INDIA

NATIONAL REPORT ON IMPLEMENTATION OF UNITED NATIONS CONVENTION TO COMBAT DESERTIFICATION

GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT & FORESTS
NEW DELHI

April 2000

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1. Executive Summary

1. At the UNCED in Rio de Janeiro a Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD) was agreed. In December 1992, The General Assembly adopted Resolution 47/188. The objective of the Convention is:

> to combat desertification and mitigate drought and/or desertification, particularly in Africa, through effective action at all levels, supported by international cooperation and partnership arrangements, in the framework of an integrated approach which is consistent with Agenda 21, with a view to contributing to the achievement of sustainable development in affected areas.

India ratified the Convention on December 17, 1996 and it came into effect on March 17, 1997.

2. In India about 107.43 m ha, or 32.75 percent of the total geographical area is affected by various forms and degree of desertification. Particularly the arid, semi-arid and sub-humid regions, commonly called dryland, represent fragile ecosystems that are susceptible to desertification. These regions are also susceptible to frequent droughts that accelerate the process of desertification and exacerbate its impact. It is estimated that droughts occur in one or two out of five years in arid and semi-arid regions. The country is currently passing through a severe drought (called *Trikal* meaning acute shortage of drinking water, food and fodder) which has affected 12 states – especially Gujrat, Rajasthan, Madhya Pradesh and Andhra Pradesh – close to 100 million people and 3.4 million cattle are caught in the grip of drought. The general problem of the dryland region with large populations is essentially one of human ecology. On one hand the inherently limited water resources within the region set the ultimate limit of biomass productivity, on the other hand erratic rainfall results in widely fluctuating production which, in turn, leads to shortage of food particularly for the poor, imposing stress on the population. As human and animal population increases, these stresses become greater and the demand on natural resources is magnified and a process of progressive degradation of resources is set into operation.

3. Post independent India has taken a number of steps to tackle the problem of drought and mitigation of distress caused by it. Systematic efforts through the launching of long-term countermeasures were initiated in the Second Plan (1956-61) which were substantially expanded during the Fourth Plan (1969-1974). However, the Fourth Plan suggested that much of the amount GoI spent on relief in famine-affected areas could be "so deployed in the areas chronically affected by drought as to generate considerable employment in rural sector largely related to pre-planned programmes of Rural Works." In 1970-71, Rural Works Programme (RWP), with the objective of creating assets designed to mitigate severity of drought where it occurred and provide employment in drought-affected areas, was formulated. The mid-term appraisal of the Fourth Plan redesignated RWP as Drought Prone Area Programme (DPAP). In spite of resource constraint to tackle the magnitude of the problem caused by desertification and drought, GoI continued to lay emphasis on poverty alleviation programmes with a focus on development and management of renewable natural resources. Various sector and cross-sector projects and programmes related to desertification control were launched earlier on and are continuing within the framework of the Ninth Five Year Plan. Different Ministries service these programmes. Some of the major ones are: Afforestation Programme, Drought Prone Area Programme (DPAP), Desert Development Programme (DDP), National Watershed Project for Rain-fed Areas (NWDPRA), Indira Gandhi Nahar (Canal) Project, Soil and Water Conservation in the Catchment of River Valley Projects, and Development of Ravine Areas. Also, steps have been taken to augment renewable energy sources by initiating programmes for tapping solar energy, by harnessing wind power and by undertaking plantation programmes with people's participation and encouraging farmers to plant trees on their fields. In addition, the National Project on Biogas Development has been undertaken to promote family type biogas plants by using cowdung. The National Programme of Improved *Chullhas* (stoves) is under implementation to improve energy conservation. In other social and economic areas Ministries such as Human Resource Development, Health, Social Welfare, etc implement programmes having a bearing on combating desertification. These programmes are implemented on a regular basis to combat desertification.

4. Although restoration of ecological balance continued to be the main objective of Drought Prone Area Programme (DPAP) and Desert Development Programme (DDP), coordination and sustained action on achieving drought-proofing and combating desertification continued to be problem areas. As a result the direction of the programme got diluted depending upon various factors such as the perception of State Governments, capabilities of sectoral departments and pressures exerted by different interest groups. In the process, by and large, each activity under the programmes was implemented in an isolated and segmented manner and watershed unit of area for planning and development was completely lost sight of.

5. When drought problems are faced Central and the State Governments undertake relief measures by providing drinking water, foodgrains through Public Distribution System (PDS), fodder, food subsidies to special groups and employment through food-for-work-programme. At the Centre, Disaster Management Division in the Ministry of Agriculture coordinates drought relief works with state governments. The National Centre for Disaster Management (NCDM) set up in 1995 undertakes human resource development, research case studies, building of database and provides information services, and documentation on disaster management. Financial assistance to state governments is provided from the Calamity Relief Fund (CRF). In the wake of the current drought GoI has set up a Commission on Disaster Management under the Chairmanship of Deputy Chairman, Planning commission to look into the entire gamut of the problem and make recommendations to streamline the system.

6. In order to provide research support to the various programmes for combating desertification, GoI has established a network of national level research institutes such as the Central Research Institute for Dryland Agriculture, Hyderabad, the Central Arid Zone Research Institute, Jodhpur, the Central Soil Salinity Research Institute, Karnal, the Central Soil and Water Conservation Research Institute. Dehra Dun, Indian Grassland Forest Research Institute, Jhansi, National Research Centre on Agroforestry, Jhansi, the Water Technology Centre at the Indian Agriculture Research Institute, New Delhi, under the aegis of the Indian Council of Agricultural Research (ICAR). A network of forestry research institutes under the Indian Council of Forestry Research and Education (ICFRE), Dehra Dun is conducting research on problems related to rehabilitation of degraded lands and increasing productivity of forests of dryland. Besides developing technology packages, these institutes are also engaged in training field staff in different disciplines.

7. The specific schemes and research efforts are well supported by institutional, policy and legislative measures. Environmental management is accepted as a major guiding factor in national developmental planning process. In June 1972, MoEF, in accordance with the principles 16 and 17 of Agenda 21, adopted the National Conservation Strategy and Policy Statement on Environment and Development which serves as a management guide for integrating environmental concern with development imperatives. In 1993, the draft Environment Action Programme (EAP) document was finalised. The EAP emphasises, *inter alia,* soil and water conservation and drought proofing and management of natural disaster. People's participation at the grass-root, local and regional levels is also accepted as key issue. EAP is now under comprehensive review both in Government and Non-Government sectors.

8. A policy framework is already in place. Important among these are: National Land Use Policy Outlines, 1986; Draft National Agriculture Policy, 1999; National Forest Policy, 1988; Draft Grazing and Livestock Policy, 1994; Draft National Policy for Common Property Resource Lands; Draft National Policy and Macro-level Action Strategy on Biodiversity, 1999, and National Policy on Population. A National Policy on Environment is under preparation. However most of these policies have come into existence in the last few years. These do not discuss desertification *per se* but have important implications for combating it.

9. On the institutional side, the National Land Use and Wastelands Development Council (NLWC), established in 1985 and chaired by the Prime Minister, is the highest policy planning and coordinating agency for all issues concerning the country's land resources. NLWC oversees the work of the National Land Use and Conservation Board (NLCB), National Wastelands Development Board (NWDB), and the National Afforestation and Eco-Development Board (NAEB). At the State level, the State Land Use Boards (SLUBs**)** under the Chairmanship of Chief

Minister are responsible for implementation of related Central/State schemes and programmes. The programmes at the village and block level in the States are coordinated by SLUBs. The ICAR institutes have substantially contributed towards development of technology, imparting training and setting up demonstration projects for dryland improvement.

10. In so far as legal and regulatory framework is concerned, Article 48A and 51 G of the Directive Principles of State Policy enjoin upon the State to protect and improve the environment and safeguard the forests and wildlife. The Indian Forest Act 1927, Wildlife (Preservation) Act 1972 and Mines Act 1952, Forest (Conservation) Act 1980 (FCA) and Environment (Protection) Act, 1986 together have helped in conservation and management of natural resources and preservation and protection of the environment. For example, as a result of enforcing the provisions of FCA the annual rate of diversion of forestlands from 150,000 ha during 1950-1980 declined to 25,000 ha during 1980-95. The last five years witnessed a further reduction in diversion of forestlands to 15,500 ha. In addition, compensatory plantations have been raised over 530,000 ha in lieu of diversion of diversion of forestlands.

11. Realising the need of wider participation of local communities in the schemes and projects formulated for natural resource management in general and for combating desertification and drought in particular, several steps have been initiated in recent years. The Constitution (Seventy-third Amendment) Act, 1992 gives constitutional status to the *Panchyati Raj* Institutions (PRIs) at Village, Block and District levels. Under the amendment a number of subjects e.g., agriculture, land improvement, implementation of land reforms, land consolidation and soil and water conservation, water management and watershed development, animal husbandry, fuelwood, and fodder, social forestry have been passed on to PRIs which are village level institutions. This constitutional amendment also promotes gender equality even in the political sphere as it reserves one-third elected seats for women in all PRIs.

12. Most of the schemes in the area of rural development and natural resource management have been revamped to involve the local communities. For example, new guidelines, based on the recommendations of Dr. Hanumantha Rao Committee, have been issued for implementation of all area development programmes. These guidelines make it mandatory that all such projects be a part of the action plans prepared on watershed basis and must involve local communities through Watershed Associations. Further, in forestry sector in pursuance to GoI Circular of June I, 1990 22 State Governments have issued their guidelines to involve the village communities and NGOs in protection and regeneration of degraded forests on the basis of their taking a share of the usufruct from the forest areas that they protect and develop. As of January, 2000 more than 36,075 Village Forest Committees are protecting about 10.25 m ha of degraded forests.

13. These steps signify major shift in approaches viz., from sectoral to integrated and from governmental to people's programmes. Along with these, emphasis has been laid on incorporating traditional practices, particularly of water harvesting in such projects and schemes. In the past the village communities have developed many environment-friendly traditional practices in the field of crop production, mixed farming, water harvesting, forage resource conservation, combined production systems, biodiversity management, forestry, energy, storage of grains/tubers. While some of these practices have already been incorporated in the on-going programmes, efforts would be made to restore them, improve them up with modern approaches and use them in combating desertification. These changes are in harmony with the spirit of CCD.

14. Though the above-mentioned efforts have been significant to an extent in combating desertification and drought and in reducing their impact, much more needs to be done considering the magnitude of the problem. To rehabilitate the total vulnerable area of about 107.43 mha, a coordinated effort as well as a significantly enhanced budgetary support would be required. The provisions of CCD and formulation of the National Action Plan (NAP) would play a major role in providing these.

15. Towards the preparation and implementation of NAP the Ministry of Environment and Forests (MoEF) functions as national focal point for the CCD. It has established a 20 member National Steering Committee (NSC) chaired by the Special Secretary, MoEF. The Committee includes the

Secretaries of the Ministries, Directors of Research Institutes, Heads of Departments and NGOs concerned with programmes related to combating desertification**.** The functions and the mandate of the NSC are: (i) to review national priorities, (ii) to assess the progress of preparation of NAP and (iii) to ensure effective inter-ministerial coordination for implementation of the NAP. MoEF provides secretarial support and funds required for efficient functioning of NSC. The NSC constituted four Working Groups (WGs). These are: (1) Desertification, Monitoring and Assessment and Early Warning Systems, (2) Sustainable Land Use Practices for Combating Desertification, (3) Local Area Development Programme (LADPs) and (4) Policy and Institutional Framework. Each WG has its own terms of reference. The WGs will provide inputs for the preparation of National Action Programme (NAP).

16. The focus of the national Action Programme (NAP) would be in areas which are considered important by CCD (article 10 of the Convention) but have not been adequately treated in NCS and EPA viz., improving institutional capacity and organisation at the grass-root level, promoting alternative livelihoods, etc. Depending upon the evaluation of the ongoing strategies and programmes and assessment of current and future needs to combat desertification and mitigating the effects of drought, the NAP would be oriented to give the thrust on meeting community needs of drinking water, food, fodder and fuelwood with a view to improve their quality of life.

17. Linkage with Regional Action Programme (RAP) has been established by participating in the six Thematic Programme Networks (TPNs) and India is host to the TPN2 "Agroforestry and Soil Conservation in Arid, Semi-arid and Dry Sub-humid Areas". MoEF and ICAR have facilitated establishing and functioning of TPN2 at the Central Arid Zone Research Institute, Jodhpur in collaboration with four other main institutions. The Space Application Centre, Ahmedabad has been identified as the Technical Coordtinator for establishing TPN-1 "Desertification Monitoring and Assessment" network in India.

18. At the UNCED four important environmental instruments were agreed: The United Nations Framework Convention of Climate Change (UNFCCC), the Convention of Biological Diversity (CBD), the United Nations Convention to Combat Desertification (CCD) and the Principles for Global Consensus on the Management, Conservation and Sustainable Development of all types of Forests (Forest Principles). The important element about these instruments is considerable similarities and complementarities at the scientific levels. Indeed, Sustainable Development by definition requires that issues be addressed holistically to ensure that solution to one environmental concern does not introduce another. Therefore, the scientific linkages between the different instruments that exist and their own provisions could provide an avenue for an integrated and cost effective approach in implementing the instruments in future.

19. MoEF has prepared the National Forestry Action Programme (NFAP) for sustainable development of the country's forests as a part of the programme recommended by the United Nations Conference for Environment and Development (UNCED), its subsequent forum the Commission on Sustainable Development (CSD), and Intergovernmental Panel on Forestry (IPF) for launch of NFAP globally. The National Policy and Macro-level Action strategy on Biodiversity has been formulated.

20. Even though the concerned Ministries and the State Governments have taken measures for local capacity building, a lot remains to be done, particularly at the grass-root level. The Central Soil and Water Conservation Research Institute, Dehra Dun has been serving as a focal institute for watershed management and soil conservation. The Committee on Training in Watershed Development has also envisaged an active role for the National Institute of Rural Development (NIRD) for a massive nationwide human resource development. Training will be given a high priority and this is an area where external assistance would be required.

21. In the country several organisations are engaged in monitoring of different aspects of desertification and drought. Work is in progress to establish an Early Warning System (EWS) and a drought management plan. In so far as monitoring and evaluation (M&E) of programmes/projects undertaken within the framework of NAP is concerned, it will be carried out by the Programme Evaluation Organisation Wing of the Planning Commission with the active support of Environment Information System (ENVIS) in MoEF. The aim should be to eventually develop a user-friendly M&E system, incorporating the relevant indicators, base line data, targets,

data source and collection methods, which may finally lead to Community Based Monitoring System (CBMS) at the local level. The criteria for selection of impact and implementation indicators have been briefly discussed. A logical framework approach for monitoring and evaluation of each NAP project has been suggested.

22. It is seen from the foregoing discussion that GoI soon after independence launched several programmes to combating desertification and mitigating the effects of drought. Even though the Government has been allocating substantial funds for the programme, these were far short of the funds needed to fully address the enormity of the problem. External assistance is therefore required for mounting a massive programme to fight the menace. As soon as the NAP document is finalised, appropriate programmes/projects identified and prioritised, consultations with multilateral and bilateral agencies and international donors would begin.

23. The report summarises thrust areas for action in the future and emphasises the need for National Action Programme which will provide an institutional mechanism both in terms of achieving better coordination among affected states and the national agencies involved in land management. It will also supplement GoI's resources with external assistance available within the CD framework for a more comprehensive, coordinated and participatory programme of action to combat desertification and mitigate the effects of drought.

