#### *River Pumping Irrigation*

Water Resources Utilization Department has been implementing pump irrigation water supply programme using high discharge capacity pumps since 1995. A tangible achievement of irrigating 153266 acres of crop lands from 162 river pumping stations has been recorded by the end of 2001 in this region. (Table 5.2-5) Currently, construction of 9 pumping projects capable of irrigating (109900) acres are in progress (Table 5.2-6). River pumping projects have been developed as per Thirty-Year Master Plan. (Table 5.2-7)

Table 5.2-5 River Pumping Irrigation Projects (Completed)

Sr. No.	States / Divisions	Electric Pumping		Diesel + Electric Pumping		Diesel Pumping		Total	
		Qty	beneficiaries	Qty	beneficiaries	Qty	beneficiaries	Qty	beneficiaries
1.	Sagaing	4	12150	4	9870	40	37358	48	59375
2.	Magway	15	40286			31	10015	46	50301
3.	Mandalay	15	16465	1	4128	52	22997	68	43590
Total		34	68901	5	13998	123	70370	162	153266

Source: (Water Resources Utilization Department )

Table 5.2-6 River Pumping Irrigation Projects (Ongoing)

Sr. No.	States / Divisions	Qty	Beneficiaries	Remarks
1.	Sagaing	3	60000	
2.	Magway	5	42700	
3.	Mandalay	1	7200	
Total		9	109900	

Source: (Water Resources Utilization Department )

Table 5.2-7 Future Plan for River Pumping Projects (As per Thirty-Year Master Plan)

Sr. No.	States / Divisions	2001-2005		2006-2010		2011-2015		2016-2020		2021-2025		2026-2030	
		Qty	Acre	Qty	Acre	Qty	Acre	Qty	Acre	Qty	Acre	Qty	Acre
1.	Sagaing	20	32350	7	10000	7	10000	5	10000	5	10000	5	8000
2.	Magway	19	14665	7	4000	7	4000	7	4000	7	4000	7	4000
3.	Mandalay	6	8700	6	4000	6	4000	6	4000	6	4000	6	4000
Total		45	55715	20	18000	20	18000	18	18000	18	18000	18	16000

Source: (Water Resources Utilization Department )

### *Groundwater Irrigation*

The deep tube wells and irrigation water supply facilities have also been installed in places where the groundwater potential has prevailing access for exploitation and worthy for

commercial production. These have benefited 71553 acres of crop lands to date. (Table 5.2-8) A thirty-year master plan for future groundwater irrigation development has also been formulated. (Table 5.2-9)

Table 5.2-8 Groundwater Irrigation Facilities (Completed)

Sr. No.	States / Divisions	Groundwater		
		Tube Wells	Cluster Wells	Beneficiaries (Acres)
1.	Sagaing Div.	836	1968	50199
2.	Magway Div.	1289		10537
3.	Mandalay Div.	789	851	10817
Total		2914	2819	71553

Source: (Water Resources Utilization Department )

Table 5.2-9 Future Plan for Groundwater Irrigation (As per Thirty-Year Master Plan)

Sr. No.	States / Divisions	2001-2005		2006-2010		2011-2015		2016-2020		2021-2025		2026-2030	
		Qty	Acre	Qty	Acre	Qty	Acre	Qty	Acre	Qty	Acre	Qty	Acre
1.	Sagaing	1320	10560			320	8000	600	10500	510	12740	325	8100
2.	Magway			503	18500	1002	29800	900	22500	1040	25960	846	33800
3.	Mandalay			400	10000	402	14000	502	16550	460	11610	10	24000
Total		1320	10560	903	28500	1724	51800	2002	49550	2010	50310	1181	65900

Source: (Water Resources Utilization Department )

### 5.3 Measures taken to prevent desertification and drought in Magway Division

Magway Division is located within the central part of Myanmar with a large area lying in the Dry Zone. Magway Division has a common boundary with Mandalay and Bago Divisions as well as Rakhine and Chin States. It has an area of 17,305 sq. miles and is situated between North Latitude 18° 50' and 22° 47' and East Longitude between 93° 47' and 95° 55'.

The western hilly region whose rainfall is slightly more than other parts of the Division has the tropical Savannah Climate. As the greater part of Magway Division falls within the Dry Zone, it is extremely hot during the hot season and is relatively cold during the cold season. The average temperature in April, which is the hottest month of the year, is 90° Fahrenheit and the temperatures during daytime range between 100°-110° Fahrenheit. The

average temperature of January, which is the coolest month of the year is 70° Fahrenheit but the temperature sometimes falls to 50° Fahrenheit.

There are 5 districts namely Magway, Minbu, Pakokku, Thayet and Gangaw districts in Magway Division.

### 5.3.1 Tree Plantation

During the raining season of 2001, a total of 23,571,813 trees have been planted by mass activity in Magway Division. There have also been planted 4,660,000 trees by the Department of Forest and 3,580,000 trees by the Dry Zone Greening Department.

Greening activities in Magway Division is being carried out as a national task. Since 1998, 159,705 of Golden teak trees have been planted along each side of the Yangon-Magway-Mandalay Union Road within the boundary of Magway Division.

The following greening activities have been carried out in Magway Division by the Dry Zone Greening Department.

- (a) 285,000 (950 acres) Neem trees (*Azadirachta indica*) have been planted on Shwe-Pon mountain in Chauk area, water is pumped from Ayeyarwady river for planting trees.
- (b) 341 baskets of seeds planted by helicopter-cast method on south side of Tantkyi mountain and Tet-ma mountain for the purpose of greening on the Tantkyi mountain. 153,000 Kokko trees (*Albizia Lebbek*), 3,000 Banyan trees (*Ficus species*) and 44,000 neem trees, totalling 200,000 have also been planted on Tantkyi mountain.
- (c) 10,000 varieties of seeds have been cultivated along each side of the Pakokku-Seikphyu road.
- (d) For the purpose of greening in Yenan-chaung township, 250 baskets of varieties of seeds have been cultivated on hill sides on 5,030 acres of the watershed area of 9 small dams.
- (e) Four camps have been built in the region of Shawtaw camp, Nyaung-kyat-san, Pho-pauk-kan and Kyay-yo-gyi to supervise the greening activities along the road sides of the Magway-Taungdwingyi highway.

