

Status of Desertification and Implementation of the United Nations Plan of Action to Combat Desertification

1 Report of the Executive Director

Contents:

[Executive Summary](#)

[Introduction](#)

PART I. World Status of Desertification

[A. Concept of Desertification](#)

[B. Past Assessments](#)

[\(I\) Assessment By UNICOD, 1977](#)

[\(II\) Assessment By UNEP, 1984](#)

[C. Present Status - Assessment 1991](#)

[\(I\) Definition of Dryland Area](#)

[\(II\) Global Status of Desertification](#)

[\(a\) Socio-economic aspects](#)

[\(b\) State of the land](#)

[\(III\) Local Assessments of Desertification Rate](#)

[\(IV\) Situation in Africa](#)

PART II. The United Nations Plan of Action to Combat Desertification

[A. Monitoring the PACD and its evaluation by the Governing Council of UNEP](#)

[B. Implementation of the PACD 1978-1991](#)

[\(I\) Introduction](#)

[\(II\) Role of the United Nations System and the International Community](#)

[\(III\) Role of Regional and Sub-Regional Co-operation](#)

[\(IV\) Actions at National Level](#)

[\(V\) Implementation of Specific Recommendations of the PACD](#)

[\(VI\) Conclusion](#)

PART III. Policy Guidelines and Course of Action for Combating Desertification

A. Policy Guidelines

[\(I\) Role and Place of Anti-Desertification Measures Within the Programmes for Socio-Economic Development and Protection of the Environment](#)

[\(II\) General Goal and Practical Targets](#)

[\(III\) Main Principles in Implementing the PACD](#)

B. Course of Action

[\(I\) Nationally](#)

[\(a\) Guiding Policies](#)

[\(b\) Practical Steps](#)

[\(II\) Regionally](#)

[\(III\) Internationally](#)

PART IV. Financing the Plan of Action to Combat Desertification

A. Desertification Costs

[\(I\) Cost of Damage](#)

[\(II\) Cost of Prevention, Correction and Rehabilitation](#)

B. Financing the PACD

[\(I\) Summary of Past Experience](#)

[\(II\) Mobilization of Resources](#)

Annex

Executive Summary

1. Desertification is land degradation in arid, semi-arid and dry sub-humid areas (drylands) resulting mainly from adverse human impact. It is a widespread but discrete in space process of land degradation throughout the drylands which is quite different from the phenomenon of observed cyclic oscillations of vegetation productivity at desert fringes ("desert expansion or contraction") as revealed by satellite data and related to climate fluctuations. At present desertification directly affects about 3.6 billion hectares-70% of the total drylands, or nearly one quarter of the total land area of the world, and about one sixth of the world's population. These figures exclude natural hyper-arid deserts.

2. At the same time, assessment of the current global status of desertification/land degradation has shown that accurate hard data, which would allow it to be stated with some preciseness to which degree and with what rate desertification is taking place in various parts of the world, are still lacking. This calls for further research and studies to define the magnitude of the problem in all regions and localities and the extent to which man is responsible for the process. The present gaps in knowledge do not, however, provide an excuse for delay in action. The existing data give enough justification to urgent and effective action to control ongoing land degradation in drylands.

3. At present desertification in the drylands manifests itself through:

- Over-exploitation and degradation of 3,333 million hectares or about 73% of the total area of rangelands which are of low potential for human and animal carrying capacity and a low population density but may be intrinsically resilient and might have considerable capacity to recuperate and regain their potential productivity if properly managed;
- Decline in fertility and soil structure leading gradually to soil loss in 216 million hectares of rainfed croplands or nearly 47% of their total area in the drylands, which constitute the most vulnerable and fragile marginal cultivable lands subjected to an increasing population pressure;
- Degradation of 43 million hectares of irrigated croplands amounting to nearly 30% of their total area in the drylands, which usually have the highest agricultural potential and the greatest population densities when well managed.

4. It is recognized that, while combating desertification is vital throughout the drylands within the above three major land use systems, prevention of degradation of lands, which are not affected or only slightly affected by desertification at present but prone to degradation if improperly managed, as well as application of corrective measures and sustaining the productivity of lands that are moderately affected is more economically viable and practically feasible than to rehabilitate severely or very severely degraded lands. Therefore, the prevention of degradation of lands that are not degraded or only slightly degraded and sustaining their productivity is considered as a first priority in combating desertification. The second priority is the application of corrective measures and sustaining the productivity of drylands which are moderately degraded at present. Rehabilitation of severely and very severely degraded drylands and their return to productive use is considered as a third priority action within the total anti- desertification campaign. At the same time, it is further recognized that actual establishment of the priorities should always be site-specific and

decided by the authorities concerned depending on the actual situation in the respective countries and localities.

5. In view of the above, in order to stop the advance of desertification in drylands, as a first-priority action at a global scale, it is recommended to undertake relevant preventive measures in:

- 102 million hectares of irrigated non-degraded or only slightly degraded irrigated croplands [70% of their total area in the drylands];
- 242 million hectares of non-degraded or only slightly degraded rainfed croplands [53% of their total area in the drylands];
- 1,233 million hectares of non-degraded or slightly degraded rangelands [27% of their total area in the drylands];

6. The second priority action will involve implementation of the corrective measures and sustaining the productivity in:

- 34 million hectares of moderately degraded irrigated croplands [23% of their total area in the drylands];
- 183 million hectares of moderately degraded rainfed croplands [40% of their total area in the drylands];
- 1,267 million hectares of moderately degraded rangelands [28% of their total area in the drylands].

7. The third priority action will include rehabilitation of:

- 9 million hectares of severely and very severely degraded irrigated croplands;
- 33 million hectares of severely and very severely degraded rainfed croplands (reclamation of only 70% of these lands might be economically viable due to climate and soil limitations);
- 2,066 million hectares of severely and very severely degraded rangelands (reclamation of only 50% of these lands might be economically viable due to climate and soil limitations).

8. The above considerations determine the main priorities in the implementation of the Plan of Action to Combat Desertification (PACD), although the actual priorities must be country-specific and may not be the same throughout the world. Furthermore, the dynamic overlap between major land-use systems must not be overlooked and, to counteract this, an integrated systems approach is emphasized in combating desertification and drylands development taking into account the interdependence of rural and urban societies and policies as well.

9. It is recognized that sustainable socio-economic development and protection of the environment are inseparable pre-requisites of human survival everywhere and in drylands in particular. Environmental protection programmes could succeed if conceived as integrated parts of programmes for socio-economic development. This means that the anti-desertification

campaign should be managed as an integral part of socio-economic development of the territories and societies of the drylands.

