

**United Nations Convention to Combat
Desertification
(UNCCD)**

Union of Myanmar

National Report on the UNCCD implementation

August 2000

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2. Introductory Remarks and Summary

Following the signing of the two conventions, namely, "Framework Convention on Climate Change" and "Convention on Biodiversity Conservation", Myanmar acceded to the United Nations Convention to Combat Desertification (UNCCD) in January 1997. The main purpose of this report is to inform the Parties to the Convention on the situation in Myanmar with regard to measures taken for the implementation of the UNCCD at the national level.

Although National Action Programme (NAP) for Myanmar has yet to be formalized, the present report is the outcome of collaborative efforts by all those who are presently involved in the NAP process. They are personnel from the National Commission for Environmental Affairs (NCEA) that acts as the National Coordinating Body (NCB); high ranking officials from government departments; professors from relevant national academic institutions; representatives from non-governmental organizations (NGOs); the private sector, regional and local authorities and the media.

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.

Except for the dry zone area, there is sufficient rainfall in Myanmar during the rainy season that 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 is less than 600 mm. The dry zone area is especially different from the other regions in the country in terms of dryness and hot weather conditions. Although the average mean temperature is about 27° C, the temperature often rises to above 40° C in the hot season. The Rakhine mountain range in the west of the country obstructs the path of the southwest monsoon causing a rain shadow area in the central Myanmar. Over the

years, much of the natural vegetation in the dry zone has diminished and the land has gradually become degraded. Sheet and gully erosion have also reduced the productivity of the soil. 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.

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 is thus 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.

Farm households in this area are constrained by low and unreliable rainfall, thin soils, and denuded ground and forest cover. The majority of them, possessing small holdings, are subsistence farmers. They grow cash crops such as cotton, sessamum, pulses and beans, although there are also some rain-fed rice cultivation, mostly for own consumption. Seasonal vegetables such as onions, garlic, chillies, and tomatoes are also grown on alluvial soils. They practice mixed and multiple cropping system as well as crop rotation in order to reduce crop losses and retain soil fertility. Poorer farm families and agricultural labourers supplement their incomes by cutting fuelwood or making jaggery both of which have contributed to over exploitation of forest resources and deforestation.

Being aware of such a situation, the Ministry of Agriculture and Forests created Agriculture and Rural Development Cooperation (ARDC) in 1953 and initiated a reforestation project in 1954. ARDC had limited success in introducing some demonstration woodlots for local fuel wood supply. This effort has been continued by successive government which has culminated in greening Mount Popa which has now become an ecotourism site of international interest. However, the population pressure in the post-war period was such that the Forest Department alone could not contain the depletion and degradation of forests.

The National Commission for Environmental Affairs was established in 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. Then in 1994, the Ministry of Forestry (MOF) launched a 3-year "Greening Project for the Nine Critical Districts" of Sagaing, Mandalay and Magway Divisions in the dry zone. This was later extended to 13 districts with the creation of a new department, the Dry Zone Greening Department (DZGD) in 1997.

Thus, as in most countries even before Myanmar's accession to UNCCD measures relating to combating desertification had already been taken at the local and national levels. However, Myanmar's accession to UNCCD serves as the organizational and coordination guarantee to combat desertification in an integrated and cohesive manner.

As the Short-term Five-Year Plan was formulated before Myanmar's accession to the Convention, measures pertaining to desertification were not explicitly integrated into the strategies and priorities of the Plan. However, with Myanmar Agenda 21 as the basis for the integration of environment and development, measures to combat desertification were implicitly included in the Plan in the form of environmental conservation activities. Myanmar Agenda 21 outlines several activities to prevent land degradation and desertification.

The National Commission for Environmental Affairs (NCEA) acts as National Coordination Body (NCB). NCEA also formed a committee for drafting the national report on combating desertification comprising about 70 percent of the NCEA members who are representatives from ministries and departments concerned, and about 10 percent

each from NGOs, Women's group and consulting agencies reflecting fairly well intersectoral and multidisciplinary character as was required. NCEA collaborates closely with government departments in matters relating to the environment.

In Myanmar, on the implementation side, the Ministry of Forestry and the Ministry of Agriculture and Irrigation are at the forefront in combating desertification. In this effort they are assisted by the other line ministries especially the Ministry of Livestock and Fisheries, the Ministry of Health, the Ministry of Education, the media, UN agencies and NGOs (both domestic and international), including womens' group.

The Government is doing its best to meet the challenges of environmental protection including land degradation/desertification. But, given the limited resources that it could mobilize, much more could be done if international cooperation in the form of new and additional resources are made available.

Monitoring and evaluation is normally done internally by respective line ministries. Strengthening this process through the use of modern technology is also underway.

This national report has followed as closely as possible the Guidelines of UNCCD, the Decision 11 of COP 1. It is based on the information provided by various line ministries concerned with environmental protection and sustainable development.

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

The Short-term Five Year Plan (1996/97 – 2000/2001) was formulated to further consolidate the gains achieved in the preceding Short-term Four Year Plan, and to lay firm foundation for the future development of the country. The first four years of the Five-Year Plan have already been implemented. At present, the 2000/2001 annual plan is being implemented. As the Short-term Five Year Plan was formulated before Myanmar' accession to the Convention, measures to combat desertification were not explicitly integrated into the Plan. However, one of the measures to be implemented for the

realization of the objectives of the Five Year Short Term Plan is to formulate the various development programmes to be implemented over the five years with built-in environmental protection measures to ensure minimal degradation of the environment.

Besides, with Myanmar Agenda 21 as the basis for the integration of environment and development, measures pertaining to combating desertification were implicitly included in the Plan in the form of environmental conservation activities. Myanmar Agenda 21 outlines several activities to prevent land degradation and desertification. Those activities include inter alia; preparing soil maps; encouraging soil conservation programmes; promoting soil reclamation; promoting application of organic and biological fertilizers; planning and management of watershed; and developing and implementing national action programme to combat desertification.

The order of priorities set in the Short-term Five - Year Plan for the income generating sectors was as follows:

- (1) agriculture
- (2) livestock and fishery
- (3) mining with special emphasis on exploration and production of crude oil, natural gas, gems, jade, metal and minerals
- (4) transportation and energy sectors
- (5) processing and manufacturing with special emphasis on the development of value added industries and agro-based industries
- (6) export of goods and services

In line with its policy of sustainable forest management, care has been taken not to over-exploit forest resources commercially. Therefore in the order of priorities set in the short-term Five-Year Plan, forestry despite its earning potential was not included in the list of priority income earning production sectors. However, a sizable amount of investment has been allocated for the development of the forestry sector during the Short-term Five - Year Plan period.