2. BACKGROUND

2.1 Location

India, with an area of about 329 m ha, is a subcontinent. It is separated from mainland Asia by the Himalayas. It lies between 8^o 4' and 37^o 6' north of the Equator and is surrounded by the Bay of Bengal in the east, the Arabian Sea in the west and the Indian Ocean to the south.

2.2 Arid, Semi-arid and Dry Sub-humid Ecosystems

The arid (19.6 percent), semi-arid (37.0 percent) and dry sub-humid (21.0 percent) areas of India occupy 77.6 percent of its total land area of 329 m ha (Government of India 1994). These together comprise a large belt of country running from the Pakistan border in the northwest through Peninsular India to the southern tip of the country. Aridity is severe in western part of Rajasthan, which is an eastern extension of the much larger arid areas of the Middle East. This part of Rajasthan, together with the adjacent portions of states of Haryana and Gujarat may be regarded as truly arid or as transition to semi-arid. **Droughts are frequent in these areas. It is estimated that droughts occur in one or two out of five years in arid and semi-arid regions.** The dry areas of the peninsula are better described as semi-arid, although portions of these areas have a combination of unfavourable factors partly induced, which now create conditions approaching the arid. These lands comprise what are here called "drylands" and where desertification is taking place.

2.3 Climate

The Himalayan range in the north acts as a meteorological barrier for the whole country. Despite the country's size and its varied relief, the seasonal rhythm of the monsoon is apparent throughout. The mean annual rainfall in arid, semi arid and dry sub-humid regions is 100-400mm, 400-600mm and 600-900mm, respectively. Although much of north India lies beyond the tropical zone, the entire country has a tropical climate marked with relatively high temperatures and dry winters.

2.4 Natural Vegetation

The Himalayan region, which is rich in vegetation harbors species that can be found in practically from the tropical to alpine regions. Altitude is the major influencing factor in actual distribution of these species in this region. In rest of the country, the type of vegetation is largely determined by the amount of rainfall. Outside the Himalayan region, the country can, however, be divided into three major vegetation zones: the tropical semi-evergreen forests, the tropical deciduous forests form the major share (38.2 percent of the total) and the thorn forests. The total area under some

kind of forest cover is 63.33 m ha, accounting for 19.25 percent of India's geographical area (Forest Survey of India 1997).

2.5 Economy

Though agriculture has been the main occupation of the bulk of the Indian population, the founding fathers of independent India had visions of the country becoming a prosperous and Modern State and accordingly established a good industrial base. Since then, India has achieved a good measure of self-sufficiency in the manufacture of a wide variety of basic and capital goods.

However, agricultural sector continued to receive the attention it deserved in the successive Five Year Plans, which provided momentum to the agricultural production and resilience to the economy. **India today is not only self-sufficient in grain production, but also has a substantial reserve, which helps in overcoming the effects of drought and occasional failure of monsoon. Agriculture and allied activities still contribute 33 percent to the Gross Domestic Product and provide livelihood to about two-thirds of the work force in the country.**

2.6 Causes of Desertification

Man and his livestock have long occupied drylands. By general arid zone standards, dry- lands of India have a high population density, which ranges from 268 persons per km^2 in Jhunjhunu to 9 persons per km^2 in Jaisalmer (Government of Rajasthan 1985 and 1997). The rate of growth of population during the period 1983-97 in Jaiselmer and Jhunjhunu was 50 and 33 percent respectively. The rate of growth of population during the decade 1981-1991 in dryland region has been 29 percent as against 23 percent for the country (Government of India 1991). The livestock population increased from 16 million in 1983 to 27 million in 1997 (52 percent increase) in Jaiselmer and 11.76 million in 1983 to 12.48 million in 1997 (6.2 percent increase) in Jhunjhunu. In Jaiselmer the density of livestock per 100 ha of grazing lands increased from 1568 in 1983 to 2364 in 1997 (51percent increase) and in Jhunjhunu the increase was 37 percent for the same period. This has led to intensive use of land and other natural resources in drier regions. The percentage of net area sown even in the truly arid areas like the Thar Desert has been steadily increasing.

The country is currently passing through a severe drought (called *Trikal* meaning severe shortage of drinking water, food and fodder) which has affected 12 states – especially Gujrat, Rajasthan, Madhya Pradesh and Andhra Pradesh -- close to 100 million people and 3.4 million cattle are caught in the grip of drought. **The general problem of arid areas with large populations is essentially one of human ecology.** The inherently limited water resources within arid and semi-arid regions set the ultimate limit of production of plant material on which both human and animal populations are finally dependent, particularly if large-scale water resources from outside cannot be tapped. Furthermore, erratic rainfall results in widely fluctuating production leading to scarcity, which imposes stress on these populations. **As population increases, the demand on natural resources is further magnified. The consequence is an imbalance between the human and animal population on the one hand, and plants, water, and land resources on the other. As the demand by the first persists and increases, the resources tend to become depleted and, as depletion proceeds, the stress upon them becomes even greater. Thus, a process of progressive degradation of resources is set into operation, which intensifies with every famine and the period following it.** If not checked timely and effectively, it leads to permanent damage in the form of loss of valuable plant species through excessive grazing or cutting for fuel; vegetal cover gets replaced by bare land or, at best, less useful plant communities. The total precipitation in these regions may be low but the rainfall often occurs in sudden heavy storms, which may lead to flooding and soil erosion. **The loss of surface soil by water erosion is of the order of 16.35 t/ha/year**. This has lead not only to lower soil fertility but also to conversion of large areas into wasteland cut up by erosion channels, or the formation of barren and unproductive sand dunes.

2.7 Extent of Desertification

About 107.43 m ha, or 32.75 percent of the total geographical area is affected by various forms and degree of degradation (Table 1).

Table 1: Current assessment of the extent of various types and land degradation in India.

Type of Land Degradation	Area m ha	Percent of total geographical area
Water erosion	57.15	17.42
Wind erosion	10.46	3.18
Ravine formation	2.67	0.81
Salt affliction	6.32	1.92
Water logging	3.19	0.97
Mining and Industrial wastes	0.25	0.08
Shifting cultivation	2.37	0.72
Degraded Forest	24.89	7.58
Special Problems	0.11	0.30

Source: Government of India 1994

Water erosion is the major problem causing loss of top soil or terrain deformation (including ravine formation) in about 59.82 m ha (representing 18.19 percent) of the total land area throughout the country. Wind erosion is dominant in the western region and has affected 10.46 m ha (3.18 percent) causing loss of topsoil and shifting of sand dunes. Water logging is observed in about 3.19 m ha, which includes areas affected by flooding where forests have been cut in the catchment area. Salt afflicted areas comprise 6.32 m ha (representing 1.92 percent). Shifting cultivation accounts for 2.3 m ha (representing 0.72 percent) and degradation of forests 24.89 m ha (representing 7.58 percent).

The recovery of such land depends upon its resilience, which, however, may be lost completely if the land is not treated in time with care. Frequent droughts, through its short-lived but recurrent stress, can aggravate the adverse impact and, if not checked properly, can interfere with the natural capacity of land to recover and advance the process of desertification.

2.8 Impact of Desertification

Desertification produces a number of adverse conditions:

- deterioration of the natural resources adversely affecting the socio-economic condition and livelihood support systems;
- reduction of irrigation potential;
- diminishing of the food security base of human beings and livestock;
- scarcity of drinking water;
- health and nutrition status of the population;
- reduced availability of biomass for fuel;
- loss of bio-diversity; and
- impoverishment, indebtedness and distress sale of assets of production.

3. THE STRATEGIES AND PRIORITIES WITHIN THE FRAMEWORK OF SUSTAINABLE DEVELOPMENT POLICIES

The policy thrust and key elements of the strategies for sustainable development are:

3.1 National Plans and Strategies Available in Other Social And Economic Areas

In addition to the programmes discussed under section 3.2 (i), programmes such as adult literacy, social welfare, poverty alleviation, human resource development, health, and social welfare, to name some, are also being implemented. These programmes are relevant in the context of community development/uplift and rehabilitation in the dryland region of the country.

3.1.1 Planning for Development

The National Development Council (NDC), which is headed by the Prime Minister and consists of the Central Cabinet Ministers and all the State Chief Ministers guides the planning process. The purpose of planning is to ensure growth, self-reliance, modernisation and social justice.

In the Eighth Five Year Plan (1992-1997), the role of the Planning Commission was redefined *viz.*, to move towards indicative planning which would outline the priorities and encourage a higher growth rate from a centralised planning system. This is also reflected in the Ninth Plan (1997-2002) document. The Ninth Plan, which has an outlay of Rs.8592 billion, envisages an average growth rate of 6.5 percent for the Plan period. In the Ninth Plan the policy thrust and key elements of growth strategy in respect of dryland region are:

- Conservation of land, water and biological resources.
- Cost effective indigenous methods of water harvesting structures and conservation works
- Shallow tubewells, open dug-wells and tanks/ponds, which help in recharge of ground water.
- Regular desilting and redigging of tanks/ponds under rural employment programme
- Development of rainfed agriculture.
- Appropriate farming systems which economise on water-use;
- Rural infrastructure development.

3.1.2 National conservation strategy

In line with principles 16 and 17 of Agenda 21, the Government of India, Ministry of Environment and Forests adopted the National Conservation Strategy and Policy Statement on Environment and Development in June 1992. It lays down the guidelines that help to weave environmental considerations into the fabric of the national planning and development processes (Government of India 1992) and **serves as a management guide for integrating environmental concerns with development imperatives. The strategy and policy statement lays down, *inter alia*, comprehensive action points in respect of sectors such as agriculture, irrigation, animal husbandry, forestry, energy generation, use and conservation, industrial development, mining and quarrying, tourism, transportation and human settlements to ensure that conservation and enhancement of the environment is taken due care of while achieving sustainable development.**

The primary purpose of the strategy and policy statement is to reinforce the traditional ethos and to build up conservation consciousness in society, which would live in harmony with nature and make efficient use of resources.

3.1. 3 Agenda 21 implementation plan

Sustainable development was accepted at the 1992 United Nations Conference on Environment and Development (UNCED) as a critical element in preserving the environment and promoting development and human welfare. In pursuance of this, country-specific programmes of action for

channeling investment resources (both internal and external) into ecologically compatible projects and programmes are now incorporated into the Indian planning and development process.

In the Government of India, the Ministry of Environment and Forests (MoEF) is the nodal agency for conducting the Environment Action Programme (EAP) exercise. MoEF constituted an EAP Implementation Committee comprising Ministries, Departments of the government of India, Research Institutes of excellence and NGOs concerned with different sectoral issues addressed in the EAP. After incorporating inter-ministerial suggestions, the draft EAP document was finalised in 1993. The goals of EAP are to improve the environmental services and to facilitate integration of environmental considerations into development programmes. **People's participation at the grass-root, local and regional levels are also accepted as key issues of the action plans. The Environmental Action Programme (EAP) process adopted a decentralised system of generating information and perspectives.**

A great deal of progress has been achieved in the strengthening of organisations in the governmental, research and non-governmental sectors to pursue the programmes under Agenda 21. **The stress, among others, on soil and water conservation and drought proofing and management of natural disasters in the Environmental Action Programme (EAP) is significant.** Consequent to EAP, the priority areas are being monitored in terms of comprehensive Environmental Impact Assessment (EIA) framework and a scientific system of Natural Resource Accounting (NRA). Twenty-nine projects have been proposed to Global Environmental Facility (GEF) and Capacity 21 of UNDP to promote capacity building and generating environmental awareness (Government of India 1993).

The Environmental Action Programme (EAP) is presently under comprehensive review both in the Governmental and Non-Governmental sectors. The results of these reviews would be significant for incorporating EAP in the future Five Year Plans.

3.2 National Plans or Strategies Available in the Field of Combating Desertification Developed Prior to the Convention.

(i) Evolution of the programme

Drought has been a recurring feature of Indian agriculture. While practically all areas have, sometime or the other, suffered crop losses and distress on account of drought, some clearly identifiable areas have been subject to frequent droughts. The subsistence economy in these areas is unable to absorb a particularly severe drought and the distress assumes the characteristics of a famine before long. Mitigation of distress caused by drought has for long exercised the Governments, but systematic efforts launching long-term countermeasures were not very much in evidence till planned economic development became State policy. Dry Farming Projects, initiated during the Second Plan (1956-1961), were substantially expanded during the Fourth Plan (1969-1974). The Fourth Plan suggested that much of the amount the Government of India spent on relief in famine-affected areas could be **"so deployed in the areas chronically affected by drought as to generate considerable employment in rural sector largely related to a pre-planned programme of Rural Works". This thinking led, in 1970-71, to the formulation of Rural Works Programme with the objective of creating assets designed to mitigate severity of drought wherever it occurred and provide employment in the drought-affected areas.** The Programme, it was intended, should spell out a long-term strategy in the context of the conditions, problems and potentials of the district. In all, 54 districts together with parts of 18 contiguous districts were identified as drought prone for purposes of the Programme. The Fourth Plan Mid-term Appraisal redesignated the Programme as Drought Prone Areas Programme (DPAP). The Appraisal, incidentally, noted that Dry Farming Projects had made little progress. However, a major turning point in the objective of the Programmes came through the recommendations of the Task Force headed by Dr. Minhas, **which concluded that DPAP as conceived and implemented was not likely to contribute to mitigation of drought and recommended the integrated development of drought affected areas.** Thus, during the Fifth Five Year Plan (1974-1979), restoration of ecological balance through an integrated development on watershed basis with a view to insulating drought prone areas from the effect of recurring drought, became the goal.

The first significant step towards development of deserts was taken in 1951-52 when the Government of India (GoI) appointed a committee to advise on development of the Rajasthan desert. A Desert Afforestation Station for the study of problems of the desert was set up in Jodhpur. Subsequently the scope of works at the Station was enlarged by inclusion of soil conservation programmes and it was named in 1957 as the Desert Afforestation and Soil Conservation Station (DA&SCS). The Station was required to conduct basic and applied research in forestry, crop husbandry and grassland development to control wind erosion and aggravation of desert conditions. In 1959, under the major Arid Zone Project of UNESCO, DA&SCS was reorganised as Central Arid Zone Research Institute.

In 1960, the State Land Utilisation Committee appointed by the Government of Rajsthan made its recommendations on the development of desert and semi-desert areas of the State. In 1966, the Desert Development Board with nominees of the States of Rajasthan, Gujrat and Haryana and representatives of other Central Ministries was constituted with Secretary, Ministry of Agriculture (MoA) as its Chairman. In 1971, the Board was reconstituted with the Minister of State in MoA as its Chairman and Secretary of Agriculture as its Vice-Chairman, thus raising the status of the Board (Government of India 1974a). On the basis of the recommendation of the Board, an integrated programme of pilot projects for desert development was proposed in the Fourth Plan (1969-1974). On the recommendations of the National Commission of Agriculture the Desert development Programme (DDP) was started in the year 1977-78.

Further changes were initiated when the Task Force headed by Dr. Swaminathan (Government of India 1982) reiterated and sharpened the emphasis on ecologically sustainable development as the objective of these programmes. Some refinements were also made through the exclusion of infrastructure-oriented works from the purview of the Programmes. There was greater conceptual clarity in the Seventh Five Year Plan (1985-1990) as far as objectives of the Programmes were concerned. The Mid-term Appraisal of the Seventh Plan in 1988 which was influenced by the decisions taken by the Central Sanctioning Committee in 1987, clearly spelt out drought proofing and control of desertification as the main objectives of the DPAP and DDP.

Although restoration of ecological balance continued to be the main objective of these Programmes, a sharp and clear focus on achieving drought-proofing and combating desertification was not properly enunciated. As a result the direction of the programme got diluted depending upon various factors such as the perception of the State governments, capabilities of sectoral departments and pressures exerted by different interest groups. In the process, each activity under the Programme was implemented in an isolated and segmented manner and watershed unit of area development was completely lost sight of.