Not only for greening purpose but also for supporting the edible oil, Thit Saint trees (Belleric myrobalan trees) are being planted under the 5-year plan (2002-2006).

During 1998 and 2001, Toddy palms have been planted annually in Magway Division as follows:

No.	Year	Plan	Actual	Successful
1	1998	1,987,630	1,893,512	970,761
2	1999	1,940,476	1,821,011	1,393,596
3	2000	5,447,497	4,748,907	2,096,887
4	2001	5,232,816	2,081,041	444,518

A total of 12,756,421 Tamarind trees, 1,208,052 Plum trees and 5,156,304 Neem trees have been planted during April 2000 to December 2001 in the Magway Division.

### 5.3.2 Agriculture

As regards the agriculture sector in Magway Division, there were over 2.9 million acres of cultivated land in 1988 and the number has increased to 5.5 million acres in 2001. There were over 0.3 million acres of paddy in 1988 and in 2001 the sown area has increased to over 0.5 million acres. Production of paddy has increased from 14 million baskets in 1988 to 33.2 million baskets in 2001. There were over 0.3 million acres of pulses and beans in 1988 and the sown area has increased to over 1.4 million acres in 2001. Production of pulses and beans has increased six times from over 2 million baskets to 12.3 million baskets during the same period. Oil crops, the main crop of Magway Division, were grown on 1.3 million acres of land in 1988 and on 2.1 million acres in 2001. Production of oil crop has doubled from 12.1 million baskets to 27 million baskets during the same period.

### 5.3.3 Building of Dams and Lakes

In Magway Division, there were 694 dams and lakes in 1988 and the number increased to 1312 in 2001. Since 1988, the Government has built Ngamin, Yinmale, Kinpuntaung, Bangon, Yanpe, Palin, Soonchaung, Saddan, Natmauk and Salin dams in Magway Division. Naga, Bwetyi, Padechaung and Moenechaung dams are under construction.

### 5.3.4 Rural Water Supply Activities

Water supply works in the 5 districts (Magway, Minbu, Thayet, Pakokku, Gangaw) of Magway Division are being carried out collectively by the Department of Development Affairs, Water Resources Utilization Department, Irrigation Department, Dry Zone Greening Department and General Administration Department. Provision of sufficient water supply and safe drinking water for rural area is prioritized as follows:-

- (1) First priority is given to those villages where water is extremely scarce
- (2) Second priority is given to those villages where water supply is insufficient
- (3) Third priority is given to those villages which are lacking safe drinking water.
- (4) Fourth priority is given to those villages where water is sufficient but for the sake of sustainable use of the existing wells, ponds, dams and dykes, the necessary actions for maintenance are to be supplemented.

#### Activities by Department of Development Affairs

During 2001-2002, 22 shallow tube wells, 10 deep wells, 19 ponds and 7 other means of water supply have been carried out in Magway district; 28 shallow tube wells, 4 deep wells and 4 ponds in Minbu district; 35 shallow tube wells, 8 deep wells and 3 ponds in Thayet district; 5 shallow tube wells, 10 deep wells, 5 ponds and 2 other means of water supply in Pakokku district; and 16 shallow tube wells in Gangaw district have been constructed (Table 5.3-1).

Table 5.3-1. Water Supply Works Implemented by Department of Development Affairs in 2001-2002

No.	District	Shallow Tube Well	Deep Well	Pond	Others
1.	Magway	22	10	19	7
2.	Minbu	28	4	4	-
3.	Thayet	35	8	3	-
4.	Pakokku	5	10	5	2
5.	Gangaw	16	-	-	-

### Activities of Water Resources Utilization Department

Since 2001, Water Resources Utilization Department has no longer constructed new tube wells in this Division but see to the maintenance of the old ones. However, 17 electric pumping stations for water supply for agriculture also serves as a source of water supply for villagers. Such water supply benefit 42 villages with a population of more than fifteen thousand in Magway Division fulfilling 1.45% of its needs (Table 5.3-2).

Table 5.3-2 Electric Pumping Station supporting rural areas by Water Resources Utilization Department

No.	District	Electric Pumping Station	Supported Villages	Population	%
1.	Magway	5	10	5650	1.64
2.	Minbu	2	3	1250	0.70
3.	Thayet	4	10	2390	1.2
4.	Pakokku	6	19	6080	2.33
5.	Gangaw	-	-	-	-
Magway Division		17	42	15,370	1.45

### Activities of Irrigation Department

In Magway district, 14 dams were built with 239,107.0 acre feet of water storage for 133 villages. As for Minbu district 7 dams with 236,420.0 acre feet of water storage for 162 villages; in Thayet district one dam with 10,000.0 acre feet of water storage for 3 villages; in Pakokku district 8 dams with 12,980.2 acre feet of water storage for 37 villages; in Gangaw district one dam with 11,725.6 acre feet of water storage for 4 villages have been built. Thus there are altogether 31 dams with 510,232.8 acre feet of water storage for 339 villages have been constructed in the Magway Division.(Table 5.3-3).

Table 5.3-3. Water supply provided by Irrigation Department

No.	District	No. of dams	Water Storage (acre feet)	Supported Villages
1.	Magway	14	239,107.0	133
2.	Minbu	7	236,420.0	162
3.	Thayet	1	10,000.0	3
4.	Pakokku	8	12,980.2	37
5.	Gangaw	1	11,725.6	4
Total		31	510,232.8	339

Although the Irrigation Department has constructed dams mainly for agriculture, water is also made available for the people and cattle in the irrigated area, meeting 1.5% of their needs. There are also 39 small dams supporting 39 villages in Magway District, 5 small dams supporting 5 villages in Minbu district, 17 small dams supporting 17 villages in Pakokku district and 3 small dams supporting 3 villages in Gangaw district (Table 5.3-4).