Plans and strategies which are relevant to combating desertification

Sectoral plans and strategies constituting an integral part of the above mentioned national development plan and which are relevant to combating desertification are as follows:

(a) Agriculture sector

(1) Action plans

- expansion of cultivated land areas
- provision of sufficient water supply for cultivation

(2) Strategies

- measures given in support of the reclamation of fallow and virgin lands to facilitate the expansion of cultivated areas. In this effort special emphasis was placed on the participation of the private sector
- conservation of environment has been given emphasis in extending and constructing new dams, weirs and other means of irrigation facilities, rehabilitating and renovating the existing ones for effective and beneficial use of water availability with particular emphasis on arid regions in the dry zone area of the country
- provision of required technical assistance and other requirements for the public to undertake construction of small-scale irrigation works, dams and reservoirs extensively
- Introduction of environmentally sustainable farming and water harvesting system.

(b) Livestock and fishery sector

(1) Action plan

- upgrading livestock breeding and environmentally sound fish culture

(2) Strategies

- setting up livestock breeding special zones in State and Divisions for specific livestock and to undertake cooperative form of livestock breeding

- distributing pedigree livestock and undertaking preventive and curative measures on cost-recovery system by private breeders
- undertaking maintenance and extension works for the development of pasture lands
- promoting and extending fish and prawn aquaculturing works along the coastal areas of the country taking into consideration environmental factors
- encouraging freshwater and marine fish production taking in view environmental balance and protection
- producing and distributing animal feedstuff and medicines
- granting virgin and fallow lands to undertake livestock breeding and fish culture on commercial basis.
- distributing quality fingerlings, stocking of fish seeds and disseminating improve methods.

(c) Forestry sector

(1) Action plan

- extracting forest goods and services without degrading and depleting forest resources in the long-run
- conserving natural environment
- maintaining and further enhancing ecological balance

(2) Strategies

- protecting and conserving the remaining natural forests and extending reserved forest area
- maintaining systematic supervision of plantation including village woodlots plantation and to place special emphasis on conservation of mangroves plantation
- implementing systematic conservation of existing watershed areas and carrying out new watershed plantations for the preservation of dams, reservoirs and irrigation facilities

- controlling and containing illegal extraction of forest products from reserved forest area and unclassified forest area according to the Forest Law
- strengthening measures to promote alternative fuel resources as a substitute fuel for firewood and charcoal
- strictly abiding the annual allowable cuts in extraction of teak, hardwoods and other forest products
- extending forest research works
- systematically implementing the greening of arid areas in central Myanmar with a view to greening these areas as well as providing safe water supply.

These important plans and strategies constitute the very first steps in the process of a National Action Programme (NAP) as envisaged by UNCCD. At the same time additional measures are being envisaged in order to mitigate the effects of desertification. These include measures to ensure that the livestock plan could adequately address the acute imbalance between forage/fodder supply and livestock population in the dry zone. The fact that half of the cattle population is to be found in the three Divisions of the Dry Zone having approximately 26 percent of the total land area in the country ^{1/} clearly suggests that overgrazing most likely is one of the major causes of land degradation/desertification. Moreover, much research still needs to be carried out, both at the national and community level, to identify high risk areas and to test innovative measures to address the problems of land degradation and there are also issues of land use to be considered. In fact, this is one area where international expertise and finance could be most beneficial.

^{1/} The three divisions in which the dry zone is located comprise 26 per cent of total land area. Out of this only 10 per cent is actually dry zone.

4. Institutional Measures Taken to Implement the Convention

A. National Coordinating Body (NCB)

The National Commission for Environmental Affairs (NCEA) acts as National Coordinating Body (NCB). In fact, 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 is comprised of a Chairman, a Secretary, a Joint Secretary and nineteen members. The Chairman of the Commission is the Minister for Foreign Affairs. The members are heads of departments of various ministries dealing in environmental conservation.

Four specialized committees are formed under the Commission:

- Committee on Conservation of Natural Resources
- Committee on Control of Pollution
- Committee on Research, Education and Information, and
- Committee on International Cooperation.

The Commission is assisted by a staff bureau composed of personnel with diverse backgrounds in botany, chemistry, economics, statistics, forestry, law, geography, marine biology and zoology (see NCEA organization chart, Annex 1).

The Commission's mandate includes: to provide advice to the Cabinet on the formulation of environmental policies and to seek its approval; to issue guidelines for the implementation of environmental policies; to provide guidance and advice to the regulatory agencies on such matters as legislation, regulations and environmental standards; to formulate short, medium and long term environmental policies and strategies that take into account both the environmental needs and development requirements.

Members of the NCEA are nominated by the ministries concerned. They are Director Generals from the Department of Agriculture Planning, Ministry of Agriculture and Irrigation, Energy Planning Department, Ministry of Energy, General Administration Department, Ministry of Home Affairs, Department of Health, Ministry of Health, Transport Planning Department, Ministry of Rail Transport, Department of Meteorology and Hydrology, Ministry of Transport, Forest Department, Ministry of Forestry, Department of Foreign Economic Relations, Ministry of National Planning and Economic Development, Planning and Statistics Department, Ministry of Forestry, Myanmar Industrial Planning Department, Ministry of No. (2) Industry, Directorate of Mining, Ministry of Mining, Fisheries Department, Ministry of Livestock and Fisheries, Directorate of Industry, Ministry of No.(1) Industry, General Manager, Myanmar Timber Enterprise, Myanmar Port Authority, Ministry of Transport, Director, Myanmar Scientific and Technological Research Department, Ministry of Science and Technology, and Professor, Geography Department, Yangon University, Ministry of Education.

NCEA/NCB also formed a committee for drafting the national report on combating desertification with the following personnel:

Steering group

1. Secretary, NCEA
2. Director General, Forest Department, Ministry of Forestry
3. Director General, Department of Agriculture Planning, Ministry of Agriculture & Irrigation

Committee Members

1. Joint Secretary, NCEA
2. Director, Planning and Statistics Department, Ministry of Forestry
3. Director, Dry Zone Greening Department (DZGD), Ministry of Forestry
4. Director, Livestock Breeding and Veterinary Department, Ministry of Livestock and Fisheries
5. Director, Planning Department, Ministry of National Planning & Economic Development

6. Director, Information & Public Relation Department, Ministry of Information
7. Director(Engineer), Department of Development Affair, Ministry of Progress of Border Areas & National Races & Development Affairs
8. Director, Department of Agriculture Planning, Ministry of Agriculture & Irrigation
9. Director, Department of Health Planning, Ministry of Health
10. Deputy Director, General Administration Department, Ministry of Home Affairs
11. Deputy Director, Energy Planning Department, Ministry of Energy
12. Deputy Director, Meteorology & Hydrology Department, Ministry of Transport
13. Education Research Officer, Myanmar Education Research Bureau, Ministry of Education
14. General Secretary, Forest Resource Environment Development and Conservation Association (FREDA)
15. Director, NCEA
16. Director, Department of Forestry, Ministry of Forestry
17. Director, Irrigation Department, Ministry of Agriculture & Irrigation

Apart from the above, NCEA in its capacity as NCB for combating desertification coopted as additional members, NGO representatives, Women group representatives and a national consultant. Thus, 70 percent of the Committee members are representatives from ministries and departments concerned and about 10 percent each from NGOs, Women's group and consulting agencies.