The Technical Committee chaired by Professor. Hanumantha Rao (Government of India 1994) has, therefore, recommended revamping of the strategy for the implementation of these Programmes. On **Committee's recommendations, full involvement of beneficiaries in the watershed development planning as well as implementation of the works through the Watershed Development Teams and sanctioning of works on the basis of the action plans prepared on watershed basis were made mandatory. The system of allocation of fixed amount per block was discontinued.**

The various sector and cross-sector projects and programmes related to desertification control were launched earlier on and are continuing within the framework of the Ninth Five Year plan. These programmes serviced by different Ministries are listed in Annexure V. Some of the major ones are discussed below:

(ii) Programmes

3.2.1 Afforestation Programmes

The Ministry of Environment and Forests in consultation with the State Governments fix targets for afforestation/tree planting activities annually. These afforestation activities are taken up under various schemes/programmes of different Central Ministries/Departments and of State Governments. During the last 50 years since independence, around 27 m ha of land has been brought under tree cover in the various plan periods at a cost of about Rs.70,000 million (Government of India 1999a). These include major schemes/projects related to forestry that help combat desertification and drought. External assistance in forestry sector started in 1980 with the

implementation of World Bank aided Social Forestry projects. The details of externally aided projects are given in Annexure I.

3.2.2 Drought Prone Area Programme (DPAP)

As mentioned earlier, the Rural Works Programme (RWP), initiated in 1970-71 to create durable assets in the rural sector, which could contribute towards reducing the severity of drought wherever it occurred, and provide wage employment to the affected population. It was re-designated as Drought Prone Areas Programme (DPAP) in 1973-74 to focus on problems of the drought prone areas only. At present the DPAP is under implementation in 947 Blocks of 161 Districts in 13 States. The total area covered under different components of the Programme since its inception to 1994-95 is about 5.7 m ha. From 1995-96 to 1998-99 work in 6057 watershed projects, each of about 500 ha, have been carried out at an expenditure of Rs.522.37 million (Government of India 1998b and 200a). Sectoral activities are: (i) land resources development, (ii) water resources development, and (iii) afforestation and pasture development.

3.2.3 Desert Development Programme (DDP)

The Desert Development Programme (DDP) was initiated in 1977-78 and is now under implementation in 227 Blocks of 40 Districts in 7 States. Its sectoral activities are sand dune stabilisation, shelterbelt creation and afforestation. Since inception of the programme up to 1994-95, a total of 552,669 ha have been covered under different components of the programme (Government of India 1998b and 2000a). Like DPAP, since 1995-96, this programme is being implemented on a watershed basis only. From 1995-96 to 1998-99 2,194 projects were implemented at an expenditure of Rs.354.84 million.

To ensure people's participation in planning and implementation in both the programmes *viz.*, DPAP and DDP, a provision of creation of 'Watershed Associations' comprising adult population of the watershed has been made. The Watershed Associations elect their Watershed Committees, which are responsible for planning and implementing the watershed development projects.

3.2.4 National Watershed Development Project for Rain-fed Areas (NWDPRA)

NWDPRA, initiated in 1990-91 during Eighth Five Year Plan (1992-93 to 1996-97), envisaged treatment only of arable lands and consisted mostly of crop production components. The Programme was re-designed in 1992-93 with focus on development of micro-watersheds as models of comprehensive and integrated development in different agro-climatic regions of the country. New programme includes measures such as conservation of rainwater in micro-watersheds, promotion of *in situ* moisture conservation on arable lands and development of multi-tier vegetation consisting of grasses, shrubs and trees. Up to the end of Eighth Plan an area of 4.3 m ha was developed covering 2,554 watersheds in 25 States and two Union Territories at an expenditure of Rs. 9,715.2 million (Government of India 2000b).

3.2.5 Soil Conservation in the Catchment of River Valley Projects (RVP)

RVP was launched in 1963-64. The scheme is being implemented in 33 catchments having a total area of 18.03 million ha. Of this an area of 3.4 m ha has been treated with a total expenditure of Rs.6738.9 million up to the end of Eighth Plan.

3.2.6 Integrated Wastelands Development Programme (IWDP)

The IWDP has been under implementation since 1989-90. From April 1995 IWDP is being implemented on watershed basis under the common guidelines for the watershed development (Government of India n.d.). During Eighth Plan (1992-93 to1996-97) a total of 284,000 ha have been treated at an expenditure of Rs. 2167.6 million (Government of India 1998b).

3.2.7 Council for Advancement of People's Action and Rural Technology (CAPART)

CAPART has the mandate to promote voluntary action and to propagate appropriate rural technologies among the rural people. By February 2000, the Council had supported 211 community-based project implementing agencies (PIAs) for watershed management programmes in the country.

3.2.8 Indira Gandhi Nahar (Canal) Project (IGNP)

The Indira Gandhi Canal, in the northwestern part of Rajasthan, covers part of the Thar Desert. It provides irrigation to over 2.5 m ha of the Thar Desert, of which 1.2 m ha is the cultivable command area. Under an externally-aided (Japan Bank of International Programme (JIB) project,

a total area of 33,725 ha, which includes sand dune stabilisation (16,114 ha), canal-side plantation (11,522 ha), road side plantation (603 ha), block plantation (2,279 ha) and pasture development (3,207 ha) has been covered since 1990-91 to protect IGNP against deposition of sand and to develop adjoining arid lands.

3.2.9 Protected area network

In the past 25 years, the network of protected areas (PAs) has expanded from 10 national parks and 125 wildlife sanctuaries to 85 national parks and 447 wildlife sanctuaries as protected areas. Within these PAs, 23 tiger reserves covering a total area of 3.30 m ha have been established. These 527 PAs together cover nearly 15 m ha, which is about 5 percent of the country's geographical area and about 23 percent of forest area (Government of India 1999b and 2000). Of these PAs, five are located in desert region, and 74 in semi arid region (Government of India 1998e). These are not only repositories of natural biological diversity but have also helped in combating desertification.

3.2.10 Other initiatives

Other measures/schemes such as Jawahar Rozgar Yojana (JRY) for poverty alleviation and rural employment with focus on horticulture and watershed development, Integrated Afforestation and Ecodevelopment Projects Scheme (IAEPS), Integrated Watershed Management in the Catchment of Flood Prone Rivers, Reclamation of Special Problem Areas and Improvement of Productivity, Development and Stabilisation of Ravines, Reclamation of Mined Areas, Saline and Alkaline Areas and Water Logged Areas, to mention a few, are relevant in this context.

In addition to the programmes mentioned above, the National Remote Sensing Agency (NRSA) with the co-operation of other agencies of the Department of Space (DOS) has carried out the following national programme for long-term drought mitigation:

(i) The Drinking Water Technology Mission prepared groundwater potential maps at district level, using multi spectral satellite data. This has helped in better identification of well sites for groundwater extraction.

(ii) The Integrated Mission for Sustainable Development (IMSD) of NRSA (being implemented by the Andhra Pradesh Government) for combating drought has evolved action plans by integrating satellite derived thematic information on watersheds with socio-economic data to provide action plans for development of food, fodder and water resources. In the first phase, 18 districts were covered. The action plans that were prepared are being implemented. In the second phase, action plans on watershed basis for about 126 districts are under preparation.

(iii) Under irrigation management projects in selected basins, satellite data has been used for purposes such as proposed irrigation development, identification of causes for poor performance of distributaries and assessment of sediment in reservoir.

(iv) NRSA is also preparing land and water resource management maps and plans for 174 chronically drought-affected districts in the country (Dutt pers. comm.).

3.2.11 Domestic energy needs, development and conservation

As early as 1974, the government recognised that renewable energy resources can provide the basis for sustainable energy development on account of their environment-friendly features and set up the Fuel Policy Committee (FPC) to analyse the country's energy situation. The committee noted in its report, submitted in 1974, that nearly one-half of the total energy consumed in the country comes from non-commercial sources such as firewood (including charcoal), cowdung and vegetable waste. This has led to a large-scale denudation and destruction of forests (Government of India 1974b).

The Committee also noted that the recorded firewood output from Indian forests in 1969-70 to be about 9 million tonnes. The actual consumption of firewood was, however, reported to be of the order of over 100 million tonnes; the balance of over 90 million tonnes came from unrecorded removals from forests as also removals from 'treelands' outside the forest area. The report

predicted a serious firewood shortage by 1985 unless a massive programme of plantation of fast growing species was undertaken.

The 1991 census results (Government of India 1991) also confirmed that, of the 151 million households in India in 1991 (consisting of 39.5 million in urban areas and 111.5 million in rural areas), 92 percent in rural and 39 percent in urban areas were dependent on bio-fuels. The census also shows the states with large tracts of hills and mountains like the northeastern states and those with dry regions are still heavily dependent on firewood.

The Government of India took the farsighted decision as early as the early 1980s to have an exclusive institutional mechanism for promoting renewable energy sources. The establishment of a Commission for Additional Sources of energy (CASE) in the Department of Science and Technology (DST) in 1981 marked the first step, which was followed by the creation of a separate Department of Non-Conventional Energy Sources (DNES) in the Ministry of Energy. A decade later, the DNES was upgraded and an exclusive Ministry of Non-Conventional Energy Sources (MENS) came into being, earning for the country the distinction of being the only one in the world to have an exclusive ministry for programming renewable energy sources. MNES has already taken steps to augment renewable energy sources by initiating programmes for tapping solar energy, by harnessing wind power, by undertaking plantation programmes with people's participation and by encouraging farmers to plant trees on their fields. During the Eighth Plan (1992-97) the Indian Renewable Energy Development Agency (IREDA) with World Bank assistance developed small hydro and windfarms and photovoltaic market development was undertaken with assistance received from Global Environment Facility (GEF).

In addition, the **National Project on biogas development, which seeks to promote family type biogas plants, was started in 1981-82 with the objective of reducing the pressure on forests and to reduce drudgery of rural women. It is estimated that up to March 1999, 2.9 million plants had become operative thereby achieving 24 percent of the existing potential. It was observed that the use of biogas helped in reducing the consumption of firewood and twigs by about 1,200 kg per household per year**. Besides, a biogas plant produced digested slurry containing nitrogen equivalent to 299 kg of urea every year. The National Programme of Improved *Chullhas* (stoves) is also being implemented since 1985-86 to improve energy conservation. The thermal efficiency of these *chullhas* is about 20-30 percent as compared to 6-10 percent in the traditional *chullhas.* So far, over 30.9 million improved *chullhas* have been provided to the rural and semi-urban households; this is against an estimated potential of 120 million households (Government of India 1998c and 2000d).

3.2.12. Measures taken to mitigate the effects of drought

In the event of drought the Central and the State Governments undertake relief measures by providing drinking water, foodgrains through Public Distribution System (PDS), fodder, food subsidies to special groups and employment through food-for-work-programme. The Disaster Management Division in the Ministry of Agriculture coordinates drought relief works with State governments. In 1995, National Centre for Disaster Management (NCDM) was set up in the Indian Institute of Public Administration (IIPA). The activities of the Centre, *inter alia,* comprise human resource development, research case studies, database and information services, and documentation on disaster management. State Governments are provided financial assistance by GoI from the Calamity Relief Fund CRF). **In the wake of the current drought GoI has set up a Commission on Disaster Management under the Chairmanship of deputy chairman, Planning commission to look into the entire gamut of the problem and make recommendations to streamline the system.**

3.2.13. Research efforts

Besides creating the institutional framework, formulation of policies and policy instruments, the Government of India has substantially augmented research efforts by strengthening the relevant National Research Institutions.

Over the years, the research institutes, in collaboration with State Agricultural Universities, have been engaged in study and analysis of the problems of desertification and drought. The emphasis is on the development of appropriate and cost-effective technologies to combat desertification and drought and to increase the productivity of affected areas. In addition, the International Crop

Research Institute for the Semi-Arid Tropics (ICRISAT) at Hyderabad is intensively studying the resource conservation and management aspects in its Farming Systems Research. ICRISAT serves as a world centre to improve the genetic potential, yield and nutritional quality of sorghum, pearl millet, pigeon pea, chickpea and groundnut.

Apart from the work of ICRISAT, other national institutes also study and analyse issues in desertification and drought including water management. The Indian Agriculture Research Institute (IARI), New Delhi has a Water Technology Centre which is solely devoted to research on various aspects of water management. A brief outline of the work being done is given in Table 2.

Table 2: Research Institutes of the ICAR Dealing with Problems Related to Desertification and Drought and their Thrust Areas of Research.

Research Institutes	Thrust Areas (Basic and Applied Research)
Central Arid Zone Research Institute (CAZRI), Jodhpur	Repository of information on the state of natural resources and desertification process and its control. Development of sustainable farming systems.
Central Research Institute for Dryland Agriculture (CRIDA), Hyderabad	Development of strategies for sustainable farming systems (including water management) in rainfed areas.
Central Soil and Water Conservation Research and Training Institute, Dehra Dun.	Controlling degradation of soil through erosion and rehabilitation of degraded lands.
National Research Centre on Agroforestry (NRCAF), Jhansi.	Evaluation and improvement of multipurpose tree species (MPTS) suitable for agroforestry; basic and applied research on all aspects of agroforestry.
Central Soil Salinity Research Institute (CSSRI), Karnal.	Development of strategies for salinity control and management of salt affected soil and use of poor quality water.
Indian Grassland and Fodder Research Institute, (IGFRI), Jhansi.	Forage crops and grassland management; sustain; enrich and enhance germplasm of these crops.
Central Sheep and Wool Research Institute (CSWRI), Awikanagar.	All disciplines relating to sheep and rabbit production; develop, update and standardised meat, fibre pelt technology.
The National Bureau of Soil Survey and Land Use Planning (NBSS & LUP), Nagpur.	Inventorise and upgrade scientific information on the nature, extent and distribution of soils and associated climatic features.

Note: These institutes serve as repositories of information in their respective fields and have excellent training facilities.

In addition, three All India Coordinated Projects of the Indian Council of Agricultural Research (ICAR) have been established; one on forage crops at Jhansi, the second on dry land farming at Hyderabad and the third on agroforestry at Jhansi. These projects, with a network of sub-centres in the arid and semi-arid regions of the country, have been established for conducting location-specific research on problems related to mitigating the effects of drought.

A network of research institutions under the Indian Council of Forestry Research and Education (ICFRE), Dehra Dun is addressing problems related to the development of suitable technologies for afforestation and improving forest productivity. These include the Arid Forest Research Institute, Jodhpur, Tropical Forest Research Institute, Jabalpur, and Institute of Forest Genetics and Tree Breeding, Coimbatore. India Meteorological Department, Department of Space, Department of Science and Technology are, among others, engaged in research related to desertification and drought.

The Centre for Environment Management of Degraded Ecosystem (CEMDE) under the Ministry of Environment and Forests has been working, *inter alia*, on the technology development for prevention of dust-blow and slope stabilisation of dry fly ash mound – the Asia's largest fly ash mound

(iii) Strategies

3.2.14 Community based development strategy for rural development

The policy of empowerment of village communities and their involvement in developmental activities including natural resource management has been strengthened through the Constitution (Seventy-third Amendment) Act, 1992. This gives Constitutional status to *Panchayati Raj* Institutions (Village, Block and District levels). A host of subjects such as agriculture, land improvement, implementation of land reforms, land consolidation and soil conservation, water management and watershed development, animal husbandry, firewood and fodder, social forestry, under the amendment have been handed over to the *Panchayati Raj* Institutions, which are village level institutions. This is a significant step towards creation of an institutional mechanism which would assist the process of the formulation and effective implementation of the Local Area Development Programme (LADPs).