Table 5.3-4 Small dams in Magway Division constructed by Irrigation Department

No.	District	No. of dams	Supported villages
1.	Magway	39	39
2.	Minbu	5	5
3.	Thayet	34	34
4.	Pakokku	17	17
5.	Gangaw	3	3
Total		98	98

#### Activities of Dry Zone Greening Department

For greening purposes, ponds and tube wells have been constructed by the Dry Zone Greening Department. The total of 71 ponds, 3 tube wells and 36 check dams have been constructed during the fiscal year of 2000-2001, and 60 ponds and 20 check dams in 2001-2002. Such constructions have also been a great support not only for greening purpose but also for meeting the need of water for 30% of the local people and 20% of the cattle.



### Activities of General Administration Department

The shortage of water supply has been addressed at 5 places in Magway district, 2 in Minbu district, 5 in Thayet district, 8 in Pakokku district and 5 in Gangaw district during 2001-2002.

#### Future Plan

Water supply works will be implemented with the collaboration of the departments concerned under a five year plan from 2001-2002 to 2005-2006. Department of Development Affairs will carry out 150 works in 2002-2003, 199 works in 2003-2004, 145 works in 2005-2006. Department of General Administration will undertake 38 works in 2002-2003, 28 works in 2003-2004, 30 works in 2004-2005 and 31 works in 2005-2006. Dry Zone Greening Department will carry out 80 works each year under the 5 year plan.

#### River Water Pumping

Hand pumping station, electric pumping station, diesel pumping station are constructed to pump water from Ayeyawaddy river for greening and for agriculture in Magway Division. River water pumping projects are as follows:-

No.	Variety	Amount	Acre
1.	Pumping station	3	9919
2.	Electric pumping station	12	18528
3.	Diesel pumping station	31	10015
Total		46	38462

#### Cooperation Work for Combat Desertification

1. Two hundred acres have been planted for fuelwood in Kyauk Htet Taung reserved area in Yesagy township, Pakokku district during 2000-2001 and 2001-2002 with the fund from UMEDA Foundation and OISCA-International, Japan.

2. In Saw Township, Gangaw district, gravity flow water supply systems have been implemented in cooperation with UNDP, Areas Focus Township (AFT), in addition to 64 shallow tube wells, 1 reservoir and 6 deep wells.

3. Under the Human Development Initiative Programme of the UNDP, the following activities relating to combating desertification have been carried out: -

- (1) Water supply for rural areas
  - (a) building reservoirs (rain water)
  - (b) building reservoirs (tube well water)
  - (c) digging traditional wells
  - (d) constructing ponds
  - (e) constructing small scale dams
  - (f) distributing water by pipe
  - (g) constructing filtered tube well

(2) Promoting sustainable environment in the dry zone, through ensuring food security and income generation. The following areas are included under the food security project.

- (a) agriculture
- (b) preservation of the soil
- (c) forestry sector
- (d) livestock breeding
- (e) rural energy (alternative energy)

#### Socio- Economic Activities in Rural Areas

In the Academic Year 2000-2001, one middle school and 9 primary schools have been opened. Moreover with the aid of UNDP and UNESCO, 4 new primary schools were built and 3 primary schools were renovated. Out of 750 primary schools to be renovated, 22 have already been completed in Magway Division.

To enhance the rural health development activities in this Division, elementary training courses for indigenous medicine have been conducted. Moreover, field work by the respective medical staff, family health care plan, cleanliness of the surrounding and sanitary latrine project were carried out. AIDS and sexually transmitted disease project, communicable disease control project, leprosy control project, trachoma and prevention of blindness have been conducted.

In 1988, there were 1,207 miles of roads including 494 miles of tarred roads in Magway Division. Now, there are 1,484 miles of roads including 825 tarred roads. There were 775 bridges in 1988 in Magway Division and the number has increased to 1,135 in the year 2001.

Since 1988, a large number of bridges each of which is over 180 feet have been built in Magway Division. These include Hsinbyushin (Yesagy), Anawrahta (Chauk), Salin creek, Nwetamai, Mone creek, Mann creek, Yaw creek and Myttha bridges. At present, Ayeyawady river (Magway) bridge is under construction.

There were 138 miles of railroads in 1988. As Yesagy- Pakokku- Gangaw railroad has been built from Aunlan to Magway there have been altogether 472 miles of railroads in the Division.

#### **5.4 Measures taken to combat desertification in the Mandalay Division**

Mandalay Division lies between the Shan Plateau and the Ayeyarwady River. The length from north to south is 285 miles and from east to west is 105 miles. The total area of the land is 14650.497 square miles. Of the total land area, about 38.15% are cropland, 38.01% are forestland, 1.73% are virgin land and 22.11% are under other uses. There are 7 districts and 31 townships in Mandalay division. It is a low-rained area with arid climate. The lowest and highest temperatures are 33.8° F and 109.8° F respectively. Average annual rainfall is less than 35.36 inches.

Among the present 12 critical districts within the "Dry Zone", 5 districts – Kyaukse, Nyaung-U, Myingyan, Yamethin and Maiktila are in Mandalay Division. Deforestation is the first step along the road to desertification. Therefore, to mitigate the effect of desertification and greening of those districts, forest plantation; protection and conservation of the natural forests; fuelwood substitution and development of water resources activities are being carried out at village, township, district and division levels by State Peace and Development Council, Ministry of Forestry, Ministry of Agriculture and Irrigation in cooperation with the local communities.

#### 5.4.1 Establishment of forest plantations

Forest Department is fully engaged in Afforestation and Reforestation Programme including planting trees for commercial purpose, industrial wood supply, fuelwood supply and watershed management. In order to promote the environment, forest plantations are being established in the 5 critical districts.