10. A distinction is made in implementing the PACD in industrialized countries which are able to cope with problem by themselves and developing countries which need substantial external assistance for its solution. In industrialized countries like Australia or USA, development is not dependent on drylands and the problem of desertification can be approached from an economic and technical point of view: how to stop land degradation and to optimize the economic return from drylands. In most developing countries, and in particular in the Sudano-Sahelian Belt of Africa, the natural resource base is the main resource upon which the development process must rely and the social systems interacting with dryland resources make the problem much more complex requiring a holistic approach based on dryland development. Accordingly, for the majority of countries affected by desertification, the PACD is in effect, a Plan of Action for Sustained Dryland Development.

11. In order to achieve the goal of reducing land degradation through dryland development, the strategy is based on identifying and implementing the following actions:

- Social, economic, cultural and political development with emphasis on solving problems of food, poverty, housing, employment, health, education, population pressures and demographic imbalance;
- Conservation of natural resources with emphasis on water, energy, soil, minerals, plant and animal resources in arid, semi-arid and dry sub-humid areas;
- Environmental control with special emphasis on protection against decline of soil fertility, soil loss, water, soil and air pollution as well as deforestation.

12. It is recognized that broad based public participation including all sections, both rural and urban, of the affected community including women, indigenous groups and representative NGOs, is most essential for implementing the PACD.

13. To fully implement the PACD, an increased international effort should include strengthening the capabilities of the countries affected, developing countries in particular, to address environmental/developmental issues through assistance in developing appropriate policies, pricing, legislation, institution building, improved natural resource management and accounting, the capacity to use environmental impact assessment and environmental cost-benefit analysis technologies, improved environmental data bases and environmental education and training, and popular participation in implementation, especially at local level.

14. On the basis of experience in implementing the PACD during 1978-1991, it could be stated that the PACD is dealing with a problem that cannot be solved once and for all. It is rather like dealing with a process that will generate new problems to be tackled once the more urgent ones have been dealt with. Therefore, it would be unrealistic to fix a date when the PACD would be fully implemented. However, certain time targets could be set forth, both nationally and internationally, for implementing major preventive, corrective and supporting measures to make the Plan fully operational.

15. The urgency of addressing the global problem of desertification is based on the fact that this process:

(a) socio-economically: constitutes the main cause and mechanism of global loss of productive land resources, causes economic instability and political unrest in areas affected, brings pressures on the economy and the stability of societies outside the affected areas, prevents achievements of sustainable development in affected areas and countries;

(b) environmentally: contributes to loss of global biodiversity, loss of the biomass and bioproductivity of the planet, and global climate change.

16. To achieve the general goal of the PACD, the following set of main environmental/developmental targets can be set for the year 2020:

(a) Preventing further deterioration of the world food security and sustaining productivity of land affected by, or prone to, desertification through the introduction of environmentally sound, socially acceptable and fair, and economically feasible land use systems based on social equity and appropriate technologies;

(b) Protection of non-degraded or slightly degraded lands prone to desertification and reclamation of degraded lands for productive use or their conservation for natural rehabilitation, as appropriate;

(c) Provision of adequate insurance against recurrent droughts and famine in the drylands;

(d) Improvement of the quality of life of the inhabitants of lands affected by desertification, including health, sanitation and family planning and achievement of the goal of satisfying basic human needs in the extensive areas of world drylands;

(e) Prevention of adverse desertification impact on global climate change and biodiversity including germplasm materials for many crop and fodder plants.

17. For the same period, the following targets for supporting measures are envisaged:

(a) Incorporation of national actions to combat desertification into broader national development policies, plans or programmes;

(b) Mobilization of national, regional and international resources needed for the full implementation of the PACD;

(c) Mobilization and strengthening of national, regional and international institutional capabilities for implementing the Plan;

(d) Introduction of new land use economic and social policies conducive to sustainable development of land and water resources and improvement of land use;

(e) Making land users the main actors in designing and implementing the Plan and ensuring full public participation in anti-desertification campaign;

(f) Development of indigenous national and ecoregional scientific research and technology capabilities;

- (g) Co-ordination of current and new national, regional and international sectoral programmes within broader environment/development programmes;
- (h) Establishment of a global network of national, regional and international institutional and technical facilities for current operational assessment and continuous monitoring of desertification;
- (i) Strengthening of regional programmes and international co-operation in the campaign against desertification;
- (j) Provision of free flow of technology on favorable terms to areas affected by, or prone to, desertification;
- (k) Improvement of infrastructure in the areas affected by, or prone to, desertification.

18. The following set of practical measures, at national level, to achieve the above targets is recommended:

Preventive, Corrective and Rehabilitation Measures

Recommendation 1: To introduce improved land use systems:

Step 1 - to introduce an integrated approach in the utilization of every piece of land in accordance with its ecological characteristics;

Step 2 - to introduce improved land/water/crop management systems in existing irrigated croplands;

Step 3 - to stabilize rainfed croplands and to introduce improved soil/crop management systems into this land use practice;

Step 4 - to introduce improved rangeland/husbandry management systems based on innovative or adapted indigenous technologies;

Step 5 - to undertake major afforestation/reforestation campaigns;

Step 6 - to undertake, whenever appropriate, major campaigns on stabilization of shifting sands.

Recommendation 2: To develop and introduce appropriate, improved and advanced, socially and environmentally acceptable and economically feasible agricultural and pastoral technologies.

Recommendation 3: To establish adequate communication infrastructure and sufficient processing and marketing facilities.

Recommendation 4: To develop appropriately available water resources and to introduce improved water management systems.

Recommendation 5: To reclaim for productive use or to protect effectively for natural rehabilitation, as appropriate, strongly desertified lands.

Supporting Measures

Recommendation 6: To establish or to strengthen, as appropriate, the national institutional capabilities for implementing the PACD.

Recommendation 7: To launch nationally a major sustained anti-desertification awareness/training campaign.

Recommendation 8: To introduce a "loop model" in the existing or newly established extension service.

Recommendation 9: To finalize the operative large-scale local and national assessment of the current status of desertification.

Recommendation 10: To develop, adopt through appropriate national legislation and introduce institutionally new national environmentally sound and development oriented land use policy.

Recommendation 11: To develop and introduce effective national insurance schemes against recurrent drought and famine./

19. Countries affected by, or prone to, desertification might wish to set their own priorities in implementing their NPACDs. However, it seems logic that a first practical step would be to implement Recommendations 6 and 7 above, within 3-5 years. Recommendations 8, 9, 10 and 11 may take a longer time probably up to the year 2000. Implementation of Recommendations 1 and 2 could start simultaneously on a trial basis. The Plan can thus become fully operational throughout affected areas by around the year 2000. Full scale reconstruction will take longer time probably through the year 2010 by which time Recommendations 1 and 2 could be fully implemented. The stabilization period will take still a longer period probably up to year 2020 by which time Recommendations 3, 4 and 5 would have been implemented.