It should be obvious from the above, that the intersectoral and multidisciplinary character is fairly well reflected in the composition of the Committee. Moreover, the presence of senior staff with experience in various socio-economic fields assures smooth and prompt feed back of relevant information to the concerned organizations and back to the NCEA.

There are regular meetings of the NCEA every three months. There are also ad hoc meetings as and when necessary.

The NCEA functions as a coordinating agency, collaborating closely with government departments in matters relating to the environment. It acts as the national focal point for environmental matters vis-a-vis other countries and international organizations.

Different ministries involved in the NAP process and in combating land degradation have their own budgets for the purpose. For example, the Ministry of Forestry will have its own budget for the reforestation component of the Programme. However, given close cooperation between different line ministries information regarding budgets as on other matters are shared between one another.

NCEA also has a data base network where social, economic and environmental information are kept and routinely updated. The availability of international funding could further improve the NCEA's ability in collecting important data such as those on the dynamics of land degradation and desertification, runoff estimation, soil loss and erosion rate, information on socio-economic conditions and farming systems, the cost of desertification and the effects of droughts etc..

Information exchange activities in support of NAP are carried out by the NCEA internally with all the above mentioned relevant ministries, NGOs and Women's groups; and externally with UNEP, ASEAN and a number of International NGOs.

Capacity and institution building in the short and medium term is being carried out by each ministry separately on their own budgets.

B. Implementing Agencies

Even before Myanmar became a party to the United Nations Convention to Combat Desertification (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 act as the principal implementing agencies.

B.1. The Dry Zone Greening Department

The Dry Zone Greening Department was entrusted with the following objectives:

- (1) To green the Central Dry Zone of Myanmar.
- (2) To protect 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 the 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 four main tasks

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

- establishment of forest plantations;
- protection and rehabilitation of remaining natural forests;
- initiating development and utilization of wood fuel substitutes; and
- development of water resources.

(a) Establishment of Forest Plantations

Prior to DZGD, the Forest Department has been establishing forest plantations in deforested areas to restore forest cover and to rehabilitate environment.

Up to 1997/98, a total of 72,210 acres (29,233 ha) had been planted under the Nine Districts Greening project.

In 1998/99, DZGD planted a total of 35,287 acres (14,280 ha) comprising 18,280 acres (7,398 ha) of village forests, 8,920 acres (3,610 ha) of watershed

plantations, 2900 acres (1,174 ha) to green mountains, 137 acres (55 ha) for research purpose and 5050 acres (2,044 ha) of woodlots.

In 1999/2000, DZGD planted a total of 35040 acres comprising 13,257 acres of village forest, 14,700 acres of watershed plantations, 2,700 acres to green mountains, 133 acres for research purpose and 4,250 acres of woodlots.

In 1999/2000 and 2000/2001, about 35,000 acres of deforested land are scheduled to be planted annually.

During the 30 year period from 2001/02 to 2030/31 of the Dry Zone Master Plan, DZGD aims to plant 1,050,000 acres (405,2000 ha).

(b) Protection of Natural Forests

About 1.82 million acres of degraded forests and about 2.8 million acres of forest affected by shifting cultivation have been identified as existing in the Dry Zone.

Protection against human, cattle and fire has been found to be very effective in improving degraded forests. Degraded forests considered to be capable of improving naturally are, therefore, identified, demarcated and protected. Constant patrols are being made by forest guards permanently stationed along the borders. Silvicultural treatments such as weeding, cleaning, climber cutting, thinning and coppicing are provided where necessary, in order to accelerate natural growth while fire lines and inspection path are constructed for efficient fire prevention.

Of these, priority areas are identified and a total of 100, 000 acres of natural forests had been specially protected each year since 1997/98.

In addition, approximately 1.8 million acres (1.09 ha) of degraded forests have been earmarked for conversion to closed forests by natural means during the 30 years of the Master plan.

The area closure involves a protection system to improve land with degraded conditions, limited vegetation, low fertility and severe erosion through natural vegetation. No livestock is allowed to graze and no human interference is tolerated for 3-5 years. The utilization of these areas has to be planned and initiated as soon as satisfactory state of recovery has been reached.

(c) Initiating Development and Utilization of Wood Fuel Substitutes

Fuelwood consumption is one of the main causes of deforestation, and excessive cutting of trees for firewood before they are fully grown, leads to the loss of growth potential of the forest stands. In most developing nations more than 80% of wood extracted are being used for fuel. In Myanmar too, illegal extraction of trees for firewood and charcoal has been a major cause of deforestation and forest degradation.

Therefore, FD had launched fuelwood substitution programme to reduce pressure on the utilization of wood for fuel. The DZGD since its creation in 1997 had distributed some 100, 000 efficient cooking stoves and 9.2 million numbers of briquettes (7.4 million kg), and the use of 45, 000 metric tons of agricultural residues by villagers in the dry zone was also recorded over the same period. Distribution of efficient cooking stoves and briquettes and the use of agricultural residues in place of fuelwood were found to have surpassed the targets adopted by DZGD for the years 1997/98 and 1998/99.

In support of forest protection and conservation, fuelwood substitution has been identified as a main task of the DZGD. Three activities would be carried out as follows:

(i) Distribution of fuel efficient stoves

Total number of 94628 A-1 cooking stoves were distributed in 1998/99. About 40, 500 number of A-1 cooking stoves are to be distributed in 1999/2000 and all the necessary arrangements have been undertaken.

(ii) Promotion of fuel briquette production and utilization

In 1998/99, 8.35 million fuel briquettes were distributed for fuelwood substitute activities. Fuel briquette mills would be set up in Sagaing township of Sagaing Division and Yezin of Mandalay Division for mass production of fuel briquettes. It is targeted to distribute about 7-million fuelwood substitute in 1999/2000.

(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 to be encouraged. In 1998/99 nearly 34, 000 tons of agricultural residues were used as fuel. It is targeted to use 14,000 tons of agricultural residues as fuel in 1999/2000.