During 2001-2002, trees are planted on 7200 acres of deforested land in the 5 districts (Kyaukse, Myingyan, Nyaung-U, Yamethin, Maiktila) of Mandalay Division. From 1994-1995 to 2001-2002, DZGD planted a total area of 67,319 acres comprising 37,297 acres of village forest plantations, 20,440 acres of watershed plantations, 3,400 acres of green mountains, 152 acres for research purpose and 6,030 acres of wood lots for fuel and others.

Table : Establishment of forest plantations

Sr. No.	District/ Division	plantations established (acres)					Total
		Village	Watershed	Mountains	Research	wood lots for fuel and others	
1.	Kyaukse	2900	-	400	29	1410	4739
2.	Myingyan	11000	10120	1100	29	1530	23779
3.	Nyaung-U	6107	-	1900	28	550	8585
4.	Yamethin	7360	5000	-	32	1380	13772
5.	Maiktila	9930	5320	-	34	1160	16444
Mandalay Division		37297	20440	3400	152	6030	67319

During the 30- year period from 2002/2003 to 2030/2031 of the Dry Zone Master Plan, DZGD of Mandalay Division aims to plant 29,110 acres of forest plantations, 100,000 acres of rehabilitation of remaining natural forests and 15,000 acres of natural reforestation.

From 1997/98 to 2001/02, a total of 170,000 acres of protection of natural forests had been planted by DZGD of Mandalay Division. A total of 8,200 acres of forest plantations, 60,000 acres of protection of natural forests and 6,000 acres of natural reforestation will be established during the period of 2002/03.

Apart from the national efforts to combat desertification in Mandalay Division, The UN agencies such as UNDP, FAO and UNICEF as well as the Korean International

Cooperation Agency (KOICA), the Japanese NGOs and local NGOs also have projects and programmes in the Dry Zone for improving food security and promoting environmental conservation.

Myanmar - Japan Friendship Afforestation Project is a joint effort between the Dry Zone Greening Department and Japan International Forestry Promotion and Co-operation Agency (JIFPRO). It has been implemented since 1998-99 for three-year period, during which about 1,110 acres of indigenous species plantations are established in Nyaung-U township, Mandalay Division of the Central Dry Zone.

Under the Forest for the Green Earth Project- Phase II which the Dry Zone Greening Department and JIFPRO have jointly been implementing since 2000-2001, about 500 acres were established in 2001 and 750 acres of indigenous species plantation will be established in Nyaung-U township during the project period. The main objective of the project is to green a selected arid area in Nyaung-U township and to provide fuelwood to local communities.

Both protected forests are in Naung-U township. Under these projects Yinmar (*Chukrasia tabularis*), Mezali (*Cassia siamca*), Eucalyp (*Eucalyptus globulus*), Shar (*Acacia catechu*), Koke Ko (*Albizia lebbek*), Mangyi (*Tamarindus indica*), Tamar (*Azadirachta indica*), Bawsakhine (*Leucana gluca*), Nyaung (*Ficus religiosa*) and Suu Phyu (*Acacia arabica*) trees were planted during 2000-2001 in the above mentioned protected forests.

Wood lots and roadside planting are also carried out annually by local communities and governmental organization.

#### 5.4.2 Land use and expansion of cultivated land areas

Based on a 2000-2001 appraisal, Mandalay Division has a total land surface area of 5,881,016.5 acres, of which about 897,652.7 acres or 15.26% are relatively closed forests; 286,896.9 acres or 4.88% degraded forests; 427,442.2 acres or 7.27% forests affected by shifting cultivation; 4,103,991.7 acres or 69.78% cultivable land; 117,887.8 acres or 2.01% land under other uses; and 47,145.2 acres or 0.80% water bodies.

Table : Area of forest and land classes, 2000-2001 appraisal

Sr.No.	forest category	Area (acre)	% of total area
1.	Closed forests	897652.7	15.26
2.	Degraded forests	286896.9	4.86
3.	Forest affected by shifting cultivation	427442.2	7.27
4.	Cultivable land	4103991.7	69.78
5.	Water bodies	47145.2	0.80
6.	Other uses	117887.8	2.01
Total land area		5881016.5	100

The total land use area of Mandalay Division in 2001-2002 was about 9,376,456 acres, of which 3,577,344 acres or 38.15% are relatively cultivable land; 3,563,864 acres or 38.01% forest land; 162,634 acres or 1.73% fallow land and 2,072,614 acres or 22.11% of other lands.

Table : Land use in Mandalay Division

Sr. No.	Land use	1998-1999	1999-2000	2000-2001	2001-2002
1.	Cultivable land	3388533	3407167	3577344	3577344
2.	Forest land	3578724	3578724	3563864	3563864
3.	Fallow land	210425	175040	162634	162634
4.	Other lands	1970940	1988091	2072614	2072614
Total land use		9148622	9149022	9376456	9376456

Reclamation of fallow and virgin lands to facilitate the expansion of cultivated areas is being carried out in Mandalay Division. From 1998 to 2001, out of 35,657 acres of reclaimed land, 26,095 acres were used for cropland. From 2001 to 2002 end January more 2,940 acres were reclaimed and 2,477 acres were used for agriculture to grow cash crops such as rice, cotton, sugar cane, beans, sesame, groundnut and sunflower.

#### 5.4.3 Development of water resources

Average annual rainfall in Mandalay Division is only 26 inches. In some years, the annual rainfall dropped as low as 17 inches. Availability of safe and adequate water for domestic use by villagers and their cattle and for forest nurseries is crucial for improving economic and social conditions and to green the environment of the Dry Zone. The activities

undertaken in developing water resources include construction of dams, ponds and reservoirs, digging of artesian / tube wells, tapping of underground water, pumping of water from rivers and creeks at the village level.

The development of rural water supply in Mandalay Division is being carried out in collaboration with Irrigation Department, Water Resources Utilization Department, Dry Zone Greening Department, General Administration Department and local people.

Up to 2001, the Government has constructed 2116 dams, ponds and reservoirs, including 168 ponds, 11 deep wells, 13 electric water pumping stations and 40 diesel water pumping stations in Mandalay Division.