20. A programme for the implementation of a world-wide direct action to combat desertification may be based on one of the following three options:

i) Implement programmes of direct preventive measures in productive drylands that are not desertified or only slightly desertified (about 30% of productive drylands). Total cost estimate is US \$ 1.4-4.2 billion per year. This, however, will not save territories that are moderately desertified from further deterioration;

ii) Implement the above programme plus programme of direct corrective measures in productive drylands that are moderately desertified (areas with 10-25% loss of productivity in croplands and 25-50% in rangelands); total cost estimate is US \$ 3.8-11.4 billion per year;

iii) Implement a comprehensive programme of direct measures to combat desertification in all productive drylands (preventive-corrective-rehabilitation); total cost estimate is US \$ 10.0-22.4 billion per year.

The above options could be considered as the sort of action priorities that could be adopted both globally and nationally. They could be modified as appropriate within the areas concerned.

21. Sub-regional co-operation on the basis of an eco-geographical concept is advocated using existing structures and promoting co-operation between industrialized and developing countries within the regions.

22. At international level, co-operation is recommended to be strengthened in the following areas: (a) mobilization of financial resources and provision of financial assistance to countries which cannot cope with the problem by themselves; (b) development of appropriate pricing and trade policies; (c) provision of technical assistance to countries in need; (d) development of appropriate anti-desertification technologies and technology transfer to needy countries on favorable terms; (e) monitoring and co-ordination of the anti-desertification campaign at a global level; (f) information exchange; (g) international legislation.

23. It is estimated that current global direct on-site financial loss [income foregone] due to desertification amounts to about US \$ 42 billion annually. Indirect off-site and social cost of desertification damage might be 2-3 or even up to 10 times higher.

24. The cost of meeting the minimum objectives of stopping the spread of desertification, that is the cost of urgent direct preventive measures in non-affected but vulnerable or only slightly affected irrigated lands (70% of their total area), rainfed croplands (53% of their total area), and rangelands (27% of their total area), amounts to about US \$ 1.4-4.2 billion a year for a 20-Year programme. This should be complemented by the cost of direct corrective measures in moderately affected irrigated lands (23% of their total area) rainfed croplands (40% of their total area) and rangelands (28% of their total area) amounting to nearly US \$ 2.4-7.2 billion a year for the same 20-Year programme. Out of this total sum of US \$ 3.8-11.4 billion a year, US \$ 2.2-6.6 billion a year are needed for financing the actions in 81 developing countries affected by desertification which cannot cope with the problem; half of this sum could, at best, be raised by the countries themselves, while the other half, or US \$ 1.1-3.3 billion should come through external assistance.

25. The above indicative figures represent only the cost of direct preventive and corrective measures for protection and sustaining of productive drylands. The total cost of combating desertification, including the cost of full implementation of all recommendations of the PACD, might be several times higher.

26. Past experience showed that the amount of funds spent by the world community during 1978-1991 [approximately US \$ 0.5-0.85 billion a year] on direct or supporting actions to combat desertification was far below the amount needed for the implementation of the PACD and for achieving substantial results. Financial assistance to developing countries which are most seriously struck by desertification and have no resources to cope with the problem, was particularly very inadequate. Likewise, existing mechanisms for mobilization of the resources and financing the PACD [DESCON, Special Account] appeared to be inadequate.

27. Financial assistance to developing countries struggling against desertification should be additional, that is over and above regular budgets and conventional extra budgetary resources; it must be predictable, sustainable, and with a degree of automaticity. Net additional financing and technical assistance to developing countries for combating desertification should be provided by the donor community and international institutions, through appropriate new or existing international and regional mechanisms to manage the process of mobilizing and allocating financial and technical resources, on terms which will not further exacerbate debt and trade problems of recipient countries but rather enhance their development process.

Introduction

1. More than 6.1 billion hectares, nearly 40 per cent of the Earth's land area, is dryland. Out of this, about 0.9 billion hectares are hyper-arid deserts. The remaining 5.2 billion hectares are arid, semi-arid and dry sub-humid lands, part of which have become desert degraded by man. These lands are the habitat and the source of livelihood for about one fifth of the world's population.

2. It is estimated that about 3.6 billion hectares, or 70% out of 5.2 billion hectares of potentially productive drylands, are presently threatened by various forms of land degradation or, as it is called, desertification, directly affecting the well-being and future of one sixth of the world's population. Recurrent drought is a persistent natural menace in these areas which is accentuated by unbalanced management of natural resources. It was the Sahelian drought of 1968-1973 and its tragic effects on the peoples of the region that drew world-wide attention to the chronic problems of human survival and development in drylands, particularly on the desert margins.

3. The United Nations General Assembly in Resolution 3202 (s-vi) of 1 May 1974 recommended that the international community undertakes concrete and speedy measures to arrest desertification and assist the economic development of affected areas. The Economic and Social Council's Resolution 1878 (LVII) of 16 July 1974 requested all the concerned organizations of the United Nations system to pursue a broad attack on the drought problem. Decisions of the Governing Councils of the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP) emphasized the need to undertake measures to check the spread of desert conditions. The General Assembly then decided, by Resolution 3337 (xxix) of 17 December 1974, to initiate concerted international action to combat desertification and, in order to provide an impetus to this action, to convene a United Nations Conference on Desertification, between 29 August and 9 September 1977 in Nairobi, Kenya, which would produce an effective, comprehensive and co-ordinated programme for solving the problem.

4. The United Nations Conference on Desertification (UNCOD) was preceded by extensive global, regional and local studies and consultations involving numerous scientists, decision and policy makers and relevant institutions all over the world.

5. On the basis of carefully collected and analyzed available data, the Conference noted the progressive diminution of biological productivity and decline of human living conditions in many arid regions of the world. This process was evidently due primarily to inappropriate land use, although accentuated by recurrent droughts. It was also evident that it threatens the well-being and socio-economic development of peoples in large areas of the world, particularly in developing countries of Africa, Central, South and South-West Asia as well as Latin America, while at the same time occurring in Australia, North America and in certain parts of Europe. The problem was identified as global in its magnitude.

6. This largely human-induced process of environmental degradation and related socio-economic decline in many drylands was considered as desertification.

7. UNCOD concluded that desertification was of global magnitude and affected adversely large areas and populations in all continents, and adopted the Plan of Action to Combat Desertification (PACD), which was endorsed by the UN General Assembly that same year as one of the major world programmes.

8. The Governing Council and the Executive Director of the United Nations Environment Programme were entrusted with the task of following-up and co-ordinating the implementation of the PACD and assisting Governments in their efforts to implement the PACD at national level. The Inter-Agency Working Group on Desertification (IAWGD) was established within the United Nations in order to assist UNEP in performing its duties. The Consultative Group for Desertification Control (DESCON), to assist in mobilizing resources, and a Special Account to finance the implementation of the PACD were created (the latter was closed in 1990 by GA Resolution 44/172A, para. 8). To assist the Governments of the Sudano-Sahelian region of Africa in the implementation of the PACD, a joint venture between UNEP and UNDP was created as part of the activities of the United Nations Sudano-Sahelian Office (UNSO). The major role in implementing the PACD was vested with Governments of countries affected by desertification.