3.2.15 Community based natural resource management strategy

Although the social forestry programmes were initiated in 1970s to afforest and establish village woodlots which would provide fuelwood to the local communities and reduce pressures on forests, the real initiative to involve the local communities in forest management was taken with the formulation of the National Forest policy, 1988. The Policy emphasised the need to involve local communities in forest protection and management. The policy framework was operationalised through the guidelines issued on June 1, 1990 which provided framework for participation of local communities in forest management. Since then, 22 State Governments have so far issued their guidelines to involve the village communities and voluntary agencies in protection and regeneration of degraded forest areas on the basis of their taking a share of the usufructs from the forest areas that they protect and develop, As on January 2000 more than 36,075 Village Forest Committees (VFCs) are protecting about 10.25 m ha of degraded forests under this agreement (Government of India 2000c).

3.3 Policies

The review made during the NAP process showed that, as far as specific sector and cross-sector policies are concerned, several of these have only come into existence in the last few years; and that most of them do not discuss desertification *per se.* Major among these is the following:

3.3.1 *National Land Use Policy Outlines*, 1986 have been prepared. This document takes into account the environmental, social, demographic, economic and legal issues. The Policy has been circulated to all concerned for adoption and implementation through enactment of suitable legislation. The policy, however, did not make the desired impact, mainly due to the fragmented handling of different components of agriculture like land and soil. However, a Land Resource Management Policy and Approach now is being finalised in consultation with FAO, the Lal Bahadur Shastri National Academy of Administration and the National Institute of Rural Development (NIRD). The policy is intended to have dynamic conservation, sustainable development and equitable access to the benefits of intervention as its thrust (Government of India 2000a).

3.3.2 *Draft National Agriculture Policy*, 1999 seeks to promote technically sound, economically viable, environmentally non-degrading, and socially acceptable use of country's natural resources – land, water, and genetic endowment – to promote sustainable development of agriculture. It also, *inter alia*, indicates the broad policy framework for development of sustainable agriculture, generation and transfer of technology; improving input use efficiency; pooling and evaluating traditional practices, knowledge and wisdom; promoting farm/agroforestry providing incentives for agriculture; promoting investments in agriculture, strengthening institutional infrastructure, ensuring better risk management and introducing management reforms, to achieve the objectives.

3.3.3 *National Land Reforms Policy* Since land is under exclusive legislative and administrative jurisdiction of the States as per the VIIth Schedule of the Constitution, GoI play an advisory and

coordinating role in the field of land reforms. It allows, *inter alia*, greater access to land by the landless rural poor and provides guidelines for introduction of land reform legislation or amendments to be initiated by the States and Union Territories (Government of India 1998).

3.3.4 ***National Forest Policy*** **(NFP) of 1988,** *inter alia*, states "the principal aim must be to ensure environmental stability and maintenance of ecological balance including atmospheric equilibrium which are vital for sustenance of all life forms, human, animal and plant. The derivation of direct economic benefit must be subordinated to this principal aim." The NFP, 1988 further states that one of the essentials of forest management is increasing forest cover on semi-arid, arid, and desert tracts. However, the policy suffers from a major weakness that it has been developed solely within the forestry sector, without being closely linked to related sectors. As a result, the NFP tends to be ignored by other sectors, which fail to notice the benefits from forestry contributing to their objectives. However, available information points out that failure to achieve some of the policy objectives have been due mainly to ineffective implementation rather than inadequacies of the policy *per se* (Government of India 1999b)

3.3.5 ***Draft Grazing and Livestock Management Policy,*** **1994**. There is as yet no national grazing policy *per se*. However in 1993, the Ministry of Environment and Forests constituted a Policy Advisory Group on grazing and livestock management. **The Group in its report identified a large gap between demand and supply of animal feed and cited the National Agriculture Commission (NCA 1976) which projected deficit of 16.2 and 19.8 million tonnes of dry and green fodder respectively, for the year 2000. However, both cattle and buffalo population has already outstripped the projected population for the year 2000. The Group observed that India with only 4 percent of the world's land mass, has 15 percent of the world's cattle population, half the number being buffaloes, 15 percent of the goat and 40 percent of the sheep populations. This large animal population cannot be provided sustenance by forests alone.** It suggested that the problem would have to be tackled in a coordinated manner by all the line departments *viz.*, Agriculture, Animal Husbandry, Forests, Soil Conservation, Rural Development, Irrigation, Revenue, etc. without which no policy for restoring country's ecological balance, which is the ultimate objective of a grazing policy, would be possible. The Group suggested the following priority initiatives:

- Each state should give attention to the breeding policies and programmes, particularly around forest areas within the state so that non descript cattle can be eliminated and people provided with productive cattle or buffalo which will not only be stall fed but also provide economic returns to the owners.

- Forest areas and forest fringes have, by and large, remained outside milk-sheds largely because of problems of logistics. Consequently, the people around forests have not felt the need to rear productive animals resulting in proliferation of non descript cattle. Removal of restrictions on grazing in forests has also contributed to the proliferation of decrepit cattle. The Department of Animal Husbandry will have to provide marketing facilities to milk producers in these areas to enable the villagers to rear economically productive animals. In addition, people in dry desertic and otherwise environmentally fragile areas need to be provided with alternative environment-friendly employment.

- In arid and semi-arid regions, large blocks of land away from human habitations should be developed as grass reserves for higher production and the hay preserved in Fodder Banks. This is particularly required for chronically drought prone States like Rajasthan, Gujrat and Haryana.

- Development of alternative avenues of fodder production will be achieved by promoting silvi-pasture system in the degraded forests with people's participation.

3.3.6 ***Draft National Policy for Common Property Resource Lands*** **(CPRLs)** seeks to provide support to the people and their production systems through restoration, protection, regeneration, upkeep and development of CPRLs. The Policy, *inter alia*, states the following.

- Privatisation of CPRLs should be stopped, and exceptions may be made only on very special and exceptional considerations. Government departments and public

requirements of land from CPRLs should be carefully vetted. The encroachments on the CPRLs should be demarcated on ground, described in records and necessary measures taken to remove the encroachments. The State should have adequate legal authority to prevail upon the *pancahyats* and other local bodies for protection of CPRLs.

- The village communities/user groups should be involved in planning, regeneration and management of CPRLs, including distribution of benefits.

- It should be clearly understood that the poorer sections of the community have special claim on the produce of CPRLs.

- Voluntary agencies and NGOs with established credibility and commitment might be involved as interface between government and local community for the management and development of the CPRLs. They should, however, act as facilitators rather than implementers.

3.3.7 ***National Policy on Education*** **(NPE) 1986** as revised in 1992 recognises the paramount need for creating consciousness of the environment and stipulates that it must permeate all ages and all sections of society, beginning with the child. Environmental consciousness should inform teaching in the schools and colleges. The policy seeks to integrate this aspect in the entire educational process.

3.3.8 ***National Policy on Environment.*** As already mentioned the Government has enunciated its policy on Environment and Forests in the form of Policy Statements on Abatement of Pollution and National Conservation Strategy and Statement of Conservation and Development (see section 3.1.2). The Ministry of Environment and Forests is currently formulating a comprehensive National Policy on Environment (Government of India 1998d).

3.3.9 ***National Population Policy,*** **2000.** The policy, while continuing with the two-child norm, takes a comprehensive look at issues determining population growth. Health care of mother and child, health and sanitation as well as compulsory education figure high on its agenda. It aims to achieve reduced population growth through decentralised decision-making. The policy aims at achieving a stable population by 2045. The new policy is significant that it has been endorsed at the highest level which should generate the political will to carry forward a programme that is already in place

4. INSTITUTIONAL MEASURES TAKEN TO IMPLEMENT THE CONVENTION

4.1 Legal Framework

India accepted the Convention on October 14,1994, ratfied it on December 17 and it came into effect on March 17, 1997. The Ministry of Environment and Forests being the nodal Ministry for all environment and forest related matters was made the national focal point for coordinating the implementation of the CCD. However, the various Ministries would continue to implement specific schemes and projects to combat desertification and drought under the overall priorities determined by the Planning Commission in each Five Year Plan.

Environmental issues that have been an integral part of Indian thought and social fabric are reflected in India's Constitution adopted in 1950. **The Articles 48A and 51G of the Directive Principles of State Policy enjoin upon the State to protect and improve the environment and safeguard the forests and wildlife. Article 40, on the other hand, calls for organisation of village *panchayats* as units of self-government.** *Panchyti Raj* Institution (PRI) provides a strong institutional structure at the village level for implementation of desertification control strategies. The *Panchyti Raj* legislations enacted by the State Governments provide the legal basis and administrative jurisdiction to them

4.2. Institutional Framework

In addition to the village level institutions, a strong institutional framework both at national and state levels already exist for coherent and functional desertification control and monitoring. The National Land Use and Wastelands Development Council (NLWC) set up in 1985 is the highest policy planning and coordination body for all issues concerning the country's land resources. The Prime Minister of India is the Chairman of the Council. NLWC is located in the Department of Land Resources, Ministry of Rural Development and oversees and coordinates the work of the National Land Use and Conservation Board (NLCB), National Wastelands Board (NWDB), and the National Afforestation and Eco-Development board (NAEB).

At the State level, State Land Use Boards (SLUBs) under the Chairmanship of Chief ministers are responsible for coordination and implementation of related Central/State schemes and programmes.

The function of the three Boards are given in Table 3.

Table 3 Functions of NLCB, NWDB and NAEB

National Land-Use and Conservation Board is chaired by Union Minister of Agriculture.	Formulation & implementation of a national land use policy. Concerned with conservation & optimal utilisation of the land resources. Guidelines and financial support to State Land Use Boards (SLUBs).
National Wastelands Development Board, MoRD is chaired by Union Minister of Rural Development.	Set up in 1985 in the MoEF and presently functioning under the Department of Land Resources under the Ministry of Rural Development. Development of wastelands in the country to sustainable use and increasing biomass available, especially fuel wood & fodder.
National Afforestation & Eco-Development Board, MoEF is chaired by Union Minister of Environment and Forests.	Set up in 1992 in MoEF. Promotion of afforestation, trees planting, ecological restoration, & eco-development activities in the country. Regeneration of degraded forest areas and land adjoining the forest areas, national parks, sanctuaries & other protected areas and ecologically fragile areas.

During the process of preparation of National Action Programme (NAP), however, the existing mechanism for coordination and hormonising of environment related programmes are being reviewed to determine whether they are effective in coordinating actions to combat desertification at the national and local levels.

4.2.1 National action programme as part of the national economic and development plan

Under UNCCD, affected Country Parties have undertaken, *inter alia*, the obligation to "establish strategies and priorities, within the framework of sustainable development plans and/or policies, to combat desertification and mitigate the effects of drought". Implicit in this obligation is that affected countries have the framework of sustainable development policies and plans, which are appropriate for combating desertification and mitigating the effects of drought. The NAP preparation process has shown that such a framework of sustainable development including policies (see section 3.3) and plans (see 3.1.1), particularly National Conservation Strategy (NCS) (see section 3.1.2) and Environmental Action Programme (EAP) which deal with issues leading to land degradation and thereby to desertification in arid, semi-arid and dry sub-humid areas does exist and that India's NAP could be linked to it.

NAP analysis has indicated complementarity between NAP and the programmes/schemes related to natural resources being implemented during the Ninth Five Year Plan (see Annexure IV). Such complmentarity has been facilitated by the fact that the National Conservation Strategy (NCS), Environmental Action Programme (EAP), the existing sectoral policies, strategies and action

programmes **do give serious consideration to the principles of participation, partnership and empowerment of grass-root communities, particularly of women, poor and the deprived.** This is in tune with UNCCD principles.

Recognising such complementarities will no doubt help avoiding duplication of efforts in NAP formulation. Existing action programmes can well serve the purposes of combating desertification and mitigating the effects of drought insofar as major areas of natural resources (e.g. forestry, land husbandry, soil conservation, water resources management, biodiversity, etc.) are concerned.

As a result, the focus of NAP would be in areas which are considered important by the Convention (Art. 10 of the Convention) but have not been adequately treated in NCS and EPA e.g. improving institutional capacity and organisation at the grass-roots level, promoting alternative livelihoods, etc.

However, some of the sector-specific programmes and strategies designed to promote sustainable management and use of natural resources are, in some respects, of such a general nature that they may have to be restated and amplified in NAP. The working groups are carrying out review of such policies and strategies. The National Steering Committee would take into account the issues of desertification and drought and ensure that these are integrated adequately within the overall policies and strategies.

Based on the evaluation of on-going strategies and programmes and the assessment of current and future needs to combat desertification and mitigating the effects of drought, the National Action Programme (NAP) would be action oriented with a thrust on meeting needs of food, fodder, firewood, drinking water of village communities and to improve their quality of life. The four Working Groups (see section 5.1.1) constituted recently are currently engaged in this exercise.

4.2.2 Coherent and functional legal and regulatory framework

Although no separate legislation has been enacted to implement the provisions of the Convention, various legislations are in place to support the strategies, programmes and policies (see section 3.3) aimed at conservation and management of natural resources and preservation and protection of the environment. The Environment Protection Act, 1986 is an umbrella Act under which action for conservation and protection of lands and the environmentally critical ecosystems viz., wetland, rangelands, watersheds, irrigation command areas, etc. can be initiated. The Act is being reviewed to make it more effective in protection of varied ecosystems. In case of forestlands, however, separate legislations exist. Forests, which were state subject earlier, brought to the concurrent list in 1976. Besides the Indian Forest Act, 1927, the other legislations in place are the Forest Conservation Act, 1980, Wildlife (Preservation) Act, 1972 extended to cover Biosphere Resources, and Mines Act, 1952. The Indian Forest Act, 1927 is under review; the draft of the revised legislation has been circulated to states, union territories and NGOs for comments/suggestions and the final draft is under preparation. FCA is a major mile stone and has initiated a process by which India's forests are treated as an environmental and social resource rather than a revenue or commercial resource. It places a strict control on diversion of forestlands to other uses and, in rare cases, when this is permitted for development purposes, compensatory afforestation is a prior requirement. **FCA has helped in reducing the annual rate of diversion of forestlands from 150,000 ha during 1950-1980 to 25,000 ha during 1980-95. There has been further reduction in diversion of forestland the last five years to 15,000 ha (Government of India 1999). Total forest area diverted since the enactment of FCA is about 470,000 ha against which compensatory plantations have been raised over 530,000[1] ha (Government of India 1999b).**

5. THE PARTICIPATORY PROCESS IN SUPPORT OF THE PREPARATION AND IMPLEMENTATION OF THE NATIONAL ACTION PROGRAMME

5.1. Established and Functional Steering Committee

The Ministry of Environment and Forests (MoEF), being the national focal point for the CCD, established a 20-member National Steering Committee (NSC) in July 1999 under the

[1] Compensatory plantations are to be carried over twice the forest area diverted.

Chairmanship of Special Secretary, MoEF. **The NSC is inter-sectoral and multidisciplinary in nature** (Annexure II). The functions and the mandate of the NSC are: (i) to review national priorities, (ii) to assess the progress of preparation of NAP and (iii) to ensure close inter-ministerial coordination for effective implementation of NAP. The MoEF provides secretarial support and funds required for efficient functioning of NSC.