Table : Cultivated area supported by dams, ponds and reservoirs in Mandalay Division

Sr. No.	District	Dams, ponds and reservoirs	cultivated area
1.	Kyaukse	854	246060
2.	Myingyan	229	67259
3.	Nyaung-U	14	950
4.	Yamethin	267	186358
5.	Maiktila	752	263952
Total		2116	764579

Table : River water pumping stations in Mandalay Division

Sr. No.	District	Electric pumping	Diesel pumping	Total
1.	Kyaukse	5	25	30
2.	Myingyan	4	6	10
3.	Nyaung-U	3	-	3
4.	Yamethin	1	6	7
5.	Maiktila	-	3	3
Total		13	40	53

The DZGD have constructed 73 check dams and 49 ponds. During the fiscal year of 2001/2002, it is targeted to construct 44 ponds and 68 check dams. DZGD of Mandalay Division aims to construct 196 ponds, 320 check dams and 12 underground water within the 5 – year plan.

Table : Construction of water ponds, check dams &amp; deep wells by the DZGD

Sr. No.	District	water ponds		check dams		deep wells	
		target	work done	target	work done	target	work done
1.	Kyaukse	9	9	15	15	-	-
2.	Myingyan	16	16	25	18	-	-
3.	Nyaung-U	3	3	5	5	3	-
4.	Yamethin	9	9	15	15	-	-
5.	Maiktila	12	12	20	20	-	-
Total		49	49	80	73	3	-

A total of 13 dams and 1 weir project and 7 reservoirs were undertaken by the Irrigation Department in Mandalay Division. As the area of irrigated land has risen to 73,950 acres, more farmers in the region are now able to grow crops. In addition to the natural rivers, the dams are also providing the people with fish for food.

#### 5.4.4 Fuelwood substitution

Wood fuels are used by small cottage industries such as bricks, pottery, jaggery, bean paste and tobacco manufacturing . To reduce dependency on fuelwood, alternative energy sources like briquettes and agriculture residues are now introduced. Dissemination and demonstration of utilization of fuelwood substitutes are carried out by responsible personnel to convince local people the advantage of using alternative energy of fuelwood substitute.

1999-2000 was designated as the year for using briquettes instead of fuel-wood and for organizing and educating the people on the use of briquettes and also for widespread distribution and making available briquettes to the people.

The Ministry of Forestry has made great efforts for widespread use of briquettes in wards and villages and success is being achieved. In support of forest protection and conservation, fuelwood substitution has been identified as a main task of the DZGD. Three activities will be carried out as follows:

- (i) Distribution of fuel efficient cooking stoves

Total numbers of 55353 cooking stoves were distributed in Mandalay Division from 1998/1999 to 2001/2002. About 9000 number of cooking stoves are to be distributed in 2002/2003.



## (ii) Utilization of fuel briquette

From 1998/1999 to 2001/2002, 11.7 million fuel briquettes were distributed for fuelwood substitute activities. About 1.5 million fuel briquette are to be distributed in 2002/2003.

## (iii) Utilization of agricultural residues

The firewood substitute fuels being used are paddy husks, cotton stems, sesamum stalks, corncobs, split plum seeds and pesinngon stalks, among others. From 1998/1999 to 2001/2002 about 13419 tons of agricultural residues were used as fuel. It is targeted to use 2500 tons of agricultural residues as fuel in 2002/2003.

Table: Status of distribution of fuelwood substitution in Mandalay Division

Year	fuel efficient stoves (nos)	fuel briquettes (million)	agricultural residues (tons)
1998-1999	16764	1653000	2530
1999-2000	13778	3521362	2697
2000-2001	19112	4257483	4248
2001-2002	5699	2315533	3944
Total	55353	11747378	13419

Years of comprehensive extension activities, public awareness and participation in rehabilitation endeavors have brought about a better quality of life for the people of the "Dry Zone" area of the Mandalay Division.

#### 5.4.5 Socio-economic sector

In the road and bridge sector, the Department of Development Affairs and Public Works have built 12 urban roads, 13 rural roads, 18 urban bridges and 9 rural bridges. General Administration Department has built 40 urban roads and 33 urban bridges under the rural development fund.

There are 4073 primary schools in Mandalay Division of which 343 primary schools are in need of renovation. During 2000-2001, 146 primary schools have been renovated.

In the urban health sector, 3 District hospitals and 3 region health centres have been repaired in 18 townships of Mandalay Division.

Under the Myanmar-UNICEF Cooperation Agreement Project (2000-2005) health and nutrition programme, water and environmental sanitation programme, education and child development programme, information programme and monitoring and capacity building programme have been implemented in the Mandalay District and Kyaukse District for childhood development.

## 5.5 Measures taken in Sagaing Division for combating desertification and drought

Sagaing Division is situated in the north –western part of Myanmar between latitude 21 30' north and longitude 94 94' east. It shares border with India in the north, Kachin State, Shan State and Mandalay Division in the east, Mandalay and Magway Divisions in the south and Chin State and India in the west and has 36,535 sq. miles.

Sagaing Division is formed with 198 villages, 38 townships and 8 districts— Sagaing, Shwebo, Monywa, Katha, Kale, Tamu, Mawlaik and Hkamti. Sagaing is the capital town of the Division.

### 5.5.1. Tree Plantation

During 2001, in the three districts in Sagaing Division namely Sagaing, Monywa and Shwebo, Tamar (*Azadirachta indica*), Maezli (*Cassia siamea*), Koeko (*Enterolobium saman*), Sha (*Acacia catechu*), Bawzagaing (*Leucana gluca*), Awrisha (*Acacia auriculiformis*), Termarine (*Tamarindus indica*), Palm (*Zizyphus jujuba*), Htan (*Calamus arboresuns*), Thitsaint (*Terminalia belerica*) were planted on hills, deforested areas, along both sides of highways, and in the compounds of hospitals and schools. The following tables show trees planted by the Forest Department, Social organizations and Dry Zone Greening Department.