9. Unfortunately, since UNCOD, progress has been modest in implementing the PACD between 1978 and 1991. It was repeatedly stated by UNEP, particularly after extensive assessments of the situation in 1984, 1987 and 1989, that desertification continued to spread. It has become one of the most serious environmental and socio-economic problems of the world, as was also stressed in the report of the United Nations Commission on Environment and Development (Our Common Future, 1988). Deep and extreme drought recurring in 1981-1984 and 1990-1991 contributed to the worsening of the situation.

10. The principal causes of failure to implement the PACD in full were considered at several global and regional international fora with the conclusion that:

- a) priority was not given to the programmes for combating desertification by implementing and funding agencies, both nationally and internationally, with the result that not enough funds were made available for the implementation of the PACD;
- b) developing countries affected by desertification were unable to cope with the problem without major external financial and technical assistance, but the needed assistance was not forthcoming;
- c) desertification control programmes were not fully integrated in programmes of socio-economic development and were considered as measures to amend environmental damage only;
- d) affected populations were not fully involved in the planning and implementation of programmes for combating desertification;
- e) technical means were often sought to solve the problem, while the solutions rested in the socio-political and socio-economic mechanisms.

11. Considering the global problems in the area of environment and development to be included in the agenda of the United Nations Conference on Environment and Development (UNCED), which will be convened in June 1992 in Brazil, the UN General Assembly, by its Resolution 44/214 of December 1989, included the problem of combating desertification "among those of major concern in maintaining the quality of the Earth's environment and especially in achieving environmentally sound and sustainable development in all countries". By the same resolution, it was further decided that UNCED should "accord high priority to drought and desertification control and consider all means necessary, including financial,

scientific and technological resources, to halt and reverse the process of desertification with a view to preserving the ecological balance of the planet".

12. By General Assembly's Resolution 44/172 of December 1989, the Governing Council and the Executive Director of UNEP were invited to "contribute substantially to the discussion on desertification at the conference, inter alia, by undertaking a general evaluation, sufficiently in advance, of progress achieved in implementing the Plan of Action to Combat Desertification". The present report was prepared in response to this invitation as well as to other provisions of the same resolution.

13. In view of the particular severity of the problems in the Sudano-Sahelian region a more detailed report on the situation of desertification and drought in the Sudano-Sahelian countries has been prepared and will be made available by UNSO as a background report.

14. The first draft of this report was prepared in March 1991. Its first part concerning the assessment of the global status of desertification was discussed with experts during inter-agency consultations held at FAO, Rome, at the beginning of April 1991. By the end of the same month, a meeting of high-level UNEP consultants was convened in Geneva to discuss the first full draft of the report. Their comments and suggestions for its improvement were incorporated into the second draft for review by a bigger audience. The costing of anti-desertification measures was extensively discussed by UNEP experts with relevant specialists at FAO and IFAD in June 1991 during a specially organized mission.

15. The financial aspects of the second draft were discussed in July 1991 at the High- Level Meeting of Specialists in World Financing, after which a new third draft was prepared incorporating their comments.

16. The third draft of August 1991 was sent in advance to the members of IAWGD and DESCON for their review and comments as well as to a number of senior consultants. The meetings of IAWGD and DESCON-8 and that of UNEP's senior consultants were held in succession in Geneva on 9-10, 11-12 and 13 September 1991, respectively. The comments and suggestions obtained at these three meetings were incorporated into the fourth draft, which after final in-house revision and clearance by the Executive Director appears as the present report.

UNCED Part 1

2 World Status of Desertification

3 A. CONCEPT OF DESERTIFICATION

1. The concept of desertification was defined by UNCOD in 1977 as follows:

"Desertification is the diminution or destruction of the biological potential of land, and can lead ultimately to desert-like conditions. It is an aspect of the widespread deterioration of ecosystems, and has diminished or destroyed the biological potential, i.e. plant and animal production, for multiple use purposes at a time when increased productivity is needed to support growing populations in quest of development."

2. This definition was found inadequate and not sufficiently operational when attempts started in different parts of the world to implement various practical recommendations of the PACD and to undertake the quantitative assessment of desertification. A series of definitions was developed by individual scientists, scientific institutions and implementing agencies. A more precise new definition was required, particularly in view of the need to distinguish between desertification and another phenomenon of observed cyclic oscillations of vegetation productivity at desert fringes (desert expansion or contraction) as revealed by satellite data and related to climate fluctuations.

3. Based on special studies and extensive discussions at the Ad-Hoc Consultative Meeting on the Assessment of Desertification, which was convened by UNEP in Nairobi in February 1990, the following definition of desertification was adopted:

"Desertification/Land Degradation, in the context of assessment, is Land Degradation in Arid, Semi-arid and Dry Sub-humid Areas resulting from adverse human impact.

Land in this concept includes soil and local water resources, land surface and vegetation or crops.

Degradation implies reduction of resource potential by one or a combination of processes acting on the land. These processes include water erosion, wind erosion and sedimentation by those agents, long term reduction in the amount or diversity of natural vegetation, where relevant, and salinization and sodication."

4. The last definition was used by UNEP for the quantitative assessment of the status of desertification which was conducted during 1990-1991. The important point is not the exact wording of the definition of desertification but an agreement on a more operationally suitable tool for assessing and combating the problem. This definition sets desertification within the broad frame of global land degradation.

5. The Panel of Senior Consultants, convened by UNEP in Geneva from 25 to 27 April 1991, to discuss the first draft of a revised PACD, considered the desertification concept as well. It was pointed out that the new document should more clearly spell out the likely impacts of natural climatic conditions, particularly of recurrent droughts, on desertification; it would be necessary to note that in certain instances desertification might not only be human-induced but climate-induced as well.

6. The Governing Council of UNEP, at its 16th session in May 1991, also considered this question. By its decision 16/22, it underlined the need for further refinement of the definition of the concept of desertification, taking into account recent findings about the influence of climate fluctuations and about the resilience of soils.

7. As a follow-up to the above considerations and taking into account the results of additional studies and consultation undertaken by UNEP, the following definition was finally adopted for the present assessment of the status of desertification and preparations for UNCED:

"Desertification is land degradation in arid, semi-arid and dry sub-humid areas resulting mainly from adverse human impact."

8. Further refinement of the concept and the definition of desertification taking into account possible influence of climate fluctuations and soil resilience, as indicated by the Governing Council of UNEP, may be undertaken in future on the basis of new knowledge acquired in the course of detailed area-specific studies and assessments. However, the present gaps in knowledge do not provide an excuse for delaying the implementation of the PACD as the existing data give overwhelming justification for a need to act urgently and effectively to control the ongoing land degradation in areas affected.