5.1.1 Effective participation in defining National Action Programme priorities

Secretaries of the Ministries of Rural development, Health, Water Resources, Social Justice and officers of the Departments of Agriculture Research and Education, Women and Child Development, Directors of premier national research institutes, Director General of India Meteorological Department, and representative of UNDP are members of NSC. The first meeting of the NSC was held in October 1999 in which it was decided that such lands as under severe stress and are seriously degrading, should be prioritised for focused attention under the NAP framework. It was also decided to incorporate representatives of other Government Ministries/ Departments such as the Ministry of Non-Conventional Energy Sources and the Department of Animal Husbandry as members of NSC. The Committee finalised constitution of four Working Groups (WGs) comprising representatives of concerned ministries, state governments, research institutions, NGOs, etc; their composition and terms of reference are given in Annexure III. The draft NAP would be circulated to the different stakeholders to elicit their views before finalisation. These would ensure effective participation of all concerned in identifying and defining priorities.

5.1.2 Methods of participation in NSC

The MoEF, which has the responsibility of providing the secretarial support to National Steering Committee (NSC), would organise its meetings. The meetings of the NSC would provide the opportunity to various agencies to participate in the process of preparation and implementation of National Action Programme (NAP). In addition, the concerned agencies would be able to make submission to the NSC on the issues of concern which could be discussed in its meetings.

5.1.3 Representation of various actors in the national priority identification process

The NSC has decided to associate representatives from some of the important affected states such as Rajasthan, Haryana, Gujarat, Karnataka, Andhra Pradesh, Madhya Pradesh and Maharashtra with the Working Groups (WGs). It was agreed that the WGs could consider and add representatives from reputed non-governmental organistions (NGOs). **For developing a common understanding of the Convention among key stakeholders and to mobilise them to be involved in NAP process, the WGs through consultative process, following a bottom-up approach, are engaged in identifying various programmes that can be included in NAP. Several NGO who have come together under the banner of RIOD-India (International NGO Forum on Drought and Desertification), have already undertaken various publicity measures. These comprise translation of UNCCD material on drought and Desertification in local languages, identification of historical reasons of droughts and desertification processes, organising workshops, and establishing their focal point for coordination amongst themselves** (Ramnayya 1999). The mechanisms of workshops provide a forum for interaction between various actors such as representatives of the state governments, NGOs/CBOs and potential stakeholders. The WGs comprising different actors are already in the process of reviewing the on going programmes of desertification control bring implemented by different Ministries for inclusion in NAP.

5.1.4 Implementation of gender related policies

For making development more gender sensitive, government policies now increasingly emphasise qualitative inputs, focusing on inculcating self-confidence among women; generating awareness about their rights; and training them for economic activities and employment. **Efforts to improve women's access to critical inputs and productive resources such as land, houses and trees through joint or individual titles have been expanded to include support through credit (or small scale capital), marketing, training in skills/management and technology** (Government of India 1988). Developing women's organisations is now accepted as an effective strategy for promoting women's empowerment.

The landmark initiative of the Government of India to promote gender equality even in the political sphere is the 73rd Constitutional amendment reserving one third elected seats for women

in all *Panchyati Raj* Institutions. Through this measure, an estimated one million women could emerge as leader at the grass-root level in rural areas alone, with 75,000 of them being Chairpersons (Government of India 1995).

Empowerment of women is one of the major objectives of the Ninth Plan (1997-2002). It will ensure that an enabling environment is created with requisite policies and programmes, legislative support, and exclusive institutional mechanisms at various levels and will provide adequate financial and human resources to achieve this objective.

5.2 Institutional framework for Coherent and Functional Desertification Control

The mechanisms for review and hormonisation of programmes to combat land degradation and desertification exist at various levels (see sections 3.2 (i) and 4.1). However, the analysis and review of different programmes/schemes related to natural resource management revealed three major weaknesses viz., absence of integrated approach, lack of people's participation and neglect of traditional practices. This realisation has led to shift in the focus and strategy of these programmes. The three major shifts are:

(a) ***Sectoral to Integrated approach****:* In order to maximise the production in good rainfall years and to minimise losses when the monsoon fails, almost all the major programmes related to natural resources management and development are now implemented on an integrated watershed management basis.

(b) ***From governmental programmes to people's programmes****:*
Participation of local communities has been made central to all most all the land development programme and natural resource management programmes which are at the core of combating desertification and drought. For example, **the Comprehensive Guidelines for Watershed Development commonly applicable to all area development programmes of the Ministry of Rural Development ensures that the local level user groups/self-help groups themselves decide their work programme which would then be integrated at the district level**. The *Panchyati Raj* Institutions have a pivotal role in this arrangement (Government of Indian 1998b).

Similarly, the National Afforestation and Eco-Development Board (NAEB) in the MoEF has made the participation of local communities or Joint Forest Management (JFM) mandatory in its afforestation schemes. Traditional soil and moisture conservation practices too have been incorporated in these programmes. Some successful Joint Forest Management (JFM) models which have been documented are Arabari, West Bengal (Chandra and Poffenberger 1989); Shivalik Hills in Haryana (SPWD 1990); Javaja Block in Ajmer, Rajasthan (SPWD 1990); Phulbani, Orissa (Kant *et al* 1991); Jammu area in Jammu and Kashmir (Chatterji and Gulati 1991); Harda, Madhya Pradesh (Bahuguna 1992); Common Lands in the Aravallis of Haryana (Srivastava and Kaul 1995; Kaul, 2000); Khariya Nala Watershed in Jhansi, Uttar Pradesh (Hazra *et al* 1996), etc. However, the success of these arrangements have thrown up certain second generation issues, which need to be resolved to strengthen the movement (Kumar and Kaul 1996; Bathala 1999).

The guidelines of JFM have been revised to strengthen people's participation in protection and management of forests. The new guidelines seek to provide institutional mechanism at various levels for coordination and conflict resolution. Increased participation of local communities coupled with the integrated approach of the progrmmes would make them more coherent and functional.

Similar arrangements for people's participation in the form of 'Watershed Associations' have been made for implementation of the Drought Prone Area Programme (DPAP) and Desert Development Programme (DDP) of the Ministry of Rural Development.

(c) ***Incorporation of traditional technologies:*** The role of traditional technologies is being increasingly recognised and has already been incorporated in some of the ongoing programmes like DPAP and DDP.

6. THE CONSULTATIVE PROCESS IN SUPPORT OF THE PREPARATION AND IMPLEMENTATION OF THE NAP AND THE PARTNERSHIP AGREEMENT WITH DEVELOPED COUNTRY PARTIES AND OTHER INTERESTED ENTITIES

6.1 Effective Support from International Partners for Cooperation

The thrust of NAP hitherto has largely been consultative. Even though the Government of India has been making all efforts to source more funds internally; external assistance would be essential to tackle the problem of desertification of this magnitude. After the NAP document is finalised, appropriate programmes identified and prioritised, consultation with multi-lateral, bilateral agencies, and international donors would commence for mobilsation of the much-needed resources to tackle the problem areas.

7. MEASURES TAKEN OR PLANNED WITHIN THE FRAMEWORK OF THE NATIONAL ACTION PROGRAMMES, INCLUDING MEASURES TO IMPROVE THE ECONOMIC ENVIRONMENT, CONSERVE NATURAL RESOURCES, IMPROVE INSTITUTIONAL ORGANISATIONS, IMPROVE KNOWLEDGE OF DESERTIFICATION AND TO MONITOR AND ASSESS THE EFFECT OF DROUGHT

7.1. Adequate Diagnosis of Past Experiences

A large body of evaluation reports/study on past programmes or even current programmes in the field of combating desertification exists. As a first step, the Working Groups have already undertaken a review of such reports{see sections 3.2 (i)} and studies. Adequate diagnosis of land degradation and its root causes in the country has also been made within the National Conservation Strategy process.

As already mentioned, a mechanism for regular evaluation of the on-going programmes to improve their contents and implementation exists. The latest in the series is the Eswaran Committee Report. In pursuance of the recommendations of the Eswaran Committee, a **National Standing Committee for Watershed Development under the Chairmanship of Deputy Chairman, Planning Commission with Ministers in charge for Rural Development, Agriculture, Environment and Forests as Members has been constituted effective from August 9, 1999.** The Committee will review the progress of watershed development schemes and analyse the experience in the field with a view to make suggestions on various aspects of the programme (Government of India 2000a).

Realising the effectiveness of watershed approach adopted for controlling land degradation and increasing productivity (see sections 3.2(i) and 5.2), the Union Finance Minister in his budget (1999-2000) speech announced creation of a **Watershed Development Fund (WDF)**. WDF has since been established at the National Agriculture Bank for Rural Development (NABARD) with the objective of integrated watershed development in 100 priority districts through participatory approach. The total corpus of the WDF is proposed at Rs. 2 billion. The fund will be utilised to create the necessary framework and conditions to replicate and consolidate the successful initiatives under different programmes in the government, semi-government and NGO sectors (Government of India 2000a).

7.2 Traditional Knowledge for Natural Resources Conservation and management

Traditional knowledge and practices have their own importance as they have stood the test of time and have proved to be efficacious to the local people. Some of these traditional practices in the fields of crop production, mixed farming, water harvesting, conservation of forage, combined production system, biodiverity conservation, forestry, and domestic energy, to mention a few, are briefly described below.

7.2.1 Crop production

The tank system is traditionally the backbone of agriculture production in semi-arid region. Tanks collect rainwater and are constructed either by *bunding* or by excavating the ground. It is estimated that 4 to 10 ha of catchment is required to fill one ha of tank bed.

In the Thar Desert, traditional systems of land and water use met environmental challenges in various ways. The limited crop-growing season led early inhabitants to rely on animal husbandry and farming of hardy millets in the summer season. However, one group of indigenous cultivators *(Paliwals)* devised a rainwater-harvesting technique fully capable of growing winter season crops.

As early as the 15th century, the *Paliwal* cultivators followed a unique practice of water harvesting and moisture conservation in suitable deep-soil plots. These plots as also surrounding catchment area were developed with care and managed to make the system a self-contained unit for winter cultivation. Under conditions of intense evaporation, the moisture threshold and soil fertility was maintained. The total energy input, rainwater, sand-silt-clay accumulation, and the cultivator's own activities were interwoven into a complete production system of winter crops. There was a progressive increase of yields every year as more and more fresh silt and clay accumulated and widened the vertical and horizontal dimension of such plots. The ratio of farmland and catchment area was regulated to be 1:11 so that the critical supply of moisture was maintained (Tewari 1988). This is known as the *Khadin* system of cultivation. In this system, the nearby uplands and rocky grounds are also used as catchment for collecting rainwater. **There are still as many as 500 big and small *khadins* covering a total area of about 12,140 ha** (Kolarkar 1980). **A similar system called *Ahar* was developed in the state of Bihar** (Prinz 1996).

In Tamil Nadu, the practice of *nangai-mel-pangai* (dry crops on wetlands) was common. If the monsoon seemed not to be promising at the planting time, farmers would plant high quality dry crops, usually *ragi* or *cholam* (varieties of millet), under tank irrigation. If the season looked good, they would plant paddy.

In central India, a very old cultivation system based on water harvesting and runoff farming in the Narmada valley locally known as *haveli* still exists. This system is location specific, like other indigenous runoff farming systems of the country. It is practiced in areas with black cotton soil. Fields are embanked (average height of embankment being 1 m) on four sides. Rainwater remains in the field until the beginning of October. A few days before sowing *rabi* (winter) crops, the excess water is drained off. Water is let out very gradually. The cultivators know from long experience which field ought to be drained first. The water from one field enters into another, and then another till it joins the natural drainage or lake. There is a mutual understanding amongst the farmers as to when to release the water. *Bhil* tribals developed another system called *patt.* The principle of this system is simple and comprises *bunding* (embankment) of a stream at a point to provide a static head of 30-60 cm, sufficient to divert water into the irrigation channel. The gradient of the channel is less than the gradient of the streambed and climbs to a height varying 3-25 m. This system allows double cropping.

7.2.2 Mixed farming

The bulk of natural resource base of the arid region is most suited to pasture based livestock farming. The traditional wisdom of the dryland farmer clearly manifest in the evolution of system of mixed farming – including crop and animal husbandry – which matched the potential and limitations of the natural resource base (Jodha and Vyas 1969). The misuse of land, namely ploughing the lands best suited to natural grasses was rectified by the practice of crop and long fallows (bush fallow) rotation.

7.2.3 Water harvesting

In the sandier tracts, the villagers of the Thar Desert had evolved an ingenious system of rain water harvesting known as *Kunds*, the local name given to a covered under ground tank was developed primarily for tackling problem of drinking water. These are either owned by communities or privately. Village ponds *(nadis*), *Kundis* and *tankas* in Rajasthan and *virdis* in Gujrat were common for meeting the drinking water needs of the inhabitants. In southern India tanks and their catchments had religious importance and were not polluted. Agarwal and Narain (1997) have documented in great detail traditional water harvesting systems in the country.

An NGO Tarun Bharat Sangh in Alwar, Rajasthan (Singh, n.d.; Patel 1997; UN 1998) has successfully revived a dry river by constructing a series of checkdams by involving villagers of the area. The villagers have now formed what is called a 'river parliament', which meets regularly to discuss its management. Villagers of Sayla Taluka, Surendranagar district in Gujarat themselves, under *van-talavalli* (forest ponds) scheme, dug up 10 such small ponds, each with a capacity of 500,000 gallons of water, recharging the water table in the adjoining areas making that much more water available for irrigation. They have switched from Pearl millet (*Bajra*) to wheat (Parivesh Factsheet n.d.). Other NGOs such as Anna Sahab Hazare in Ralegan Siddhi, Maharashtra (Ganesh and Pangre 1992), Sadguru Water and Land Development Foundation and Agha Khan Rural Support Programme in Gujrat, to mention a few, have done outstanding work in the area of water harvesting using traditional knowledge with community involvement.

7.2.4 Conservation of forage resources

The pastoralist (nomadic cattle breeders), based on their centuries of experience, developed a unique method of water harvesting for the most effective utilisation of their grazing lands and also for ensuring their revival and growth during the successive years. With the commencement of rains, the population was divided into different caste groups and dispersed to their *tobas* (small dug out ponds) along with their livestock. The *tobas* were situated within the confines of the village boundaries but outside the settlement proper. If water in one *toba* was exhausted its users were not allowed to come back to the village but had to make use of another *toba* where water and fodder might still be available, and by convention they had to be allowed the facility of using the water and grazing resources there. It was only when the water in all the *tobas* was exhausted that the entire population, along with their stock, returned to the village proper and were allowed to use the water in the village tank and the lush growth of grasses around the village. Severe penalties were imposed on graziers for violation of regulations designed to control grazing and water use from *tobas* (Malhotra 1988). The *Jagirdar* (feudal landlord) imposed animal grazing tax (*ghas-mari*) and periodic free gifts (*laag*) especially from owners of large flocks of sheep and goat, which acted as a strong deterrent against indiscriminate grazing (Jodha 1978). **With the abolition of *Jagirdari,* the practice of realising grazing tax was discontinued resulting in free ranging and consequent degradation of rangelands.**

7.2.5 Combined production system

The practice of agroforestry *viz.*, cultivation in spaces between rows of trees and shrubs, has been traditionally practiced by the desert dwellers. For example, *Prosopis cineraria* in cultivated fields and *Ziziphus mauritiana* in rangelands are common in arid and semi-arid parts of Rajasthan. The communities have a strong belief that trees and shrubs not only provide fodder for livestock but also increase crop growth under their canopy. And, as cultivation of crops alone is a big gamble in arid areas, most desert dwellers follow mixed farming to minimise risk against total crop failure, in which animal husbandry is an important component. **Density of *P. cineraria* varies from 20 to 40 trees per ha in cultivated field of flat alluvial plains having deep (100-150 cm) sandy loam to sandy clay loam soils underlain by an indurated *kankar* pan in 350-450 mm rainfall in Shekavati region of Rajasthan** (Shankar 1980)**.** In dryland regions planting of trees along field boundaries, roads and around homesteads and watering points for shade is a common traditional practice.