#### (i) Forest Department

( No. of trees )

No.	District	Provisional	Actual	Remarks
1.	Sagaing	230000	240000	
2.	Monywa	430000	443513	
3.	Shwebo	280000	297314	
Total		940000	980827	

(ii) Social Organizations

( No. of trees )

No.	District	Actual	Remarks
1.	Sagaing	3600000	
2.	Monywa	4500000	
3.	Shwebo	3600000	
Total		11700000	

(iii) Dry Zone Greening Department

No.	District	1994-95	1995-96	1996-97	1997-98	1998-99	1999 2000	2000 2001	2001 2002	Total	02-03 (Provisional)
1.	Sagaing	600	800	750	750	1811	1685	1685	800	8881	800
2.	Monywa	1700	1900	1500	1805	2212	2580	2585	2280	16557	2100
3.	Shwebo	-	950	950	1000	3602	3064	3060	1920	14546	1700
District Total		2300	3650	3200	3555	7625	7329	7325	5000	39984	4600

Note: 300 plants/ 1 acre

(iv) Special Greening Projects

In Sagaing Division, Dry Zone Greening Department has been implementing the rehabilitation activities for the greening of the following mountains where forests are degraded and denuded.

- i. Sagaing Minwun Mountain
- ii. Kyaitkar- Shwemyintin Mountain
- iii. Phowin Mountain

(a) Sagaing – Minwun mountain greening projects

( No. of trees )

No.	Name	1999-2000	2000-2001	2001-2002	2002-2003 (Provisional)
1.	Minwun mountain	5000	5000	8000	8000
2.	Padamyia mountain	-	2000	-	-
Total		5000	7000	8000	8000

(b) Kyauk-Ka, Shwe Myin Tin hill and Ngwe Khwe Dam watershed  
greening projects

( No. of trees )

No.	Name	2000-2001	2001-2002	2002-2003 (Provisional)
1.	Plant	10000	15000	15000

(c) Phowin Mountain greening project

Since 1997, the responsible departments have been implementing the greening activities to keep the natural forest areas at the Phowin mountain lush and green. Four small dams have also been constructed to supply water for the greening activities.

5.5.2. Conservation of natural forests

Nearly 19,000 acres of natural forests in Sagaing Division have been protected in 2000-2001 and about 60,000 acres of natural forests in 2001-2002.

5.5.3. Woodfuel Substitution

(i) Distribution of Fuel Briquette

Fuel Briquette mills have been set up in Sagaing Township of Sagaing Division for mass production of fuel briquettes. In 2000-2001, 1953,960 millions fuel briquettes and in 2001-2002 , 1056,572 millions fuel briquettes were distributed for fuel wood substitute activities.

(ii) Distribution of fuel efficient stoves

In 2000-2001, a total of 17167 cooking stoves and in 2001-2002, a total of 9339 cooking stoves were distributed.

(iii) Utilization of agricultural residues

To promote fuelwood substitutions, utilization of residues of agricultural crops such as stalks of sesame, pea, cotton, peanut husks and etc. ... are encouraged. In 2000-2001, 2498 tons of agricultural residues and in 2001-2002, 2817 tons of agricultural residues were used as fuel.

#### 5.5.4. Rural water resources development

##### (i) Construction of wells

Tube- wells, artesian wells and over flowing wells have been constructed to tap underground water in District of Monywa, Shwebo and Sagaing. To date 66 tube wells, 391 manual tube wells, and 45 man-made water bodies have been dug in Sagaing Division in 2000-2001.

The Government has been implementing projects to irrigate 60,000 acres of land, to supply water to 20,000 acres of cultivated land in Monywa, Chaung U and Budalin townships. Efforts are being made to build 99 water over-flowing wells which will irrigate 10,000 acres in Yinmabin township and to modernize a network of canals in Tabayin township with a capacity to irrigate 120,000 acres of land. Irrigation projects are being implemented in accord with the land and water conditions of the respective areas in the division.

Due to construction of irrigation facilities and zealous efforts of the farmers, there is a great improvement in agricultural sector in Sagaing Division. Sown acreage of the Division in 2000-2001 was 3.768 million acres- an increase of 368,000 acres within a three-year period from 3.39 million in 1997-98. Crops were cultivated on 6.05 million acres, including 2.292 million acres of multiple and mixed crops recording a 161 percent increase in 2000-2002 in the agricultural sector. Over 1.417 million acres of land have been put under paddy in Sagaing Division to transform it into rice bowl.

##### (ii) River water pumping

Rural development tasks have been carried out since 2000-2001. River- water pumping stations have been installed to irrigate cultivable lands from Chindwin, Mu and Ayeyarwady rivers. The Government has also set up 46 pumped-water stations along the banks of the Ayeyarwady, Chindwin and Mu rivers.

##### (iii) Building of Dams and Irrigation facilities

In Sagaing Division, Kindat regulating dam was built to irrigate 150,000 acres. The Thaphanseik dam in Kyunhla township is feeding water into the regulating dam. The

Thaphanseik is the biggest dam in Southeast Asia built on the Mu River. The main dam is over four miles long. It is a multipurpose dam project which can irrigate over 500,000 acres of crops and generate 30 megawatts of hydro electricity. It is the largest irrigation facility in Myanmar. If the irrigation capacity of the 200 small dams built in cooperation with the local villagers is added, the region's irrigated areas will reach nearly 900,000 acres.

#### 5.5.5 Development of Agriculture Land

During the period of Third Five-Year National Economic Plan, over 1.58 million acres of land will be put under crops, and if the multiple and mixed cropping areas are added the total sown acreage will reach 2.13 million acres. About 150 million baskets of paddy can be produced in Sagaing Division and the surplus amount of 64 million baskets will be distributed to other states and divisions in upper Myanmar. Local farmers are making efforts to increase the yield of cotton to be grown on 0.795 million acres of land and on 0.14 million acres of irrigated land.