9. The urgency to address the problem of desertification by co-ordinated international action is accentuated by the facts that:

- the time for action is running short as desertification expands threatening new areas and new societies, while anti-desertification measures tend to be long-term and time demanding;
- the cost of anti-desertification measures escalates from year to year because (a) the area affected is growing (b) the degree of the damage is growing, and (c) world prices and costs of rehabilitative measures are growing;
- off-site (and social) costs of desertification will continue to increase as degradation adversely affects land, water and air resources;
- other environmental and economic problems are increasing, tending to distract the attention of society to other urgent needs;
- if the process of desertification is not arrested in the near future, world shortage of food will increase dramatically within a few decades.

10. Whether the process of desertification or its end result is considered, the most obvious symptoms relate to:

- reduction of yield or crop failure in irrigated or rainfed farmland;
- reduction of perennial plant cover and biomass produced by rangeland and consequent depletion of food available to livestock;
- reduction of available woody biomass and consequent extension of distance to sources of fuelwood or building material;

- reduction of available water due to a decrease of river flow or groundwater resources;
- encroachment of sand that may overwhelm productive land, settlements or infrastructures;
- increased flooding, sedimentation of water bodies, water and air pollution;
- societal disruption due to deterioration of life-support systems, societal need for outside help (relief aid) or for seeking haven elsewhere (environmental refugees).

11. The causes of these various forms of ecological degradation and corresponding socio-economic disruption relate to a combination of (a) human exploitation that oversteps the natural carrying capacity of the land resource system and sometimes increased negligence and abandonment of land due to the out-migration of people, (b) inherent ecological fragility of the resource system, and (c) adverse climatic conditions, in particular, severe recurrent droughts. The high degree of land degradation plays a large part in increasing the susceptibility of farming systems to the shocks of drought, as was so clearly seen in the Sudano-Sahelian region of Africa during the last three decades. Land resource exploitation acts through land-use operations, among which are : irrigated farming, rainfed agriculture and pastoralism, with a certain contribution from wood cutting, extraction of mineral resources, excessive tourism and hunting game animals, etc. Excessive human pressures on natural resource systems relate to : (1) increase of population and escalation of human needs; (2) socio-political processes that bring pressures on rural communities for orienting their production towards national and international markets; (3) socio-economic processes that reduce the market value of rural products and escalate the prices of basic needs of rural people; (4) processes of national development, especially programmes for expansion of farmlands for production of cash crops, that exacerbate conflicts of land and water use and often reduce areas available to marginalized communities. An overriding socio-economic issue in desertification is the imbalance of power and access to strategic resources between different groups in the society.

12. Desertification is a very distinctive global environmental and socio-economic problem requiring special attention. This process is singled out under the specific term of desertification and distinguished from similar phenomena in other more humid areas of the world because it proceeds under harsh climatic conditions and acts adversely on areas with limited natural resources, i.e. soil, water and vegetation. Naturally, there are extents and degrees, but the end result of degraded and abandoned land is a question of time only, if the process is not arrested.

13. The urgency to address this problem is connected with the fact that desertification:

Socio-economically:

- constitutes the main cause and mechanism of global loss of productive land resources and thus reduces the world capability of providing sufficient food and shelter to growing populations, contributing to the spread of poverty and hunger;
- causes economic instability and political unrest in areas affected, struggle for scarce land and water resources, outward migration in seek of relief and refuge;

- brings pressures on the economy and stability of societies outside areas affected by desertification through escalating need for food aid, growth of environmental refugees, etc.;
- prevents achievement of sustainable development in countries and regions affected and through them, the world as a whole;
- directly threatens health and nutrition status of populations menaced, particularly children.

Environmentally:

- is one element of planetary environment degradation that contributes to climate change, water, air and soil pollution, deforestation, soil loss, etc.;
- contributes to loss of global biodiversity, particularly in the areas which are the centres of origin of major crop species of the world, e.g. wheat, barley, sorghum, maize, etc.;
- contributes to loss of biomass and bioproductivity of the planet and to the exhaustion of global humus reserve, thus disrupting normal global biogeo-chemical turnover and reducing the global carbon dioxide sink in particular;
- contributes to global climate change by increasing land surface albedo, increasing potential, and decreasing actual evapotranspiration rate, changing the ground surface energy budget and adjoining air temperature, and adding dust and CO₂ into the atmosphere.

14. Desertification is always a site-specific problem that occurs locally within state boundaries and affects local societies of sovereign states. Therefore, it can only be solved by the peoples themselves. Governments and peoples of localities and countries affected are the primary actors of the anti-desertification campaign. At the same time, as a global problem, desertification needs to be addressed by internationally co-ordinated efforts because:

- it is a problem of global magnitude with major environmental and socio-economic consequences;
- the problem is complex and requires a holistic integrated approach including social, economic, political and technical measures which can only be provided by concerted and co-ordinated efforts of the world community;
- countries most seriously affected by desertification usually are developing countries including least developed ones, which do not have the means of coping with a problem of such magnitude;
- the problem of desertification, most seriously and directly, affects rural areas and populations engaged in various agricultural activities; however, world-wide agriculture needs substantial subsidies to survive and to feed the world; without additional support it would be virtually impossible to cope with the requirements of combating desertification and the related activities of reclaiming drylands.

4 B. PAST ASSESSMENTS

(I) ASSESSMENT BY UNCOD, 1977

15. The following key indicative figures, based on various studies conducted in different parts of the world by individuals, scientific institutions and relevant agencies, both within and outside the United Nations system, were provided to UNCOD:

- According to *soil/vegetation data*, world drylands constitute 6.45 billion hectares or 43 percent of global land. According to *climatic data*, world drylands constitutes 5.55 billion hectares or 37 percent of global land.
- Area threatened at least moderately by desertification within the drylands 3.97 billion hectares or 75.1 per cent of the total drylands, excluding hyper-arid deserts
- Countries affected by desertification > 100
- Inhabitants of the world drylands > 15% of the worlds population
- Population in areas recently undergoing severe desertification 78.5 million
- Annual rate of land degradation (in arid and semi arid areas only) in million hectares:

Irrigated lands	0.125
Rainfed croplands	2.500
Rangelands	3.200
TOTAL	5.825

- Annual loss of productive capacity (income foregone) US\$ 26 billion
- Annual cost of land reclamation measures US\$ 388 million
- Annual benefit of land reclamation measures US\$ 895 million
- A twenty-year worldwide programme to arrest further desertification requires about US\$ 4.5 billion a year or US\$ 90 billion in total, of which developing countries in need of financial assistance would require US\$ 2.4 billion a year or US\$ 48 billion for twenty years.