(d) Water resources development

Rains fall only in a few days annually and water is very 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 1998/99, the DZGD has been able to construct 170 ponds and 12 tube wells. The biggest success in water resource development is the success in implementing Tant-Kyee Taung water distribution programme. Under this programme water from the Ayeyarwady river is pumped to the top of the mountain which is 1, 024 feet above sea level and about 6980 feet away from the river. The main objective of this programme is to help reforest the very degraded and steep sacred mountain. In 1999/2000, it is targeted to construct 170 ponds, 5 tube wells and 171 check dams by the DZGD.

Activities for the greening of mountains

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, Padamyay, Shwe Min Wun, Menyo, Mingon, Kokke, Taungtha, Kyauktalon, Myinsaing and Tuyin.

(2) Magwe Division

Tant kyii, Shin Ma Taung, Tetma and Minbu Mountain Range.

(3) Sagaing Division

Sagaing Minwun Mountain.

B.2. Myanmar Agriculture Service

Myanmar Agriculture Service (MAS) is one of the departments of the Ministry of Agriculture and Irrigation (MOAI). The main functions of the MAS constitute agricultural research and extension developments, with objectives directed towards:-

- the increased production of major crops;
- the development of improved production technology through proper researches on management soil crop and pest control;
- development of suitable high-yielding crop varieties;
- the transfer of appropriate crop production technology through agricultural extension programme;
- distribution of certified seeds through the seed programme;
- the provision of agricultural inputs;
- classification of soils, advising on soil conservation techniques and providing fertilizer recommendations; and
- the exploration of export markets on some agriculture produce.

The Managing Director with eight Divisional Head (General Managers) carried out the above functions. Among those Divisions, Land Use Division takes the responsibility of making soil surveys, soil maps, conduct fertilizer experiments on farmers' field and co-ordinates research activities with related agencies for introduction of soil conservation and land improvement practices. It also undertakes research activities for problem soils, amelioration and soil fertility investigation in farmers' field.

B.3. Irrigation Department

The Ministry of Agriculture and Irrigation has (13) institutions under its jurisdiction and the Irrigation Department, as having the largest staff force, constitutes an important department. The provision of irrigation water, flood protection etc., will consequently remain essential and the Irrigation Department is responsible to respond to the needs appropriately.

Myanmar is a country endowed with abundance of land and water resources. In order to tap its potential, numerous irrigation facilities will have to be provided throughout the country. It will have to be met with the construction of new dams, weirs and furnishing of flood protection works. It will be incumbent on the Irrigation Department to implement the mandates with resolution and zeal and thereby tender strong support to the Government's committed priority to agriculture.

The dry zone is a low-rained area. Some parts of the area suffer from desertification because of seasonal drought occurrences. The Irrigation Department therefore initiated and participated in the project for greening of dry zone area.

The project envisages in the dry zone area are: -

- (1) Rehabilitation and renovation of existing Government maintained and village irrigation works requiring improvement for efficiency and economy .
- (2) Construction of small and medium dams and weirs with very few environmental problems presenting quick yielding solution for low yields and cropping intensities and quick investments and benefits reaching large number of farmers in selected poverty stricken areas.

Annual budget allocation of Irrigation Department for the construction and maintenance works of the dry zone area is shown in Table (1) below:

Table (1) (Kyat million)

No.	Year	Capital			Current	Total
		A	B	Total		
1	1991-92	164.7	-	164.70	42.47	207.17
2	1992-93	90.1	-	90.10	57.60	147.70
3	1993-94	461.2	-	461.20	51.00	512.00
4	1994-95	162.0	50.00	212.00	58.80	270.80
5	1995-96	1090.2	100.00	1190.20	64.84	1255.04
6	1996-97	2393.4	18.52	2411.92	83.68	2495.60
7	1997-98	618.1	15.00	633.10	107.95	741.05

8	1998-99	3268.4	5.00	3273.40	252.00	3525.40
9	1999-2000	1363.0	-	1363.00	314.21	1677.21

Note: A = Capital expenditures for Irrigation Projects implemented in dry zone area

B = Capital expenditures for small Irrigation Works under greening of 13 districts scheme.

B.4. Water Resources Utilization Department

Although Myanmar is endowed with abundant water resources, totalling approximately 870 million acre-feet, only 41 million acre-feet has been utilized so far. Agriculture in Myanmar, is traditionally reliant on annual rainfall, needs to be made more stable though increasing utilization of water resources and improved management. Plans have accordingly been formulated to bring areas under irrigation.

The Ministry of Agriculture and Irrigation has adopted five methods for availing water for crops production. Among them, pumping water from rivers and streams and utilization of underground water for irrigation had been undertaken by Irrigation Department and Agricultural Mechanization Department till early 1995. From the 8th of February 1995, however, the Underground Water Division of the Irrigation Department and the Rural Water Supply Division of the Agricultural Mechanization Department were merged as the Water Resources Utilization Department, for closer cooperation and more efficient utilization of water resources.

The main functions of the Water Resources Utilization Department are as follows:-

- To increase the agriculture production in Myanmar by pumping water from rivers and streams, and also utilization of groundwater from feasible potentials.
- To promote the socio-economic conditions of rural population by supplying portable water from tube wells and piped water.
- To supply cropwater and drinking water from spring sources by gravity flow systems in the mountainous region of the border area and remote areas.
- To introduce sprinklers and drip irrigation systems to farmers.

5. Nature and Magnitude of Land Degradation / Desertification

Myanmar is a country affected by desertification and drought in some area. The main area affected by desertification and drought is the Dry Zone in the central part of the country. The dry zone (boundary) encompasses Lower Sagaing, Mandalay and Magway Divisions (especially 13 districts in these Divisions). According to mean annual rainfall of less than 1000 mm, about 10 percent of the total area of the country can be identified as the dry zone. However, the total area of Sagaing, Mandalay and Magway Divisions and their population in 1997/98 were approximately 26 percent and 34 percent respectively of the country total.

The dry zone is characterized by less than 1000 mm of rainfall annually (less than in other parts of Myanmar). The area shrinks in wet years and expands dramatically, especially northward and southward, in dry years. The central core (dry) area is confined to Pakokku, Nyaung Oo and Myingyan districts which are the hottest places in Myanmar and where the mean annual rainfall is less than 600 mm. Annuals mean rainfall as well as mean rainy days over the dry zone during the last three decades (1968 to 1997) clearly indicates a declining trend. As the potential evapotranspiration (PET) in the area is about twice the annual rainfall, the ratio of annual rainfall or precipitation to potential evapotranspiration falls within the range of 0.05 to 0.65 as specified in the Convention.