#### 5.5.6 Transportation and Social Development

To date, thirty-eight new rural earth roads with a total length of 180 miles were built in the Division, and the 78 existing roads totalling 147 miles were upgraded. A total of 852 rural schools and 29 rural health centers, clinics and dispensaries have been renovated. Altogether 50 bridges have been constructed in the Division.

## **6. Consultative Process in Support of National Action Programme with Interested Entities**

### 6.1 Preparation of National Reports on UNCCD Implementation

NCEA has formed a committee for preparing the first national report on combating desertification with the personnel from National Commission for Environmental Affairs, Ministry of Forestry, Ministry of Livestock and Fisheries, Ministry of National Planning and Economic Development, Ministry of Information, Ministry of Progress of Border Areas and National Races and Development Affairs, Ministry of Agriculture and Irrigation, Ministry of Health, Ministry of Home affairs, Ministry of Energy, Ministry of Transport, Ministry of

Education and Forest Resource Environment Development and Conservation Association (FREDA) – NGO.

The intersectoral and multidisciplinary character is fairly well reflected in the composition of the Committee.

National Workshops have been held with the participation of committee members representing all the departments concerned and NGO representatives to discuss and review the final report.

The second national report is prepared by the NCEA also in cooperation with the committee members and the concerned departments. A workshop to review the second national report has been organized by the NCEA. Views and recommendations of the workshop participants are incorporated in the report.

The two national reports have been prepared by means of consultative process and would serve as a basis for preparing the NAP.

## 6.2 Preparation of UNCCD National Action Programme.

The first National workshop on Preparation of the United Nations Convention to Combat Desertification National Action Programme was held in Yangon, Myanmar on 20-21 December 2001. The workshop was jointly organized and sponsored by the United Nations Convention to Combat Desertification (UNCCD) and the Ministry of Forestry, Myanmar.

Forty-seven representatives from the District Peace and Development Councils of Mandalay, Sagaing and Magway Divisions, National Commission for Environmental Affairs. (NCEA), Agricultural Planning Department, Myanma Agricultural Services, Irrigation Department, Department of Fisheries, Geography Department of Yangon University, Department of Health, Ministry of Science and Technology, Remote sensing and data processing Centre, News and Periodical Enterprises, Planning Department of Ministry of National Planning and Economic Development, Department of Meteorology and Hydrology, Planning and Statistics Department, Forest Department and Dry Zone Greening Department under Ministry of Forestry, National Working Committee for Women's Affairs, Myanmar Maternal and Child Welfare Association and Forest Resource Environment Development and Conservation Association (FREDA) forest-related non-governmental organization participated in the workshop.

At the workshop the presentations were made on,

- "Review of Land Use and Land Degradation Status in Myanmar, Desertification, Land Degradation, Deforestation, Drought and Their Environment and Socio Economic Impacts".
- "Experience with Stakeholders".
- "Implementation of Policies and Measures Aimed at Rehabilitating Degraded Lands, Promoting Reforestation, Protection and Conservation of the Remaining Natural Forests, Promotion of the Fuelwood Substitute Utilization and Water Resources Development Works".
- "Designing Land Degradation Project for Securing Financing".
- "CCD Implementation and the Proposed Elements for the NAP".

### 6.3 Coordination and Working Committees for the Preparation and Implementation of NAP

Coordination and Working Committees at various levels are formed to facilitate the preparation and implementation of NAP.

#### (i) National Level Committee

<u>Composition</u>	<u>Function</u>
<ul style="list-style-type: none"> <li>• Ministry of Foreign Affairs</li> <li>• NCEA</li> <li>• Ministry of Forestry</li> <li>• Ministry of Agriculture and Irrigation</li> <li>• Ministry of Energy</li> <li>• Ministry of Livestock Breeding and Fisheries</li> <li>• Ministry of Transport</li> <li>• Ministry of Home Affairs</li> <li>• Ministry for Progress of Border Areas and National Races and Development Affairs</li> <li>• Ministry of Information</li> <li>• Ministry of Science and Technology</li> <li>• Ministry of Finance and Revenue</li> </ul>	<ul style="list-style-type: none"> <li>• Policy Framework</li> <li>• National guideline</li> <li>• Define Role, Responsibility and Duty</li> <li>• Ministerial Coordination</li> <li>• International Relationship</li> </ul>



<ul style="list-style-type: none"> <li>• Ministry of National Planning and Economic Development</li> <li>• Ministry of Education</li> <li>• Ministry of Health</li> <li>• Ministry of Industry No.(1)</li> <li>• Ministry of Industry No.(2)</li> </ul>	
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(ii) National Level-Working Committee

<u>Composition</u>	<u>Function</u>
Representatives from Respective Agencies	<ul style="list-style-type: none"> <li>• Formulation of Integrated Plan covering Sectoral Plan</li> <li>• Monitoring &amp; Evaluation of Program level</li> <li>• Sectoral Guideline and Responsibility</li> <li>• Program Progress</li> </ul>

(iii) State and Division Level-Working Committee

<u>Composition</u>	<u>Function</u>
<ul style="list-style-type: none"> <li>• Representatives from respective government agencies being included in national working committee</li> <li>• Regional authorities</li> <li>• Respective NGO</li> </ul>	<ul style="list-style-type: none"> <li>• Coordination among Implementing agencies</li> <li>• Monitoring &amp; Evaluation of Integrated Plan</li> <li>• Sectoral Guideline</li> <li>• Progress to National Working Committee</li> <li>• Area level progress and responsibility</li> </ul>

(iv) District Level Working Committee

<u>Composition</u>	<u>Function</u>
<ul style="list-style-type: none"> <li>• Representatives from respective government agencies being included in state level</li> <li>• District authorities</li> <li>• Local NGOs</li> </ul>	<ul style="list-style-type: none"> <li>• Approved local level indicated plan (Township plan and upstream guideline)</li> <li>• Coordination among Implementing Agency</li> <li>• Coordination between down stream level and upstream level</li> <li>• Monitoring and Evaluation of Indicated Plan</li> <li>• Sectorally Supervised</li> <li>• District level progress and responsibility</li> </ul>