16. Calculations on the basis of maps produced by FAO, UNESCO and WMO for the conference showed the following areas of dryland in the world in million hectares: [Table](#)

17. Territories affected by desertification hazard were assessed by UNCOD as follows:

RISK	ARID	SEMI-ARID	SUB-HUMID	WORLD TOTAL
	*	**	*	**
	*	**	*	**

Very severe	110	6.7	220	11.5	20	5.0	350	8.8
Severe	1340	80.7	440	23.1	60	15.0	1840	46.4
Moderate	210	12.6	1250	65.4	320	80.0	1780	44.8
World Total	1660	100.0	1910	100.0	400	100.0	3970	100.0

* million hectares

** % of the affected area

(II) ASSESSMENT BY UNEP, 1984

18. The general assessment of the status and trend of desertification was undertaken by UNEP in accordance with UNEP's Governing Council decision 9/22A of 26 May 1981. The summarized results of the assessment were presented in the Executive Directors Report UNEP GC.12/9 of 16 February 1984 and were considered by the Governing Council at its 12th Session. The main findings arising from the assessment showed that:

- the scale and urgency of the problem of desertification as presented to UNCOD and addressed by the PACD were confirmed;
- desertification has continued to spread and intensify despite efforts undertaken since 1977, and the efforts were too modest to be effective;
- land degraded to desert-like conditions continued at 6 million hectares annually, and land reduced to zero or negative net economic productivity was showing an increase (from 20 to 21 million hectares annually);
- areas affected by at least moderate desertification were: 3,100 million hectares of rangelands, 335 million hectares of rainfed croplands, and 40 million hectares of irrigated lands, thus totalling up to 3,475 million hectares;
- rural populations in areas severely affected by desertification numbered 135 million;
- projections to the year 2000 indicated that desertification in rangelands would continue to increase at existing rates; in rainfed croplands it would accelerate into a critical situation; in irrigated lands, the status of desertification would likely remain largely as it was, with gains balancing losses and with possible local improvements;
- the cost of losses due to desertification was estimated as five times the cost of halting desertification.

19. Areas within arid, semi-arid and sub-humid zones of the world's drylands were estimated as follows:

AFFECTED BY	NOT AFFECTED BY	TOTAL
-------------	-----------------	-------

	DESERTIFICATION		DESERTIFICATION		DESERTIFICATION	
	million hectares	%*	million hectares	%*	million hectares	%*
Rangelands**	3100	80	600	20	3700	100
Rainfed croplands	335	60	235	40	570	100
Irrigated lands	40	30	91	70	131	100
Total	3475	70	926	30	4409	100

* % of their total areas in drylands

** The term rangelands, for purposes of desertification assessment, includes all territories presently used as grazing lands, which are accounted for in yearly FAOs statistics, as well as other non-agricultural, largely unoccupied, drylands which are used only occasionally by nomadic pastoralists or are presently unused at all.

5 C. PRESENT STATUS - ASSESSMENT 1991

20. A new assessment of the world status of desertification was undertaken by UNEP in 1990-1991 in accordance with the provisions of UN General Assemblys Resolution 44/172 of December 1989.

6 (I) DEFINITION OF DRYLAND AREA

21. For purposes of the present assessment a new working definition of desertification was adopted in February 1990 (see para. 3 above). Following this definition, a world map of drylands was prepared by GEMS/GRID of UNEP in 1991, on the basis of climatic data sets supplied by the University of East Anglia for the period of 1951-1980. Aridity zones were defined in accordance with their physical parameters using the following precipitation over potential evapotranspiration (calculated by adapted Thornthwaite formula as opposed to the Penman formula used in 1977) ratios:

Hyper-arid	0.05
Arid	0.05-0.20
Semi-arid	0.21-0.50
Dry sub-humid	0.51-0.65
Moist sub-humid & Humid	0.65

For the region boundaries the conventions used in the Times Atlas of the World, 1985 were followed.

WORLD DRYLANDS

22. According to these new data, the following is the area of world drylands in million hectares:

	Africa	Asia	Australia	Europe	North America	South America	World Total	%
Hyper-arid	672	277	0	0	3	26	978	16
Arid	504	626	303	11	82	45	1571}	
Semi-arid	514	693	309	105	419	265	2305} 5172	84
Dry Sub-humid	269	353	51	184	232	207	1296}	
Total	1959	1949	663	300	736	543	6150	100
%	32	32	11	5	12	8	100	

23. The estimates of the total area of the world drylands made in 1977, 1984 and 1991 were obtained using slightly different methodologies and different climatic data sets. Therefore, they should not be compared as a time-sequence. The latest (1991) data sets are regarded as more precise being based on time-dependent climatic data selected with most rigorous criteria. A remarkable coincidence of estimates of total drylands of the world in 1977 and 1991 should be noted, while the differences between the continental figures are sometimes significant. Thus, all figures given above and below should be regarded as indicative only, with a degree of accuracy of + 10%.

24. It follows from the above that accurate measurement of changes in areas of lands affected by desertification during 1977-1991 at global or continental scales is not attainable as the observed changes will fall within the range of standard error. However, estimations of changes and trends are possible for areas where more precise data are available as a result of recent detailed assessments at national or local level.

7 (II) GLOBAL STATUS OF DESERTIFICATION

8 (a) Socio-economic aspects

25. During the whole period under consideration, from 1978 to 1991, and even earlier during recent decades, while people were the main agents of desertification, they were also its victims. Throughout the world drylands in developing countries, desertification has been one of the main factors in the migration of subsistence farmers and pastoralists to the slums and shanty towns of major cities looking for better opportunities, producing desperate populations vulnerable to disease and natural disasters and prone to participate in crime and civil strife. Such exodus from rural to urban areas has exacerbated the already dire urban problems in many developing countries affected by desertification. At the same time, it has delayed efforts to rehabilitate and develop dryland rural areas through lack of manpower and increased

negligence of land. The effects of land degradation in drylands were compounded by recurrent severe droughts.

26. The mass exodus from rural areas affected by desertification that has been taking place in Africa since the late 1970s is a vivid illustration of the plight of people facing such intolerable environmental conditions. At the peak of the crisis, in 1984 and 1985, an estimated 30-35 million people in 21 African countries were seriously affected by severe droughts, of which about 10 million were displaced and became known as environmental refugees. Death, disease, chronic malnutrition and disability haunt these millions of refugees because of continuing intolerable living conditions. In 1991 there were still some 30 million Africans who were threatened by famine and needed urgent external food aid in order to survive, e.g. Angola, Ethiopia, Mozambique, Somalia, The Sudan and several countries in West Sahel.

27. Recent developments further underlined the fact that desertification is the result of complex interactions between physical, chemical, biological, socio-economic and political issues, both of local, national and global nature. It was often overlooked that challenges to productivity and thus the physical, chemical and biological stability of land were closely linked to national and international economic policies. The socio-economic climate and thus the political framework of land tenure, taxation and trade barriers have been particularly disadvantageous for poor developing countries affected by, or prone to, desertification during the past decades. The burden placed on the individual land user in these countries can partly be traced to international policies and markets, but also have roots in transition in local usufruct rights and in domestic priorities, often favoring the urban consumer over the rural producer, and political and economic mismanagement in developing countries themselves. Development policies often lacked poverty abatement orientation, so that marginalized peoples often got little support in breaking the vicious circles that forced them to mismanage land. Women land users often failed to obtain credit and access to advisory services that could improve their land use practices.