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 (but not Magway) took place during 1982 and 1983. The third worse drought hit the whole area of the dry zone during 1993 and 1994.

Droughts of equal magnitude also hit lower Sagaing Division during 1969 and 1970, and Mandalay and Magway Divisions during 1994 and 1995. Except for the interval between the second and third worse droughts of some 10 years, recurrence of droughts in the Dry Zone seems to be showing up at shorter intervals.

The soil water deficit in the dry zone as a whole and in Lower Sagaing usually occurs during December and July. In Magway Division, the soil water deficit period is slightly shorter-December to May-, while Mandalay normally has to face the longest soil water deficit period – November to August.

Accordingly with the assistance of UNDP and FAO, Myanmar has conducted a project (UNDP/FAO (MYA/96/006) which resulted in "Guidelines on soil and water conservation for the Myanmar Dry Zone" and "Environmentally Sustainable Food Security and Micro Income Opportunities in the Dry Zone Project".

The above-mentioned project noted the conditions pertaining to the Dry Zone as follows:

- Land degradation in the Myanmar Dry Zone is becoming a matter of serious concern for its negative implications on the livelihood of the rural population and the environment on which they largely depend. An increasing population in combination with unfriendly climatic conditions triggers the rapid misuse of the land and over-exploitation of natural resources. As a consequence, soil erosion by water and by wind and the progressive removal of the vegetative cover are becoming common features observable in many parts of the Dry Zone. Therefore, land degradation is a most dangerous form of negative ecological process, taking gradually irreversible forms as the process advances and accelerates.
- Traditional measures, though valuable and an essential source of inspiration and reference, are generally not sufficient to counterbalance the pace of the process and need to be improved, consolidated and supplemented by additional technologies (UNDP/FAO 1999, p-ii).

Table 1 shows different types of land use categories in the administrative area of the Dry Zone.

Table 1. Land use categories in the administrative area of the Dry Zone

Forest Category	Area		% of Total Area
Closed forests	4,250,596 acres	(10,503,223 ha)	19.7%
Degraded forests	1,815,842 acres	(734,861 ha)	8.4%
Forests affected by S/C*	2,804,174 acres	(1,134,834 ha)	13.0%
Agriculture	11,962,396 acres	(4,841,115 ha)	55.5%
Water body	302,178 acres	(122,290 ha)	1.4%
Others	422,273 acres	(170,892 ha)	2.0%
Total	21,557,459 acres	(8,724,184 ha)	100%

* Shifting Cultivation

Source: Forest Department, Myanmar 1997.

According to the assessment of change of forest conducted in 1990, the actual forest area had decreased at an annual rate of 220,000 ha or 0.64 percent of the actual forested area during a period of 14 years from 1975 to 1989. Forest Department data also revealed the annual deforestation rate in Sagaing, Mandalay and Magway Divisions to be 0.68%, 1.48% and 4.07% respectively. Clearly, deforestation in the dry zone and especially in the more heavily and densely populated Divisions of Mandalay and Magway is more serious than the national average.

The dry zone to this day is still one of the most important agricultural areas in Myanmar. There is still over 55 percent of fairly productive land for agriculture (Table 1). Most of the crops grown in this region are typical "Ya" crops such as cotton, maize, pulses, millet, groundnut, sessamum, and so on. Although there are some rain-fed rice cultivation, multi-crop cultivation is the traditional farming system in this area.

Deforestation is generally regarded as the first step along the road to desertification. Deforestation degrades the vegetation cover and makes the soil more vulnerable to erosion by subsequent over cultivation and/or over grazing. The productivity of agricultural land is likely to decline as a result of soil degradation. Accordingly to mitigate the effect of desertification and the greening of the dry zone occupies a place of special importance in the government's environmental protection endeavours.

According to "Agricultural Statistics" (1987/88 to 1997/98) productivity for most crops show an increasing trend between 1972/73 and 1982/83, for some crops by double or more than double the previous level. It may be attributed to the impact of "green revolution" (and greater utilization of inputs, especially chemical fertilizers) in Myanmar that took place around 1974-75. The same pattern of increasing productivity trend is also observed for Magway Division between 1982/83 and 1996/97. In Sagaing and Mandalay Divisions however, per unit area for some crops indeed remained stagnant or declined slightly during the same period. But, there were also some crops whose productivity continued to increase. This may be due partly to the fact that many of the crops grown in the area are drought tolerant, and partly to greater input utilization stemming from incentives provided by agricultural liberalization in the late 1980s. In other words, decline in productivity resulting from soil degradation as generally assumed, is not evident at least in terms of aggregates at the Division level. To prevent the environmental degradation in the dry zone area, it is important to introduce environmentally friendly farming system and techniques.

Deforestation and the decline in the forest cover of the dry zone is attributable to overcutting of woody biomass for fuelwood due to population growth, inadequate supply and high cost of non-wood energy sources and inefficient utilization of fuelwood. In this connection, it is worthy of note that (i) 81 percent of the energy in Myanmar came from biomass; (ii) that the household sector dominates energy consumption with an estimate of 87.2 percent; and (iii) that consumption of woodfuel accounts for 84.1 percent (78.3% of fuelwood and 5.8% of charcoal). It may further be noted that with the exception of Ayeyarwady, other areas especially, Mandalay, Sagaing and Magway Divisions are areas with serious woodfuel deficits.

Land degradation however, is not confined to the dry zone. It is also a severe problem in the Southern part of the Ayeyarwady Delta where valuable mangrove forests are being degraded and some inhabitant species are in danger to be depleted. Accordingly, as a preventive measure ecosystem management of mangrove area is being made with the cooperation of UNDP as well as National and International NGOs.

6. Measures Taken or Planned to Combat Desertification

A number of projects pertaining to the sustainable management of natural resources have been implemented since the early 1950s by relevant sectors. Brief accounts of measures that have been undertaken or planned by sectors to combat desertification are given below.

Measures taken in the Forestry Sector

Forest resources in Myanmar play a dominant role in the socio-economic development of the nation. According to the analysis of 1989 Landsat TM imageries, about 50.87% of the country is covered with forests, which are managed under the Myanmar Selection System.

The role of forests for environmental stability and for soil and water conservation is increasingly recognized by the government. Dry Zone Greening Department is fully engaged in restoration and rehabilitation measures in the denuded and degraded areas of the dry zone of Central Myanmar. In addition, the protected areas system is being expanded to cover diverse biological resources.

In Myanmar Forest Policy 1995, it is mandated to increase the area of Reserved Forest (RF) & 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.