7.2.6 Biodiversity management

There are several scared tree groves dedicated to temples spread over the entire country. Communities zealously protect these groves against interference of any kind. These groves are excellent examples of biodiversity conservation. For example, it was religiously prohibited to cut any vegetation from the lands in the immediate vicinity of temples and religious places, known as *Oran* (protected forest) lands. **Collection of dry wood only was allowed for fuel and serious punishment was prescribed for using an axe in *Orans*. In Barmer, Jaiselmer, Nagaur, Jodhpur, Pali, Sikar, Jhunjhunu, and Jalore districts of Rajasthan there are still 420 *Orans* covering a total area of 100,140 ha** (Govil and Daima 2000). Some customs observed by the *Bishnoi* community in Rajasthan and Haryana helped to conserve vegetation and wild animals. An incident that occurred over 250 years ago in Khejadala village in Jodhpur district in Rajasthan is a dramatic example, in which *Bishnoi* women zealously sacrificed their lives by hugging their *Prosopis cineraria* (*khejri*) trees rather than allowing these to be cut down (Malhotra 1986). There can be little doubt that these strategies emanated from people who had a strong concern for

preservation of their environment and its ecosystems, an attitude which enabled societies to conserve their resources through “oral fencing”.

7.2.7 Forestry

A useful indigenous technique of water conservation called pitcher planting. Earthen pitchers with holes on one side are embedded near the root zone of newly planted seedlings to provide it with the required amount of water. This technique prevents loss of water either due to evaporation or seepage and helps in seedling establishment. This technique is still practiced by melon cultivators in arid region of Rajasthan. Similarly, these farmers bury bushes in a chess board pattern (similar to stubble mulch) to protect melon plants from getting buried by shifting sands. These techniques have been successfully adopted in arid zone afforestation in the country and else where (Kaul 1970). Dryland farmers raised windbreaks (*matt*) around their fields and homesteads to protect crops and their livestock against hot desiccating winds.

7.2.8 Energy

Lopping of trees such as *Prosopis cineraria, Azadirachta indica and Ailanthus excelsa* during winter season for leaf fodder is still a common traditional practice in arid and semi-arid regions of Rajasthan. The branches and twigs are used as firewood. The practice of lopping trees during winter season has been found scientifically sound, as it causes no damage to trees for they are dormant and by then all the food is translocated to roots (Bhimaya1*et al* 1964).

7.2.9 Storage of grains/tubers

In some parts of the country tightly woven rope baskets are used to protect rice against rats for up to five years, unlike the plastic bags that are now used in many areas. The farmers of Malwa region of Madhya Pradesh have been successfully storing potato crops in dug out pits lined with bricks from times immemorial. **Following this technology, potato crop can be stored for a period of at least four months and their carbohydrate content has been found to be less than the ones stored in cold storage. This technology is reported to have aroused worldwide interest.**

7.2.10 Conclusion

Since many of these traditional systems are environment-friendly and sustainable, efforts would be made to restore them and back them up with modern approaches to enable their effective mainstreaming in combating desertification. **Some of the traditional technologies discussed here offer promising entry points for developing packages on community-based dryland resource management technologies.** While these changes in the strategy would result in better implementation of these programmes, the participation of local communities may also lead to greater use of traditional practices. **It is, therefore, necessary to document such knowledge base through a properly designed research programme and to analyse their economic, technological and socio-cultural sustainability for optimization of their use. Such a programme would be initiated in cooperation with non-governmental organisations (NGOs) within the NAP framework.**

7.3 Established Technical Programmes and Functional Integrated Projects to Combat Desertification

As mentioned earlier the programmes being implemented by different Ministries {see sections 3.2 (ii) and Annexure IV} have been inventorised (see Annexure IV) and are being evaluated by the Working Groups with a view to integrate them into NAP. T**he integrated area development programmes such as the Drought Prone Area Programme (DPAP), the Desert Development Programme (DDP) and the National Watershed Development Projects for Rainfed Areas (NWDPRA), among others, being focused programmes, will certainly find their place in the NAP.**

The Ministry of Environment and Forests (MoEF) has formulated the National Forestry Action Programme (NFAP) as a part of programme recommended by the United Nations Conference for Environment and Development (UNCED), its subsequent forum the Commission on Sustainable Development (CSD), and Intergovernmental Panel on Forestry (IPF) for launch of NFAP globally. Total financial proposal to achieve the goals mandated in the National Forest Policy,

1988 and for sustainable development of the country's forests has been estimated as Rs. 1339 billion over a period of 20 years (Government of India 1999b).

7.4 Linkage Achieved with Sub-regional and Regional Action Programme

A number of meetings have been held during the past few years to chalk out a programme for regional cooperation in Asia under the aegis of the UNCED with support of UNCCD Secretariat. The First Regional Conference on implementation of UNCCD for Asia was held in New Delhi in August 1996 which agreed upon the establishment of network of regional cooperation. The Conference also helped in identifying the major cross cutting elements for combating land degradation/desertification. This was followed by second Ministerial Level Regional Conference at Beijing in May 1997. A framework for the formulation of the Regional Action Programme (RAP) and development of National Action Programme (NAP) was conceptualised by the Ministerial Conference. The NAPs are also to be supported by RAPs through the establishment of Thematic Programme Network (TPN) for cooperation among the affected countries. The Beijing Conference identified the following six TPNs:

TPN1 Desertification Monitoring and Assessment
TPN2 Agroforestry and Soil Conservation in Arid, Semi-arid and Dry Sub-humid Areas
TPN3 Rangeland Management in Arid Areas including Fixation of Sand Dunes
TPN4 Water Resources Management for Agriculture in Arid, Semi-arid and Dry Sub-humid Areas
TPN5 Strengthening Capacities for Drought Impact Mitigating and Combating Desertification
TPN6 Assistance for Development of Integrated Local Area Development Programme (LADPs)

An International Expert Group (IEG) meeting on RAP for Asia was held at ESCAP, Bangkok, Thailand from November 10-13 1998 on the preparation of RAP for Combating Desertification and Drought in Asia and the Pacific. It was decided that the TPNs would be formulated and implemented building upon existing knowledge and experience as well as strengthening partnership. Flexible modalities for partnership were acknowledged as guiding principles to develop TPNs. TPNs being regional in nature, it was recommended that international organisations, particularly the Regional and International financing institutions lend their technical and financial support to the preparation and implementation of RAP. The network is expected to help the member parties to strengthen their existing infrastructure for tackling the problems they face in combating desertification.

Thematic Programme Network - 1 on Desertification Monitoring and Assessment hosted by China was launched in Beijing in July 1999. The Space Application Centre, Ahmedabad has been identified as the Technical Coordinator for establishing TPN-1 network in India.

The Ministry of Environment is facilitating establishment and functioning of TPN-2 "Agro-forestry Management and Soil Conservation in Arid, Semi-arid and Dry Sub-humid areas" through the Central Arid Zone Research Institute, Jodhpur (CAZRI) in collaboration with four other main institutions involved in these areas. CAZRI is the nodal institution for implementation of TPN-2 and its Director is currently functioning as the Task Manager. The Minister of Environment and Forests, Government of India on March 14, 2000 in New Delhi launched TPN-2. This was followed by presentations by 12 Asian member-party countries on the status, problems, etc. relating to TPN-2 in their respective countries and the benefits they expect from the network. After discussion and with a few modifications the broad work programme of the network for Asia for 2000-2002 and the Operational Guidelines were adopted by the meeting on March 15, 2000. About 15 countries of the Asian region are identified to join the network.

7.5 Effective Measures for Local Capacity Building

In spite of the focused in-service and local capacity building efforts, which have been made by the concerned Ministries as well as by the State Governments and non-governmental agencies, local level actors have not yet been reached to the extent desired. A lot remains to be done in terms of capacity building, particularly at the grass-root level, for the efficient implementation of the NAP. Capacity building measures are being strengthened on the basis of recommendations of the Committee on Training in Watershed Development. **A proactive role is envisaged for the**

National Institute of Rural Development (NIRD) for a massive nationwide human resource development (Government of India 2000). However, the Joint Forest Management (JFM) and area development programmes, in which participatory approach is an integral element, have built a pool of trained professionals at the state level through their training programmes of participatory planning and project preparation, communication skills, monitoring and evaluation, etc. This qualified manpower is expected to train further down stream. **Training and capacity building, particularly at grass-root local level is a time consuming process and it will be given high priority for effective implementation of NAP. This is an area where external assistance would be required.**

7.6 Monitoring and Information Systems

Since several Ministries are involved in land-based programmes it is proposed that NAP is monitored by the Programme Evaluation Organisation Wing of the Planning Commission with the active support of Environmental Information System (ENVIS) in MoEF (see section 6.6.2). The objective of the strategy would be to develop a user-friendly monitoring and evaluation system, incorporating the relevant indicators, base line data, targets, data source and collection methods.

This strategy is based on the premise that regular reviews will be conducted. Information collected on a regular basis for monitoring purposes will facilitate efficient evaluation of NAP activities thereby providing opportunity for mid course corrections. In order to ensure that the data provided on implementation of the NAP activities are reflective of the opinions and realities of local populations, periodic local level consultations shall be provided in the strategy. **This would help in developing a Community Based Monitoring System (CBMS) at the local level.**

Following monitoring arrangements for desertification, drought, climate, environment and energy are already in place.

7.6.1 Desertification and drought

(i) *Desertification:* The Central Arid Zone Research Institute, Jodhpur is one of the ENVIS centres functioning as a database on desertification, it is necessary to develop a networks at the national, state and district levels of monitoring activities covering the entire arid, semi-arid and dry sub-humid regions of the country. Collecting data/information on the impact indicators (see section 8.1) using remote sensing and GIS for developing a sound database would be an important function of these networks.

(ii*) Drought:* The satellite based National Agricultural Drought Assessment and Monitoring System (NADAMS) is established at the Department of Space (DOS). The programmes are being carried out by the National Remote Sensing Agency (NRSA). The Department of Agriculture and Co-operation, with support from state and central government departments, has sponsored NADAMS for providing reliable and accurate information on agricultural conditions. NADAMS uses daily NOAA-AVHRR (1.1 km) and IRS-WIFS (188 m) based biweekly/monthly vegetation index and provides periodic information on crop conditions at the district and sub-district level in terms of drought bulletin and detail reports. This programme at present covers 10 states of the country *viz*., Andhra Pradesh, Bihar, Gujrat, Haryana, Karnataka, Madhya Pradesh, Orissa, Rajasthan, Tamilnadu and Utter Pradesh.

There is, however, need to strengthen the national climatological and hydrological capabilities to ensure early warning systems and to suggest measures for strengthening drought preparedness and management including drought contingency plan at local, national and regional levels.

7.6.2 Environmental Information System (ENVIS): The ENVIS network, set up at the Ministry of Environment and Forests (MoEF), consists of 25 network partners. The objective of ENVIS is to serve as a repository and dissemination centre in environmental science and engineering, and to provide national environmental information service to the users, originators, processors and disseminators of environmental information at national and international level. Since 1998, it has started publishing the ENVIRO Newsletter of the MoEF on monthly basis for disseminating information to all concerned on various important policies, new rules/regulations, important notifications and other important decisions taken by the MoEF from time to time. The newsletter

can be accessed through Internet at the MoEF Home Page. **The ENVIS Centres collect, collate, store, retrieve and disseminate information in their respective subject areas e.g., desertification, renewable energy and environment, environmentally sound and appropriate technologies, environmental education, forestry, floral biodiversity, environmental problem of mining, control of water, air and noise pollution, panchyati raj and environment, etc.**

For the INFOTERRA Network, a global information network of the United Nations Environmental Programme (UNEP), ENVIS continues to function as a National Focal Point and a Regional Centre for countries in South Asia Sub-region. ENVIS also maintains a close liaison with various other National Information Systems like the National Institute of Science, Technology and Development Studies (NISTADS), the Birla Institute of Technology and Science (BITS), etc. in the country for exchange of environmental information.

7.6.3 Sustainable Development Networking Programme (SDNP): In 1998, ENVIS was designated as the National SDNP of UNDP. The SDNP secretariat has started functioning in the Ministry of Environment and Forests. SDNP would act as a clearinghouse of information on sustainable development by involving government, academic, business and NGOs. It also aims to strengthen selected ENVIS Centres and to identify new modes for disseminating information on sustainable development. SDNP has launched a website for accessing information in this regard by a wide cross-section of users.

7.6.4 Monitoring Cell for Joint forest management (JFM): A cell has been created in the MoEF for monitoring the impact of the JFM programmes of which the key element is people's participation. **In addition, NGOs like WWF-India and Society for Promotion of Wasteland Development (SPWD) have their JFM networks, which periodically hold workshops to share experiences and to influence Government's policy.**

7.6.5 Indira Gandhi Conservation Monitoring Centre (IGCMC): The IGCMC was set up by the Worldwide Fund for Nature (WWF-India) in 1994, with the support of the Government of India, Ministry of Environment and Forests. Its overall goal and purpose is to support biodiversity and natural resource conservation in India through collection, managing, disseminating and making accessible relevant data and knowledge, and by providing appropriate technical, analytical and networking services.

7.6.6 National Data Bank Facility in Agro-meteorology: The National Data Bank is being set up under the All India Co-ordinated Project on Agro-meteorology at the Crop Research Institute for Dry Land Agriculture (CRIDA), Hyderabad.

7.6.7 Forest Survey of India (FSI): FSI is responsible for monitoring the state of India's forest cover and acts as a repository of forest databases. FSI publishes every two years "The State of India's Forest" giving an assessment of forest cover for different states of the country and comparative changes that have taken place during the two year period (Forest Survey of India 1997).

8. FINANCIAL ALLOCATION FROM NATIONAL BUDGETS IN SUPPORT OF THE IMPLEMENTATION AS WELL AS FINANCIAL ASSISTANCE AND TECHNICAL COOPERATION RECEIVED AND NEEDED, IDENTIFYING AND PRIOIRITISING REQUIREMENTS.

8.1 Adopted Financial Mechanism

The major actors in the sphere of sustainable renewable natural resource management and desertification control are the Ministries of Forests and Environment, Agriculture and Cooperation, Rural Development and Non-conventional Energy Sources at the centre and their counterpart technical line departments in the states. **The sources of funding available to these agencies for implementing their sustainable development programmes including desertification control are the national and state budgets, dedicated sectoral funds and external assistance.**

Budget planning is done for a fiscal year (April 1 - March 31). The current mechanism of funding of Centrally sponsored and Central sector Plan projects/schemes would be followed for NAP. Under this mechanism the state governments in partnership with village communities would prepare projects within the NAP framework and forward it to the concerned Ministry for technical scrutiny and release of funds for implementation. However, funding procedures need to be streamlined so that (i) funds are made available on time to state governments/project implementation authorities, and (ii) carry over unspent funds and advance authorisation for expenditure during the early part of the fiscal year is facilitated.

8.2 NAP Financing

Those of the on-going programmes that will be integrated in the NAP framework will continue to be funded from Plan Budget of the concerned Ministries and the State Governments. However, the resources that have been made available are not adequate to match the enormity of the problem. **Projects will, therefore, be posed to multi-lateral and bilateral agencies, and international donors for financial assistance.**

9. A REVIEW OF BENCHMARKS AND INDICATORS UTILISED TO MEASURE PROGRESS AND AN ASSESSMENT THEREOF

9.1. Criteria for selection of indicators

Despite the seriousness of the environmental and socio-economic impacts of desertification, few efforts have been made to devise diagnostic and monitoring techniques for appraising the status and trend of desertification. Indicators are integrated and synthesised information that can provide data on threshold levels, status and evaluation of relevant physical, chemical, biological and anthropogenic processes. It is, therefore, necessary to use indicators to develop a system of desertification evaluation as applicable to Indian conditions.