28. Most developing countries affected by desertification today not only face high population growth rates (frequently 3.0-3.5% per annum) but also high rates of urbanization (8-10% per annum). Some countries in Latin America already have 3/4 of their population living in towns and cities, with Asia and Africa just above 1/3 and under 1/3, respectively. There are countries in Africa with more than half of the population urbanized, e.g. Zambia 52%, Djibouti 81%. The growing number of urban dwellers requires food. There is therefore a steady stream of soil nutrients (in the form of food, fuelwood and charcoal) moving from the productive countryside to the towns, to end up as useless, often polluting, sewage. This rapid transition from rural to urban societies has not been matched by equally rapid replenishment of soil nutrients, as was so characteristic of the older subsistence economies in developing countries or of modernized agriculture in developed ones.

29. Demand on production has increased the pressure on existing productive land and moved the limits of production onto increasingly marginal lands. There is a steady tendency of expansion of irrigation onto rainfed croplands while the latter is encroaching onto better rangelands forcing pastoralists to move further onto poorer and dryer desert areas of lower productivity. This process is accompanied by an ever increasing rate of soil degradation as marginal lands are much more susceptible to adverse processes like erosion and salinization. Increased use of the world's drylands for cropping and grazing means increased dependence on rainfed agriculture and rangelands, where rainfall not only is low but highly variable. A run of dry years, as experienced throughout the drylands in seventies and eighties, followed periods of favorable rainfall when cropping and high stocking rates become common in areas

previously little used. As desertification persisted, productivity fell but food demands grew with growing populations. Famine persisted. Although the drylands have shown remarkable resilience, returning more rapidly to productive states with subsequent wetter years than was expected by most experts, they remain vulnerable and will doubtlessly be subject to new droughts and famines.

30. Agricultural expansion to marginal lands often resulted in rapid land degradation, with subsequent decline in production. With marginal drylands, it is often hunger for land that causes agricultural encroachment by poor marginalized farmers, and it illustrates that unwise use of land is also a poverty issue. Unless adequate livelihoods can be created elsewhere, e.g. through further intensification of agriculture in fertile areas or the creation of off-farm employment, there is little political realism in trying to stop agricultural encroachment on marginal drylands and consequently, desertification.

31. The overall situation in areas affected by desertification, particularly in Africa, may be illustrated by a conclusion of the most recent study in The Sudan (K. Olsson and A. Rapp, 1991): The drought of 1982-1984 resulted in serious dryland degradation in Central Sudan (Kordofan). The period was characterized by greatly diminished rainfall, loss of vegetation, crop failures with zero harvest of cereals, soil erosion, famine, suffering and death of people and livestock, and human migration from the region. The northward movement of grassland that occurred following the culmination of the drought of 1982-1984 appears to represent a quite rapid recovery from drought-engendered dryland degradation. Recovery can be attributed, in part, to an increase in rainfall, but it is important to note that rainfall during the period 1985-1987 remained below the long-term average for the region. Thus it seems that an important contributor to the recovery has been the low level of exploitation during the period 1985-1986, owing to the large numbers of people and animals that had been wiped out during 1983-1984.

9 (b) State of the land

32. Two global data sets showing different aspects of dryland deterioration were obtained in the course of the present assessment.

The first data set was produced in ICASALS of Texas Tech University, USA, on the basis of available country statistics with reference to major land uses in drylands. It shows various forms of land degradation in drylands delineated in previous assessments with a correction for subdividing the sub-humid zone into two parts, dry and moist.

The second one relates to soil degradation within drylands of the world delineated by the GEMS/GRID aridity zones and is based on the World Map of the Status of Human Induced Soil Degradation (GLASOD) prepared by ISRIC/UNEP in 1990 at an average scale of 1:10,000,000. Due to scale limitations, this map shows the situation only by continents with no relation to major land-use systems.

The two data sets are different, although interrelated: they can be compared at a global and continental level but they should not be directly compared at a country level. The major difference between the global figures for degraded areas within the drylands can be attributed to extensive rangeland areas with significant vegetation degradation but no recorded soil degradation, which have been treated as non-degraded stable lands in the GLASOD assessment, e.g. all extensive areas of rangelands in Australia or the Aral-Caspian Basin of the

USSR. These rangeland areas are included in the figures of land degradation but not in the figures pertaining to soil degradation.

Reconciliation of these two data sets of global figures provides the following picture of the status of desertification in the world:

	Million hectares drylands	Percent of total
1. Degraded irrigated lands	43	0.8
2. Degraded rainfed croplands	216	4.1
3. Degraded rangelands [soil and vegetation degradation]	757	14.6
4. Drylands with human-induced soil degradation [GLASOD] [1 + 2 + 3]	016	19.5
5. Degraded rangelands [vegetation degradation without recorded soil degradation]	2576	50.0
6. Total degraded drylands [4 + 5]	3592	69.5
7. Non-degraded drylands	1580	30.5
8. Total area of drylands excluding hyper-arid deserts [6 + 7]	5172	100.0

The above breakdown of degraded areas indicates that some 2.6 billion hectares, mainly in rangelands, suffer from degradation process not recorded in the data compilation carried out in the framework of GLASOD, additionally some 1 billion hectares suffer from soil degradation as well, making a total area of drylands affected by degradation at present nearly 3.6 billion hectares or about 70% of total drylands.

33. The largest areas of degraded irrigated lands are situated in the drylands of Asia, followed by North America, Europe, Africa, South America and Australia in a descending order (see Figure 2). About 43 million hectares of irrigated lands or 30% of their total area in the worlds drylands [145 m.ha] are affected by various processes of degradation, mainly waterlogging, salinization and alkalinization (Table 1 in Annex). Apparently there is an increase of some 3 million hectares in comparison with the assessment in 1984, [about 7.5%], but this falls within the range of + 10% accuracy. It would be safer to assume that the situation did not change appreciably during this period and remained unsatisfactory with a tendency to getting worse.

10 **Figure 2. Situation in Irrigated Lands Within World Drylands**

Irrigated lands in drylands constitute nearly 62% of the total irrigated area of the world [240 m.ha]. It was established by soil scientists that the world is now losing, annually, about 1.5 million hectares of irrigated lands due to various processes of soil degradation, mostly

salinization and mainly in drylands. It would thus be safe to assume that about 1.0-1.3 million hectares of irrigated land are currently lost every year throughout the world drylands, being compensated for by involving the best rainfed croplands and rangelands in irrigation, whose area decreases accordingly.

34. Nearly 216 million hectares of rainfed croplands or about 47% of their total area in the world drylands (457 million hectares) are affected by various processes of degradation, mainly water and wind soil erosion, depletion of nutrients and physical deterioration (see Figure 3 and Table 2 in Annex). It shows some decrease in comparison with the 1984 assessment. Rainfed cropland in drylands constitutes nearly 36% of its total area in the world (out of 1260 million hectares). It was estimated that the world is losing annually about 7-8 million hectares of croplands due to various processes of soil degradation, mainly erosion and urbanization, more than half of it is in the drylands. Therefore, it follows that about 3.5-4.0 million hectares of rainfed croplands are currently lost every year throughout the world's drylands, being compensated for by involving the best rangelands in cultivation, the area of which decreases accordingly.