Myanmar has been establishing plantations extensively since early 1980's. The total area of forest plantations in 1997 was about 621,318 ha, of which 54% were commercial plantations. In 1999, it came to 694,192 ha with an increase of 72,874 ha in two years of which commercial plantations constituted about 48%. Myanmar launched a Special Teak Plantation Programme in 1998, with an annual planting target of 8100 ha on a 40-year rotation. The primary objectives are to increase teak yield and reduced pressure on natural forests.

The exercise of National Forestry Master Plan (NFP) for Myanmar reflects Myanmar's cultural, social, economic, ecological, and political climates of the country.

At present the drafts of all chapters are completed. This NFP document will therefore be finalized soon.

Integrated Plan for the period from 2001-02 to 2030-31 has now been prepared for the central dry zone. At the end of the plan, about 730,000 ha of degraded natural forests will have been improved by natural means and about 330,000 ha of forest plantations established in the Dry Zone. Moreover, environmentally sustainable food security and micro-income opportunities the Central Dry Zone of Myanmar (Mya/96/006) are being implemented jointly by UNDP/FAO and relevant ministries. These projects are designed for increased food production and income generation for the rural poor through environmental conservation and management. Community forestry, agroforestry, training programmes, financial and material incentives are the major components. These projects are still on-going.

Development of Myanmar's Criteria and Indicators for Sustainable Forest Management (C&I for SFM) at both national and Forest Management Unit (FMU) levels was completed in October 1999. At present, Forest Department (FD) will test the C&Is in the field and revision and improvements will be made afterwards as appropriate. Moreover, FD has been undertaking an assessment on the application of Myanmar's C&Is in a forest management unit. Two workshops on C&I and Timber Certification had been jointly organized by FD and Japan Overseas Forestry Consultants Association (JOFCA) in 1999 and 2000.

One significant achievement after the Seventeenth Session of the Asia Pacific Forestry Commission (APFC) is the development of the National Code of Forest Harvesting Practices in Myanmar. The Code was formulated and prepared by FD in cooperation with Myanma Timber Enterprise (MTE) and the Planning and Statistics Department of the Ministry of Forestry with FAO's financial and technical assistance. The follow-up action will be the implementation of the Code together with other existing rules, instructions and guidelines.

The Myanmar Government has updated some policies and legislations to reflect its commitment to the international forestry obligations and the country's specific

conditions. The Myanmar Forest Policy was enacted in 1995 and the 1902 Forest act was revised in 1992. Forest Rules were formulated and prescribed in 1995. The "Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law was promulgated in 1994, replacing the old Burma Wildlife Protection Act, 1936.

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.

FD 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.

A nation-wide tree planting programme is implemented annually for the purpose of afforestation and greening non-forest areas. School children, local communities and government and non-governmental organizations take part in this programme, and more than 15 million tree seedlings are planted every year.

Some reserved forests, located close to the villages are usually set aside for the formation of Local Supply Working Circles (LSWC). Annual coupes are opened and closed systematically, and utilization of forest resources and period of time for extraction are specifically designated in the forest management plans. Significant features are regulation of extraction by ticket system and practice of Coppice and Coppice with Standard Systems, in which standards are maintained for the production of poles, posts and sawn logs to the villagers.

Measures taken in the Agriculture Sector

Myanmar has well established farming and cropping systems for each of agro-ecologically different areas. These systems are crucial in sustaining the productivity of the land. In the dry zone more so than in other parts of the country, farm households are accustomed to cultivating pulses and beans at least once in one crop rotation cycle. This

practice provides one of the major plant nutrients, nitrogen as well as humus as a soil conditioner.

The present government has built innumerable dams and irrigation schemes, including many in the dry zone, as a major means to increase agricultural production. This has helped to increase farm income and better the livelihood of the farm households.

Also, Myanma Agriculture Service (MAS) has launched a programme throughout the country to introduce applicable and effective hill side farming techniques, like contour planting, formation of contour strips and contour bunds, and sloping agriculture land techniques. These programmes are being implemented with the support of local authorities and community participation. To the extent that they are effective, they will help to stem further clearing of forests for shifting cultivation. Research and development to generate approximate dry zone farming system is now underway.

Measures taken in the Livestock and Fisheries sector

Livestock farming is mainly a complementary activity to all farming and cropping system in dry zone areas. Draught animals still have to be relied upon in about 85% of all cultivation. Ruminants not only provided main traction-power but also manure for improvement of soil condition and sustainable agriculture.

Because of the vital role of ruminant animals in cultivation, there have been many wasteland-classified pasturelands for grazing purpose by cattle and buffaloes. Livestock Breeding and Veterinary Department has undertaken many pasture development programmes in the dry zone since 1982-83.

On the other hand, because of the ever increasing demand of grain and other agriculture products by the growing population, there is a tendency in the dry zone as in other parts of the country, to encroach on the grazing pasture for cultivation.

Measures have also been constituted to enhance coordination between agriculture, livestock and forest sectors for proper land use in the area.

Measures taken in the social sectors and by the media

Myanmar being a member country of WHO adopted the primary health care approach with the objective of achieving "Health for All" goal. Primary Health Care (PHC) is the main vehicle for achieving HFA/2000. The minimum components of PHC are "health education, adequate supply of food and nutrition, sufficient safe water and sanitation, maternal and child health care including family planning, prevention and control of locally endemic diseases, immunization against the main infectious diseases, treatment of common diseases and injuries, and the provision of essential drugs". Safe Water Supply and Sanitation Project (WATSON) has been undertaken by the Ministry of Health in collaboration with the Ministry of Agriculture and Irrigation and the Ministry of Progress of Border Areas and National Races and Development Affairs. In general, the public health sector has delivered important services with significant benefits for the people, including those in the dry zone. The dramatic decrease of trachoma and leprosy cases which are the common diseases in the dry zone have been observed.

With regard to education, the active participation of Myanmar in the Education for All (EFA) should benefit all, including those in the dry zone. Moreover, the fact that the main thrust of education is primary education means that people in the rural areas should benefit more as it is the level of education that most farm households can afford.

Wide coverage on government projects and activities including Dry Zone Greening project, a nation-wide tree planting programme or other environmental conservation measures are given by the electronic and print media. There are also programmes and/or articles to raise the public knowledge and awareness of the need for environmental conservation, for combating desertification and appropriate agriculture and forestry practices.

Magazines in Myanmar often have articles concerning natural resource conservation and desertification.

Measures taken by the NGOs and the Private Sector

International and national NGOs are undertaking many activities, coordinating

with private enterprises, other NGOs, UNDP and Government agencies bilaterally or multilaterally in critical areas of desertification.