Indicators have the advantage of being simplified, synthesised information on the state or tendency of complex processes such as desertification. Indicator can be easily communicated to the public or policy-makers. And they can be used as easy synthetic information in geographic information systems (GISs) to determine spatial extension and geographic distribution of degraded areas and to relate causes (human action) and effects (environmental conditions). For all these purposes selection of complementary indicators reflecting different aspects of environmental stress is necessary. Some of the following criteria may be considered while selecting desertification indicators for Indian conditions.

- Reliable and scientifically valid.
- Independent of sample size.
- Be measurable (standardised, accurate method and analysis with low measurement error).
- Biologically and socially relevant.
- Sensitive to stress factors without high natural variability and therefore has an early warning function.
- Easy and cost effective.
- Able to assess trends over time (Benchmarks).
- Be based on readily available data of known quality.

Three distinct systems viz., (i) Physical, (ii) Biological and (iii) Socio-economic are considered for purposes of monitoring desretification. Each system comprises distinct components. For example, Physical system comprises climate, soil and water. Each component in turn comprises of sub-systems. For example, soil comprises microflora and microfauna, physical properties, equilibrium of nutrients, mineral and organic matter. For each sub system an indicator has to be identified. **However, for arid, semi-arid and dry sub-humid areas, benchmarks for time-series monitoring of desertification and improvement are rare. The few research stations scattered within these regions do not always collect the crucial basic data for monitoring desertification.** More quantitative information on the current extent and on hazards or risks of land degradation in all forms, awaits better, fully geo-referenced databases on natural resources and current socio-economic conditions on a more meaningful scale.

9.2 Impact Indicators

Keeping in view the above criteria, a suggestive list of impact indicators is given in Table 4.

Table 4. A Suggestive List of Indicators to Monitor Desertification

(i) Physical	**(ii) Biological**
Climate	***Flora***
• Indicies of temperature and rainfall levels. • Evapotranspiration. • Precipitation tendencies. • Albedo.	Changes in vertical structure (Percent cover). Changes in horizontal structure (Strata). • Changes in dominant species (Species dominance). • Changes in richness and species diversity (index of diversity). Changes in phyto-volume.
Soil	***Fauna***
• Surface run-off. • Visual erosion or soil loss. • Sediment in suspension. • Soil compaction. • Salinization of soil. • Soil fertility. • Organic matter.	Density, abundance and rarity of species Socio-economic Poverty. Income. Infant mortality. Agriculture income/Total income (indicate pressure). Population dependent on cultivation (indicate pressure). Nutrition status by age and sex Age specific literacy rate by gender. Percentage of population aware of desertification phenomenon.
Water	
• Water table depth. • Groundwater salinization. • Volume of water bodies.	
Land use	
• Crop and livestock productivity	

The Working Group I on Desertification Monitoring and Early Warning System have already deliberated on many facets especially as regards data required for the diagnosis and effective control of desertification. These data are scattered in many organisations/department of the government. All are in different forms and formats and are of varying qualities. **While finalising a list of indicators the Group will take into account ongoing work on indicators as well as experience acquired in other sectors/conventions e.g. biological diversity, climate change, forestry and soil conservation to avoid duplication of effort.** However, the International Crop Research Institute for Semi-Arid Tropics (ICRISAT) at Hyderabad has been using mainly soil loss index for monitoring progress of desertification.

9.3 Implementation Indicators

For proper monitoring and evaluation of implementation of the Convention to Combat Desertification (CCD) it is proposed to follow a logical framework (logframe) approach which will list different components *viz*., output and activities, indicators of achievements, actual achievement, source of verification and responsible unit. For example, CCD implementation processes are (i) awareness creation about the Convention and identification priorities, (ii) formulation of National Action Programme (NAP) and (iii) implementation of field projects/activities within the framework of NAP.

For monitoring and evaluation of NAP projects to be implemented a logframe for each project has to be developed. Besides intervention components, means of verification (MOV), and risk and assumption, the objectively verifiable indicators (OVI) are an important part of a logframe matrix. The indicators have to relate to goal, purpose, outputs and means. This is illustrated by an example of logical framework matrix to monitor institution-building activity of a project on combating desertification with people's participation (Table 5).

Table 5. Logical framework matrix for institution building of a project on combating desertification with people's participation.

Intervention Component	*Indicator Group (OVI)*	*Means of Verification (MOV)*	*Risk/Assumption*
Strategic Level: Long-term development objectives Sustainable and equitable management of rehabilitated common lands (CL) with the active participation of village-level institutions and local communities	• Establishment of village-level institutions • Awareness level of the institution and villagers • Functioning of village-level institutions	• 6 months. progress reports	• Target population willingness to participate. • Stable project environment with special respect to staffing
Tactical Level: Immediate objectives xxxx ha of common lands rehabilitated and managed by xxxx Village Committees (VCs) with extension provided by the Project authority	• Establishment of VCs • Awareness level of the VCs and Villagers • Functioning of VCs	• 6 months. progress reports • Forester/SDO/ DFO records • VC Interviews	• Target population willingness to participate • Stable project environment with special respect to staffing
Tactical-Operational level: Output VCs established which manage CL on the basis of approved Village Management Plans (VMP)	• No. of VCs established	• 6 months. progress reports	• Stable project environment with special respect to staffing
Tactical-Operational level: Activities • Information and mobilisation activities • Community organising activities • Continual extension and counseling activities	Sample indicators: No. of campaigns; publicity material distributed; No. of VMP; frequency of community/ project staff meetings at different levels; etc.	• 6 months. progress reports	• Stable project environment with special respect to staffing

For successful implementation of a project it is necessary to identify risks and assumptions. These are statements about uncertain parameters affecting an intervention level in the logical framework matrix, which should be reflected in strategic and tactical considerations.

10. TASKS AHEAD

It would be seen from the foregoing account that excessive pressure of an ever-increasing human and animal population and their consumption needs has taken a heavy toll of India's renewable natural resources in dryland region, causing widespread desertification and accentuating the effects of drought. The Government of India (GoI) is seized of the magnitude of the problem of desertification and drought and has since 1956 taken several measures to combat it. Even though sizeable funds for the programme were made available, these fell far short of the amount needed. Sustained flow of fund could also not be ensured. Programmes that were initiated in the 1950s have since been evaluated and modifications made.

The fact that programmes, policies and institutions are already in place is proof of the GoI's commitment to combating desertification. Action in the following areas is required to combat the problem. Some are of a immediate nature, some have a medium-term perspective and some a longer terms perspective.

- Similarities and complementarities exist between the four Rio instruments *viz*., UN Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity, the UN Convention to Combat Desertification (UNCCD), and the Forest Principles. There is, therefore, a need to develop synergies between these instruments in terms of their implementation at the policy and the field levels. **Only through networking can knowledge be freely shared, taken full advantage of and duplication avoided**.

- **Ongoing schemes/programmes need to be continued and consolidated** and the delivery system significantly improved. A project approach has to be followed and steps taken to ensure completion within the time frame set for the project as is the case in watershed approach which has been introduced for most land-based development projects. **New initiatives and more focused programmes need to be formulated and implemented in the context of CCD.**

- Several policies and programmes whether in economic, social (population policy for instance), infrastructure sectors have a bearing on the factors that lead to prevent/control desertification and mitigate the effects of drought. **This explains the importance of coordination and integration at different levels.**

- All traditional methods of water storage, integral to local culture, have been decimated. As mentioned earlier, water harvesting systems like *khadin, nadi, virdi, tanka,* etc. which for years had been used to efficiently augment ground water, have given way to tube wells resulting in steady decline in water table. **A massive programme of revival of traditional practices of water harvesting with involvement and participation of local communities need to be mounted.** Even in urban areas roof-water-harvesting should be made mandatory in building construction bylaws.

- **Availability of water at cheap rates has led to its reckless use resulting in problem of water logging and soil salinisation**. Because of the profit motive farmer's grow crops and follow practices which are wasteful in the use of water. **Tapping of underground water has to be regulated and farmers must not be allowed to use it so extensively that it goes on progressively lowering water table**. State Governments should be asked to adopt and enforce the provisions of the model bill drafted by the Centre way back in 1987 to prevent over exploitation of water resources and discontinue excessive subsidy on water to discourage farmers to sink more electric tube wells. The current policy of governing use of water fails to accord recognition to it as precious and scarce resource which has to be conserved and used for maximum good. **Policies have to come in place for inducting sound water management programme, which balance the interest of farmers and the community.**

- **States need to act through legislative, administrative and education measures to ensure that land is used according to its capability.** They will also have to strengthen their Soil and Water Conservation, and Agriculture departments so that technical help is provided. Proper land use will go a long way in combating desertification and mitigating the effects of drought.

- **Communities are the best resource managers and are to be involved in local renewable natural resources (*viz*., soil, water and vegetation) projects so that they realise how critical it is for their own survival and develop a stake in conservation measures of renewable natural resources.**

- **Massive campaign is necessary to bring home the point that water is a precious and scarce commodity and its judicious use is essential for the survival of community**. Public support has to be mobilised at the local level and *Panchyati Raj* Institutions utilised for conserving and regulating use of water.

The National Action Programme (NAP) will provide an institutional mechanism both in terms of achieving better coordination among affected states and the national agencies involved in natural resource management. It will also supplement GoI's resources with external assistance available within the CCD framework for a more comprehensive, coordinated and participatory programme of action to combat desertification and mitigating the effects of drought.

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Annexure I

Land-Based Externally Aided Projects Under Different Ministries

S.No.	Project	Donor	Year of launch	Achievement	
				Physical in ha *	Financial Rs. In million *
	Ministry of Agriculture				
	I. Rainfed Farming System				
1	Integrated Watershed Development Project (Hills)				
	Phase I	IDA	NA	NA	2856.00
	Phase II			1999	9546.00
2	Doon Valley Project	EEC	1993	8506	387.00 #
3	German (Kreditanstant for Widdera-ufbau) Assisted Watershed Project	KFW			
	a) Karnataka		1996	53633*	550.80
	b)Maharashtra		1992	NA	187.30
4	Comprehensive Watershed Development Project,				
	a) Tirnulvallei, Tamil Nadu.	DANIDA	1990-91	NA	417.20
	b) Ramnathpuram	DANIDA	1994-95	NA	130.00
	c) Karnatka	DANIDA	1990-91	NA	133.50
	d) Koraput, Orissa	DANIDA	1993-84	NA	132.50
	e)Madhya Pradesh	DANIDA	1997-98	NA	131.50
	II. Soil And Water Conservation				
5	Indo German Bilateral Project on Watershed (Training of staff)	German Government			110.00
6	Haryana Operational Pilot Project for Reclamation of Waterlogged and Saline Lands	Netherlands	1994-95	1028**	293.00
7	North Bengal Terai Development Project (Phase III)	Netherlands	1995-96		393.50
8	UP Sodic Land Reclamation Project	World Bank	1993-94	47000	1365.80
	Ministry of Rural Development				978.00
1	Community Forestry Project, Haryana	EEC	1993-94	300 villages*	978.00
2	Watershed Development Project (being implemented by NTGCF)	CIDA		7872*	459.90
3	Allappady Wastelands Comprehensive Environment Conservation Project, Kerala	OECF	1996	50,700*	1768.90
4	Capacity building and Knowledge Generation,				
	a) Andhra Pradesh	DFID	1999		381.60
	b) Orissa	DFID			2358.00
5	Community Management of Natural Resources, Gujarat	EEC	1997	45,000*	489.95
	Total				23558.50

* Total allocation of external assistance (not including State share) and targets

**Actual achievement and expenditure incurred so far

Upto March 1998

Source: Annual Reports for 199-2000 of Ministries of Agriculture and Rural Development, Government of India

Ministry of Environment and Forests
Ongoing Projects

S.No.	Name of the Project	Implementing Agency	Funding agency	Project Cost (Rs. in million)	Physical Targets (in '000 ha.)
	State Sector				
1	Maharashtra Forestry Project (2328 - IN) 1992-93 to 1999-00	Maharashtra Government	WORLD BANK	4315.10	369.00
2	Andhra Pradesh Forestry Project (2573 – IN 1994-95 to 1999-00	Andhra Pradesh Government	WORLD BANK	3539.20	355.00
3	Afforestation and Pasture Dev. along Indira Gandhi Canal (ID -P - 73) 1990-91 to 1999-00	Rajasthan Government	JBIC (JAPAN)	1075.00	61.50
4	Western Ghats Forestry Project 1992-93 to 1998-99 (1 year Extension under consideration)	Karnataka Government	DFID (U.K.)	842.00	61.00
5	Himachal Pradesh Forestry Project, Kullu Mandi. 1994-95 to 1999-00	H.P. Government	DFID (U.K.)	139.20	11.00
6	Madhya Pradesh Forestry Project, (2700 - IN) 1995-96 to 1999-00	Madhya Pradesh Government	WORLD BANK	2459.40	235.00
7	Integrated Gujarat Forestry Development Project. (ID-P-112) 1995-96 to 2000-01	Gujarat Government	JBIC (JAPAN)	6085.00	230.00
8	Rajasthan Forestry Project, (ID-P-104) 1995-96 to 1999-00	Rajasthan Government	JBIC (JAPAN)	1391.80	55.00
9	Tamil Nadu Afforestation Project 1996-97 to 2001-02	Tamil Nadu Government	JBIC (JAPAN)	4992.00	405.00
10	Eastern Karnataka Afforestation Project 1996-97 to 2001-02	Karnataka Government	JBIC (JAPAN)	5655.40	471.00
11	Capacity Building Project for Participatory Management of Forests 1997-98 to 1998-99 (Yet to be completed)	Orissa Government	SIDA (SWEDEN)	85.00	19.00
12	Uttar Pradesh Forestry Project 1997-98 to 2000-01	UP Government	WORLD BANK	2720.00	160.00
13	Punjab Afforestation Project 1997-98 to 2004-05 (Present loan for 4 years)	Punjab Government	JBIC (JAPAN)	4420.00	59.00

S.No.	Name of the Project	Implementing Agency	Funding agency	Project Cost (Rs. in million)	Physical Targets (in '000 ha.)
14	Kerala Forestry Project 1998-99 to 2001-02	Kerala Government	WORLD BANK	1830.00	54.00
15	Capacity Building Project for Rehabilitation of Degraded Forests Through Landscape Participatory Programme 1998-99 to 2000-01	KFRI , Kerala Government	AUSAID (AUSTRALIA)	11.70	
16	Afforestation of Aravalli Hills 1992-93 to 1999-00	Rajasthan Government	JBIC (JAPAN)	1766.90	115
	Total			**41327.70**	
	Central Sector				
17	FREEP	MoEF	World Bank	1924.7	
18	Eco-Development Project	MoEF	World Bank	2949.3	
	Grand Total			**46201.7**	

Source: Ministry of Environment and Forests, Government of India, New Delhi.