(v) Township Level Working Committee

<u>Composition</u>	<u>Function</u>
<ul style="list-style-type: none"> <li>• Representatives from respective government agencies</li> <li>• Township Authorities</li> <li>• Representative of local NGO</li> <li>• Representative of Community Based Organizations</li> </ul>	<ul style="list-style-type: none"> <li>• Develop integrated township operational plan/schedule based on Community Needs raised by village tract level committee and NGOs, CBO within Upstream framework</li> <li>• Coordination among Implementing agencies and village authorities</li> <li>• Coordination with District level</li> <li>• Supervise on implementation</li> <li>• Monitoring &amp; Evaluation</li> <li>• Implementation responsibility and Progress to District</li> </ul>

(vi) Village Tract Level Working Committee

<u>Composition</u>	<u>Function</u>
<ul style="list-style-type: none"> <li>• Village administration</li> <li>• Respective area staff from respective agencies</li> <li>• Representatives from CBOs</li> </ul>	<ul style="list-style-type: none"> <li>• Assess community need and compilation to submit to township committee</li> <li>• Facilitation in implementation</li> <li>• Monitoring and evaluation</li> <li>• Activity responsibility and progress report</li> </ul>

**7. Financial Allocation from the National Budgets**

Annual budgets of the DZGD for the years 1997-1998 to 2001-2002 are shown in Table 7-1 below.

Table 7-1 DZGD budgets for the years 1997-1998 to 2001-2002.

No.	Year	Capital Budget	Current Budget	(Kyats million)
				Total
1.	1997-98	123.046	58.018	181.064
2.	1998-99	185.463	141.160	326.623
3.	1999-2000	212.268	157.538	369.806
4.	2000-2001	204.514	298.069	502.582
5.	2001-2002	215.860	330.000	544.860
	Total	941.151	984.785	1924.935

Annual budget allocation for the DZGD has increased year by year. In 1997-98 the total budget allocated for DZGD was Kyats 181.064 million. In 2001-2002, annual budget allotment increased by three-fold to Kyats 544.860 million. This shows that the Government is placing increased priority to the Greening programmes to combat desertification in Myanmar.

Other sources of financing are:

- The budget allotment for the Department of General Affairs, Ministry of Home Affairs.
- The Budget allotment for the Department of Development Affairs, Ministry for Development of Border Areas and National Races
- Rural Development Fund
- Private contribution
- UNDP / FAO
- International NGOs
- National NGOs
- Joint-venture companies and private enterprises
- Local community

Total expenditure for combating desertification in the Mandalay, Magway & Sagaing division in the Dry Zone was met from budget allotment of various departments such as Dry Zone Greening Department, Department of General Affairs (DGA), Department of Development Affairs (DDA). Private, UN agencies, International and Local NGOs also made financial and material contribution. Total expenditure for the rural development programmes of Magway Division is shown below.

Table 7-2 Total expenditure for the Rural Development Programme (Magway Division)  
(Kyats million)

No.	Year	DZGD	D.G.A	D.D.A	Private Contribution	Total
1.	1999-2000	54.503	15.000	-	-	69.503
2.	2000-2001	56.152	34.500	-	-	90.652
3.	2001-2002	51.569	74.400	32.791*	1.473*	160.233
		162.224	123.900	32.791	1.473	320.388

\* Only water supply program

## 8. Monitoring and Evaluation

Environmental monitoring of the Dry Zone particularly, land use changes, erosion mapping and regeneration plan mapping are done by the Remote Sensing and GIS Section of Forest Department. Main methodology is integrated use of Remote Sensing and GIS. Data sources include landsat 5 TM digital imageries, landsat 5 TM hardcopies, Aerialphotography, Topographic Base Maps and 1:500,000 scale GIS database of Myanmar. Deforestation rates for Myanmar have been compiled by the Forest Department. However, deforestation rate for the Dry Zone proper is yet to be carried out. The following table (8-1) shows Different Deforestation Rates in Myanmar. The summary of the types of landuse in the Dry Zone is shown in table (8-2).

Table 8-1 Different Deforestation Rates of Actual Forests of Myanmar

Serial	Period	Interval	Actual Forest Cover Lost During the Period (sq.Km)	Deforestation Rate of Actual Forests Percent of Total Land area
1	1955 to 1975	20	62242.9	0.5
2	1975 to 1989	14	31121.4	0.3
3	1989 to 1997	8	39375.4	0.7
Overall	1955 to 1997	42	132739.7	0.467

Table 8-2 Summary Landuse types of Dryzone

Serial	Land Use Type	Area (acres)	Area (sq.miles)	% of Total
1	Closed Forest	4,250,596	6,641.55	19.7 %
2	Degraded Forest	1,815,843	2,837.25	8.4 %
3	Shifting Cultivation	2,804,174	4,381.52	13.0 %
4	Agriculture	11,962,395	18,691.24	55.5 %
5	Other Landuse	422,273	659.80	2.0 %
6	Water Bodies	302,178	472.15	1.4 %
	Total	21,557,459	33,683.53	100 %

Erosion susceptibility data of Sagaing, Magway and Mandalay Divisions is shown in the table (8-3) below.

(acres)

	Slight	Moderate	Critical	Grand Total
Sagaing Division	5292357.275	226362.4	3434.608	5522154.24
Magway Division	7839612.168	2257853	284657.5	10382122.24
Mandalay Division	4968876.658	555614.1	128692	5653182.72
Dryzone Total	18100846.1	3039829	416784.1	21557459.1

According to the data, erosion susceptibility is not yet a problem in the Dry Zone. However, moderate areas can become a problem unless regeneration plan is carried out.

Scientific studies and monitoring relating to the degradation of water quality and quantity, the degradation of arable soils are yet to be undertaken.

Map – 1

Map - 2