Currently, Forest Resource Environmental Development and Conservation Association (FREDA), in collaboration with Japan Overseas Forestry consultants Association (JOFCA), is engaged in soil conservation activities in areas dominated by slash and burn agriculture (in Kalaw and Mindon townships) at grass root level through the promotion of improved land use for sustainable development of rural communities.

Renewable Energy Association Myanmar (REAM affiliated to FREDA) is also one of the active national NGO working on renewable energy related services for rural development and environmental conservation.

At present, a number of activities and projects including promotion of public education are being implemented by REAM and the following associated groups:

- Forest Resources Environment Development & Conservation Association (FREDA)
- Friends of Rainforest in Myanmar (FORM)
- ECODEV Group
- Solar Energy Cooperative Ltd.
- UNDP/FAO/MYA/99/006 (Kyaukpadaung area)

7. Consultative Process in Support of National Action Programme with Interested Entities

Since the adoption of a market-oriented policy and opening up of the economy in 1988 followed by the promulgation of the Myanmar Investment Law, Myanmar has welcomed international partners in many fields of activities. The consultative process with international organizations in the field of combating desertification problems are carried out by the line ministries and departments such as the FD, DZGD and MAS as evidenced by the projects below.

Ministry of Agriculture and Irrigation has been cooperating with UNDP/FAO in the implementation of a project entitled "Environmentally Sustainable Food Security and

Micro-income Opportunities in the Dry Zone." In addition FD/DZGD has been implementing the following projects in cooperation with:

Yomiuri sponsored NGO from Japan in Afforestation Project in Naung-Oo District;

Japan International Forestry Promotion and Co-operation Agency (JIFPRO) in Afforestation Project in Naung-Oo District;

Korea International Co-operation Agency (KOICA) in Dry Zone Greening Project in Naung-Oo District; and

Organization for Industrial Spiritual and Cultural Advancement International (OISCA-International) in Greening Project in Pokkoku District.

The Government also encourages and promotes local NGOs and private sector organizations to develop bilateral and multilateral cooperation with UN agencies, ASEAN member countries, international organizations, international NGOs and overseas companies.

Myanmar-Yomiuri Afforestation Project is a joint effort between Forest Department and Yomiuri Shimbun. It has been implemented since 1995-96 for four-year period, during which about 450 ha of agroforestry plantations are to be established in Nyaung-Oo township of the Central Dry Zone.

Dahat-Si Greening Project: FD and Japan International Forestry Promotion and Cooperation Agency (JIFPRO) have jointly been implementing the project since 1997 for a period of two years, during which about 250 ha of agroforestry plantation will be established also in Nyaung-Oo township.

8. Financial Allocations from the National Budgets

Myanmar is still in the process of developing specific mechanisms to ensure financing for combating desertification. Apart from the annual budget of NCEA, is the annual budget allocations for various line ministries concerned with varying aspects of natural resource management and desertification control. As these ministries also have

other responsibilities and commitments besides natural resource management activities, the funds for desertification control is hardly adequate. Other sources of financing are:

- UNDP/FAO
- International NGOs
- National NGOs
- Joint-venture companies and private enterprises
- Local community sources.

Annual budgets of the DZGD for the years 1997/98 to 1999/2000 is shown in Table 2 below.

Table (2) DZGD Budget for the Years 1997/98 – 1999/2000

(Kyat million)				
No.	Year	Capital	Current	Total
1	1997/98	123.046	58.018	181.064
2	1998/99	185.463	141.160	326.623
3	1999/2000	212.268	157.536	369.804
	Total	520.777	356.714	877.491

Source: :DZGD.

Annual budget allocation for the Dry Zone Greening Department has increased year by year. In 1997/98, the total budget allocated for Dry Zone Greening Department was Kyats 181.064 million. In 1999/2000, annual budget allotment increased by twofold to Kyats 369.804 million. This shows that the Government is placing more and more priority to the programmes to combat desertification in Myanmar.

9. Monitoring and Evaluation

Presently NCEA is responsible for observation and monitoring of the environment and the methodology for the elaboration of impact indicators. The line ministries have their own internal mechanism for observation and monitoring of activities at the national, division, district and township levels. The capacity for national mechanism will be enhanced with the formation of a National Environmental Protection Commission and the establishment of a Ministry responsible for Environment, which is envisaged in the near future.

Forest Department and DZGD in particular, have developed an elaborate set of criteria and indicators for monitoring and evaluation. For example, the following are but a few of the criteria set for forest plantations-

- Forest plantations must supplement 5 to 10 % of the wood-fuel needs of the Dry Zone,
- Only local variety seedlings are to be used in forest plantations,
- Only plantations with over 70 % survival rate are to be considered as successful.

Some of the indicators used in evaluating the success in implementation during 1998/99 are –

- 35, 287 acres (14, 280 ha) of trees planted,
- One million acres(40470 ha) of natural forest protected,
- 170 ponds constructed in the villages of 13 districts.