Ministry of Environment and Forests: Externally Aided Projects Completed

Sl. No.	Name of the Project	Aid Agency	Project Period	Project Cost (Rs. in million	Actual Expdtr. (Rs. in million)	Physical (in ha.)
1.	Social Forestry Project Uttar Pradesh	World Bank	1979-80 to 1983-84	400.00	500.00	76000
2.	Social Forestry Project Maharashtra	USAID	1982-83 to 1990	564.00	728.00	75726
3.	Social Forestry Project Andhra Pradesh	CIDA	1983-84 to 1990-91	383.80	427.60	45217
4.	Social Forestry Project Bihar	SIDA	1985-86 to 1991-92	538.50	486.00	53375
5.	Social Forestry Project J & K and Haryana	World Bank	1982-83 to 1990-91	570.70	1061.90	186281
6.	Social Forestry Project West Bengal	World Bank	1981-82 to 1990-91	347.50	640.00	242578
7.	Social Forestry Project Karnataka	World Bank/ODA	1983-84 to 1991-92	1245.00	852.10	53351
8.	Social Forestry Project Kerala	World Bank	1984-85 to 1992-93	595.10	896.80	131000
9.	National Social Forestry Project (UP, HP, Raj, Guj)	World Bank/ USAID	1985-86 to 1992-93	3872.90	6981.80	1198742
10.	Gujarat Community Forestry Project	World Bank	1980-81 to 1984-85	666.50	676.40	108355
11.	Orissa Social Forestry Project, (Phase I)	SIDA	1983-84 to 1987-88	281.70	270.60	33592
12.	Social Forestry Project Tamil Nadu(Phase I)	SIDA	1981-82 to 1988-89	656.80	569.60	140363
13.	Social Forestry Project Orissa. (Phase II)	SIDA	1988-89 to 1995-96	783.40	1368.00	119450
14.	Social Forestry Project Tamil Nadu. (Phase II)	SIDA	1988-89 to 1995-96	854.00	1548.60	108176
15	West Bengal Forestry Project	World Bank	1992-93 to 1997-98	1140.00	1367.90	205711
16	Rehabilitation of Common lands in Aravallis, Haryana.	EEC	1990-91 to 1999-00	481.50	1164.96	58050
	Total			13381.90	19540.26	288504

Source: Ministry of Environment and Forests, Government of India, New Delhi.

ANNEXURE II

National Steering Committee for NAP

Government of India Ministries / Departments

1. Special Secretary, — Chairman
   Ministry of Environment and Forests,
   Paryavaran Bhawan, CGO Complex, New Delhi-110003.

2. Joint Secretary, — Member Secretary
   Ministry of Environment and Forests,
   Paryavaran Bhawan, CGO Complex, New Delhi-110003.
3. Additional Inspector General of Forests. — Member
   Forest Conservation Division,
   Ministry of Environment and Forests,
   Paryavaran Bhawan, CGO Complex, New Delhi – 110003.
4 Joint Director, CS Division (Desertification),
   Ministry of Environment and Forests,
   Paryavaran Bhawan, CGO Complex, New Delhi-110003.
5. Secretary,
   Department of Agricultural Research and Education (DARE),
   Ministry of Agriculture &
   DG, ICAR,
   Krishi Bhawan, New Delhi-110001.
6. Secretary,
   Department of Rural Development &
   Department of Land Resources, and
   Technology Mission for Drinking Water,
   NBO Building,
   G-Wing, Nirman Bhawan, New Delhi-110001
7. Secretary,
   Ministry of Health,
   Nirman Bhawan, New Delhi-110001.
8. Secretary,
   Department of Education,
   Ministry of Human Resource Development,
   Shastri Bhawan, New Delhi-110001.
9. Secretary,
   Department of Woman and Child Development,
   Ministry of Human Resource Development,
   Shastri Bhawan, New Delhi-110001,
10. Secretary,
    Ministry of Water Resources,
    Shram Shakti Bhawan, New Delhi-110001.
11. Secretary,
    Ministry of Social Justice and Empowerment,
    New Delhi-110001.

Research and Development Institutions

12. Director,
    National Bureau of Soil Survey and Land Use Planning (NBSS&LUP),
    Amravati Road, Nagpur- 440010.
13. Director,
    Central Research Institute for Dryland Agriculture (CRIDA),
    Santhoshnagar, Hyderabad- 500059.
14. Director,
    Central Soil and Water Conservation Research & Training Institute (CSWCR &TI),

Kaulagarh Road, Dehra Dun-48195.

15. Director,
Central Arid Zone Research Institute (CAZRI), Jodhpur- 342003.

16. Director,
Arid Forest Research Institute (AFRI),
JODHPUR-3420003.

17 Director,
National Research Centre for Agroforestry (NRCAF),
Near Pahuj Dam, Jhansi- 284003.

18. Director-General,
India Meteorological Department,
Mausam Bhawan,
Lodi Road, New Delhi-110003.

19. Director,
National Atlas and Thematic Mapping Organisation (NATMO),
Calcutta.

20. Adviser (Environment & Forests),
Planning Commission,
Yojana Bhawan New Delhi-110011.

21. Assistant Resident Representative,
UNDP,
55, Lodi Estate, New Delhi - 110003.

ANNEXURE III

WORKING GROUPS AND THEIR TERMS OF REFERENCE for NAP

Working Group 1: Desertification Monitoring and Assessment and Early Warning Systems.

Headed by: Head, Natural Resource Management (NRM) Division,
Indian Council for Agricultural Research (ICAR), New Delhi.

Member Organisations:

- Indian Meteorological Department (IMD).
- Indian Space Research Organisation (ISRO) and National Remote Sensing Agency (NRSA).
- Ministry of Water Resources.
- Ministry of Rural Development (Division dealing with DDP, DPAP Schemes).
- Ministry of Agriculture:
    - Department of Agriculture & Cooperation (Divisions dealing with Rainfed Agriculture, Watershed Management, Natural Disaster Management).
    - Department of Animal Husbandry.
    - Department of Agricultural Research & Education.
- Ministry of Food.
- State Departments Of Agriculture, Forest, Health and Rural Development of the States of Madhya Pradesh, Rajasthan.
- National Atlas & Thematic Mapping Organisation (NATMO), Calcutta.
- National Bureau of Soil Survey & Landuse Planning (NBSS&LUP), Nagpur.
- All India Soil & Landuse Survey (AISLUS), New Delhi.
- Central Research Institute for Dyland Agriculture (CRIDA), Hyderabad.
- Central Soil Salinity Research Institute (CSSRI), Karnal.
- Central Groundwater Board (CGWB).
- National Afforestation and Ecodevelopment Board (NAEB).
- Society for Promotion of Wastelands Development (SPWD) (NGO).
- National Centre for Medium Range Weather Forecasting (DST).
- Central Arid Zone Research Institute (Member- Secretary).

Terms of Reference:

1. Identify the most vulnerable dryland regions which are being degraded at an alarming rate or are susceptible to degradation and require immediate attention.
2. Enhance national climatological, meteorological and hydrological capabilities and the means to provide for drought early warning, and strengthen drought preparedness and management, including drought contingency plans at the local, national, sub-regional and regional levels.
3. Mitigation of drought: Establish/ strengthen food security systems, including storage and marketing facilities.
4. Dissemination of information to relevant stakeholders.

Working Group: 2 Sustainable Land Use Practices for Combating Desertification

Headed by: Head, Natural Resource Management (NRM) Division, ICAR, New Delhi.

Member Organisations:

- Ministry of Agriculture:
    - Department of Animal Husbandry.
    - Department of Agriculture & Cooperation (Plant Protection Directorate, Division for Division for Natural Disaster Management).
- Ministry of Environment & Forests (NAEB).
- Ministry of Water Resources.
- Ministry of Rural Development - Department Land Resources.
- Ministry of Non-Conventional Energy Sources.
- State Departments of Agriculture, Forest, Health and Rural Development of the States of Rajasthan and Gujarat..
- Central Ground Water Board (CGWB), New Delhi.

- Central Arid Zone Research Institute, Jodhpur.
- National Research Centre for Agroforestry (NRCAF), Jhansi.
- Central Soil & Water Conservation Research &Training Institute (CSWCR&TI), Dehra Dun.
- Indian Grassland & Fodder Research Institute (IGFRI), Jhansi.
- Arid Forest Research Institute (AFRI), Jodhpur.
- Agha Khan Rural Support Programme (AKRSP) Ahmedabad (NGO).
- PRADAN (NGO).
- Planning Commission, New Delhi.
- Dasholi Gram Swarajya Mandal, Chamoli (Member - RIOD, India).
- Central Research Institute for Dryland Agriculture (CRIDA) (Member-Secretary).

Terms of Reference:

1. Strategies for combating desertification through sustainable landuse agricultural practices. Strategies and programmes for arable land management, and soil conservation in the short-term (5 years.), medium (10 years) and long-term (25 years), giving particular attention to the implementation of preventive measures for land that are not degraded or are only slightly degraded.
2. Augmentation of fodder and fuel for the next 15-20 years.
3. Management of rangelands and pasturelands including livestock.
4. Research and Development - technology development and application in the above-mentioned areas, application of traditional knowledge to cope with different socio-economic, ecological and geo-physical conditions. Effective networking between R&D and its applications in the relevant sectors.
5. Application of alternate sources of energy.
6. Incorporate strategies for effective participation of local communities, particularly women.
7. Dissemination of information to all relevant stakeholders in the different dryland regions of the country through RIOD, ENVIS and SDNP.

Working Group: 3 Local Area Development Programmes (LADPs)

Headed by: Joint Secretary, Ministry of Rural Development.

Member Organisations:

- Ministry of Health (Department of Family Welfare).
- Ministry of Water Resources.
- Ministry of Social Justice.
- Ministry of Agriculture & Cooperation (Division dealing with watershed management).
- Ministry of Environment & Forests (NAEB).
- Department of Education.
- Department of Sports & Youth Affairs.
- Rajiv Gandhi Drinking Water Mission.
- Planning Commission.
- Council for Advancement for People's Action & Rural Technology, (CAPART), New Delhi.
- National Bank for Agricultural & Rural Development (NABARD).
- Tarun Bharat Sangh (NGO).
- Dasholi Gram Swarajya Mandal, Chamoli (Member - RIOD, India).
- Departments of Rural Development, Women & Child Development,, Forests and
- Agriculture in the States of Andhra Pradesh, Karnataka, Haryana & Gujarat
- Dept of Women & Child Development (Member-Secretary)

Terms of reference:

1. Local Area Development Programmes such as integrated micro-watershed development and management, programmes on community development including health, literacy and people's participation including women's participation and development.
2. Capacity building and strengthening the roles of various stakeholders. Identify programmes, schemes that can be taken up, for strengthening LADP in the dryland regions of the country.
3. Income generation schemes for poverty eradication.
4. Revival of traditional methods of water harvesting.

5. Dissemination of information through effective networking on all elements with all stakeholders.

Working Group: 4 Policy and Institutional Framework

Headed by: Joint Secretary, Ministry of Environment & Forests.

Member organisations:

- Ministry of Rural Development.
- Ministry of Agriculture & Cooperation (Departments of Agriculture & Cooperation, Agriculture Research and Education and Animal Husbandry).
- Ministry of Water Resources.
- Ministry of Social Justice.
- Ministry of Human Resource Development.
- Ministry of Women & Child Development.
- Ministry of Non-Conventional Energy Sources.
- Planning Commission, New Delhi.
- NABARD.
- UNDP.
- RIOD.
- National Institute for Rural Development (NIRD), Hyderabad.
- Central Arid Zone Research institute, Jodhpur.
- State Governments of Rajasthan, Gujarat, Maharashtra, Karnataka, Madhya Pradesh and Andhra Pradesh, Haryana (dealing with watershed development in drylands, poverty alleviation, land regeneration).
- NAEB (Member-Secretary).

Terms of Reference:

1. Compilation of existing plan programmes and schemes, under implementation at the center and the States on various areas relating to environmental conservation, local area development, agricultural production, community development, etc. Identifying their impact in improving the standard of the local communities.
2. Constraints faced in implementation of programmes, understanding the gaps in the institutional framework, policy structure and legislation.
3. Financial assistance - Multilateral and Bilateral cooperation.

ANNEXURE IV

Major Programmes under Central/Centrally Sponsored Sectors under Implementation by Different Ministries

Ministry of Environment and Forests

* Integrated Afforestation and Eco-Development Scheme(IAEPS)	To promote afforestation and Projects development of degraded forests by adopting an integrated approach to the development of land and other related natural resources on watershed basis, through the micro-planning process
Area Oriented Fuelwood and Fodder Projects Scheme (AOFFPS)	To augment the production of fuelwood and fodder in 242 identified fuelwood districts in the country.
* Conservation and Development of Non-Timber Forest Produce (NTFP) including medicinal plants	Special focus on tribal population for whom NTFP is the main source of livelihood.
Grants-in Aid scheme	Promoting peoples' participation- funds provided to NGOs and Voluntary Agencies (VA) for afforestation and tree planting activities.
Eco-Task Forces	Afforestation, pasture development, soil and water conservation and other restorative work carried out by 4 eco-task forces in selected locations. These forces comprise ex-servicemen and serving JCOs and officers.
Association of Scheduled Tribes and rural Poor in Regeneration of Degraded Forest on Usufruct Sharing Basis	For rehabilitation of degraded forests in tribal dominant areas also aims at providing wage employment and usufructs to the tribal people.
Ministry of Rural Development: .	Implementation of programmes for rural development including wastelands development
* Desert Development Programme (DDP)	Restore degraded areas due to soil erosion, water and moisture stress with low productivity and inadequate vegetative cover.
* Drought Prone Area Programme .	To restore ecosystems of desert areas (227 blocks of 36 districts in 7 States) affected by extreme climatic conditions (temperature, poor rainfall, low humidity and high wing velocity) combined with recurrent drought. Implemented on a watershed basis with the involvement of the Panchayati Raj Institutions.
* Integrated Wastelands Development Project Scheme	Integrated wastelands development based on village/micro-watershed plans, with peoples' participation.
* Jawahar Rozgar Yojana	Executed by the Panchayati Raj Institutions as per the felt needs of the poor. There is no separate earmarking of funds for social forestry.
* Employment Assurance Scheme(EAS) .	Demand drive, with no fixed earmarking of funds for any district or block. 50% of EAS funds are utilised for watershed development

	only in DPAP and DDP blocks. No earmarking for forestry work
* Investment Promotional Scheme (IPS)	To facilitate/attract/channelise/mobile resources from financial institutions/ banks, corporate bodies including user industries and other entrepreneurs for development of wastelands belonging to individual farmers, community/ panchayat, institutions and government agencies.
* Support to NGOs/VAs (Grants-in-Aid)	For registered VAs to take up small programmes like plantation, soil and moisture conservation, etc.
Ministry of Agriculture	
* National Watershed Development Rainfed Areas	Project Aims at conservation of rainwater for holistic and for integrated development of potential watersheds and promotion of farming system approach, management of common property resources, augmenting family income and nutritional levels through household production systems.
* Integrated Watershed Development Project (Hills) .	Designed to address the integrated development of hilly areas especially of the ecologically degraded Shivalik, Karewas ranges in Haryana, HP, J&K and Punjab
* Integrated Watershed Development (Plains) Project	For minimising ecological degradation by promoting sustainable and replicable rainwater conservation measures and diversified production system.
* Soil Conservation in the Catchments of River Valley Projects	Aims at enhancing the productivity of degraded lands, improvement of land capability, prevention of soil erosion from the catchments/watersheds and ultimately increasing the lives of reservoirs, in priority watersheds.
* Soil Conservation in the Catchments of Flood Prone Rivers	Aims at reducing peak rate of runoff by increasing in-situ conservation of water and groundwater recharge by increasing the time of concentration resulting in reduction of flood hazards.
* Reclamation of Alkali soils .	Aims at improving physical conditions and productivity status of alkali soils for restoring optimum crop production