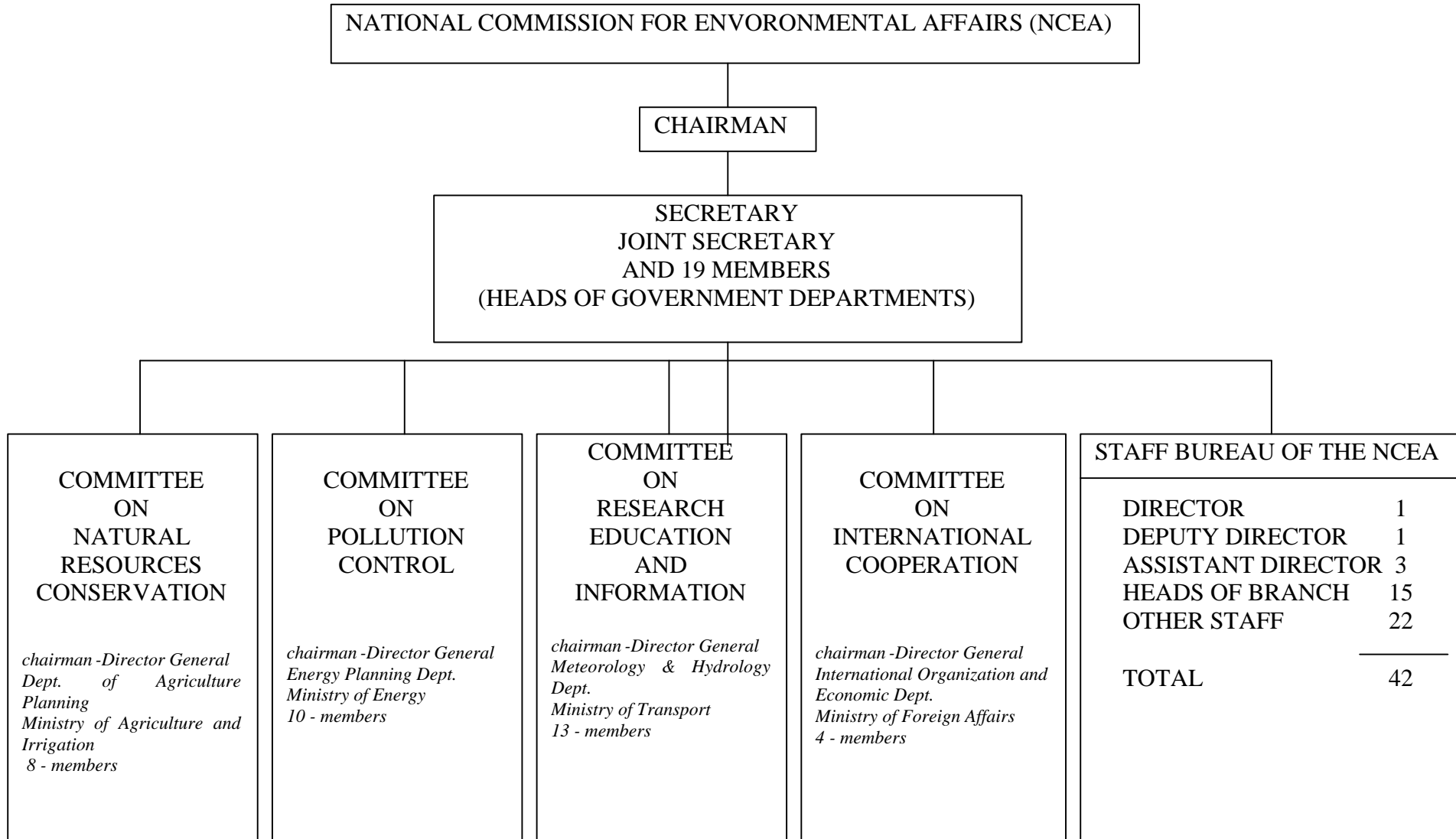
In evaluating the success of the plan objectives, *efficiency, effectiveness and relevance* are carefully taken into consideration.

Rainfall and temperature data are available from a number of meteorological stations scattered in the dry zone. A number of agriculture research stations are also scattered in the dry zone to test the suitability of various types of crops in the region. These stations have provided the Government to have with monitoring and evaluation capability.

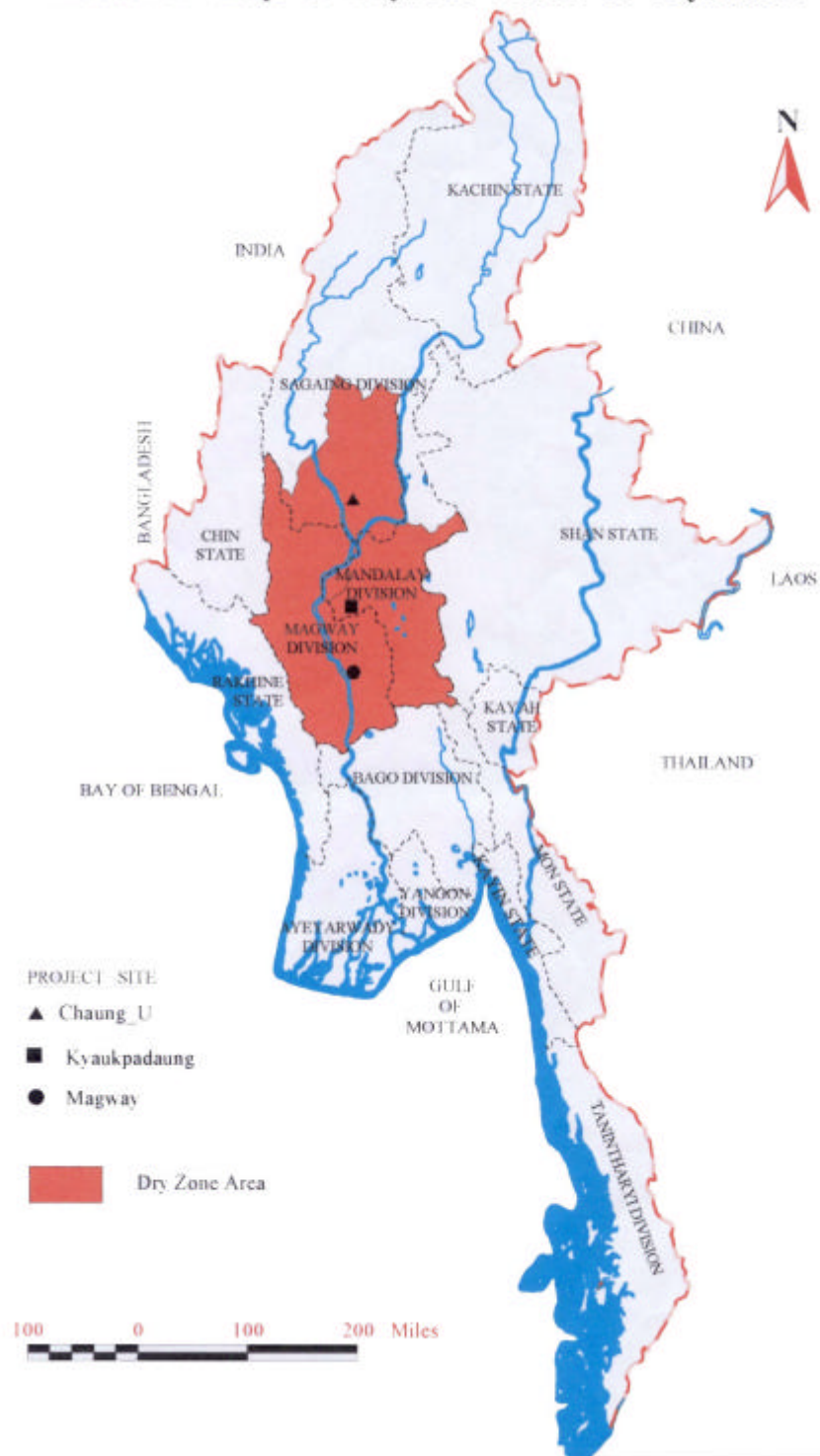
Monitoring and evaluation component is in variably included in programmes funded by UN agencies.

Annex 1

ORGANIZATION CHART OF THE NATIONAL COMMISSION FOR ENVIRONMENTAL AFFAIRS (NCEA)



Location Map of Dryzone Areas in Myanmar



PROJECT AREA OF DRYZONE GREENING DEPARTMENT