11 [Figure 3](#). Situation in Rainfed Lands Within World Drylands

35. This present assessment shows that the largest area of degraded rangelands again occurs in Asia followed by Africa, while the percentage of degraded rangelands is similar in both these continents and in Europe and Americas as well (see Figure 4 and Table 3 in Annex). The figures for Australia seem to be underestimated, but this has to be studied further as earlier published figures also showed about two thirds of the rangelands as being affected by degradation.

12 [Figure 4](#). Situation in Rangelands Within World Drylands

About 3,333 million hectares of rangeland or nearly 73% of its total area in the world's drylands (4,556 million hectares) are affected by degradation, mainly by degradation of vegetation which on some 757 million hectares is accompanied by soil degradation, mainly erosion. It shows an increase of some 233 million hectares in comparison with the 1984 assessment, that is about 7.5%. Again this falls within the range of +10% accuracy. As in the case of irrigated lands, it would be safer to assume that the situation did not change appreciably during this period and remained very unsatisfactory with a tendency to getting worse. There are no reliable global data on actual losses of rangelands and their conversion into agricultural land, wasteland/badland/desert or urban lands.

Fig. 5 illustrates the situation in North Africa, showing not only the decrease of rangeland area on account of growing cultivated and fallowed (abandoned due to soil degradation) land, but a decline of rangeland productivity as well caused by increasing pressure of population. If the above estimations of losses of agricultural lands and their compensation on account of better rangelands are correct, then it follows that annual losses of the rangelands within the drylands are of an order of some 4.5-5.8 million hectares and even more if so far unaccounted sand encroachment, urbanization, etc. is to be considered.

13 [FIGURE 5](#). Evolution of human population, land use and productivity of rangeland in North Africa between 1980 and 1990 (Le Hourou, 1991)

36. The summary of the above findings illustrates the following global status of desertification/land degradation: 70% of all agriculturally used drylands is affected at some degree by various forms of land degradation, mostly by the degradation of natural vegetation partly accompanied by serious deterioration of soil (see Figure 6 and Table 4 in Annex). Apparently, the situation is better in Australia and somewhat better in Europe than in the rest of the world where it seems to be more or less similar everywhere, but the situation in Australia could be underestimated. The worst situation is in North America and Africa, although the problem is not much less serious in South America and Asia.

14 FIGURE 6

37. A comparison of total estimates for the areas affected by desertification shows an increase from 3,475 million hectares in 1984 to 3,592 million hectares in 1991, that is 117 million hectares or 3.4 %. This increase in figures falls within the range of + 10% accuracy and thus should not be considered as a proven change. The conclusion again is that the situation remains the same and very unsatisfactory.

38. Despite existing inaccuracy of the available data, the present assessment shows very definitely a dramatic situation in land resources of the world drylands about 70% of which is affected by desertification or various forms of land degradation. It is difficult at this stage to make definite predictions for the future trends, but the process, if unabated, may lead to very serious socio-political and economic consequences for the world, mostly in developing countries. 18 industrialized or oil-producing countries out of the 99 countries affected are believed to be able to cope with the problem and to combat desertification of some 1.5 billion hectares of their territories. For the 81 developing countries with 2.1 billion hectares of lands affected by desertification the problem cannot be solved without major external assistance through international partnership.

39. The analysis of soil degradation, in degrees, in areas of the world drylands shows that major areas of degraded soils are confined to semi-arid (419.4 million hectares) and arid (392.2 million hectares) zones (Table 5 in Annex). The area of degraded soils in drylands of the world comprises some 1,138 million hectares or more than 18% of the total area. Mostly, soils are slightly and moderately affected by various degradation processes, the strong and extreme degradation being more limited.

40. The analysis of soil degradation, by types, in areas of the world affected by desertification shows that the major soil degradation process in drylands is wind erosion (512.4 million hectares) followed by water erosion (478.4 million hectares), then chemical (111.5 million hectares) and physical (34.9 million hectares) degradation (Table 6 in Annex). In dry sub-humid and semi-arid zones water erosion is more serious than wind action, while in arid and hyper-arid areas wind erosion is more serious.

41. The analysis of soil degradation, by types and degrees, in areas of the world affected by desertification, excluding hyper-arid zone, indicates that the major soil degradation process in these areas is water erosion (45.2%) followed by wind erosion (41.8%) then chemical (9.7%) and physical (3.4%) degradation, the dominant role is played by slight (41.3%) and moderate (45.4%), while strong (12.6%) and extreme (0.7%) degrees are not very significant (Table 7 in Annex). Three major causative factors responsible for soil degradation in drylands are: overgrazing (34.5%), deforestation (29.5%) and agriculture (28.1%). Apparently, Asia is the major sufferer from soil degradation in drylands followed by Africa, if the total area affected is considered, while the percentage of the affected areas is the largest in Africa [81% in Africa

compared to 22% in Asia]. All other continents have approximately the same areas of drylands affected by soil degradation, while the percentage is the lowest in North America and Europe (Table 8 in Annex).

15 (III) LOCAL ASSESSMENTS OF DESERTIFICATION RATE

42. There are no reliable global data on the present rate of desertification with the exception of those figures on annual land losses provided above in paragraphs pertaining to irrigated land (33), rainfed cropland (34) and rangeland (35). Certain local studies provide more detailed additional information in this respect. 43. KENYA

In the Baringo study area of 360 thousand hectares, situated in a transitional zone with annual precipitation of nearly 600 mm rising to 1900 mm in the surrounding mountains and mostly used as rangeland with some irrigated agriculture, the following changes were observed from 1950 to 1981, in percentage of the total area:

Areas improved to better vegetation class..... 11.0
 Areas degraded to worse vegetation class..... 14.0
 Expansion of agricultural area..... 5.3

Calculations give the rate of vegetation degradation as 1,626 hectares per year, which gives the annual desertification rate of 0.6%.

In the Marsabit study area of 1,400 thousand hectares, situated in a more dry zone with annual precipitations of less than 250 mm rising up to 800 mm in the surrounding mountains and mostly used under extensive pastoralism with some mixed farming, the changes during 1956-1972 were as follows, in percentage of the total area:

Areas improved to better vegetation class..... 0.0
 Areas degraded to worse vegetation class..... 20.5
 Areas mainly unchanged..... 79.5
 Expansion of agricultural area..... 0.0

Calculations give the rate of vegetation degradation as 17,937 hectares per year, that is an annual desertification rate of 1.3%.

44. MALI

In three study areas of Mali, the following soil losses were observed within the last 30 to 35 years:

	NARA	MOURDIAH	YANFOLILA
Total area, hectares	60,241	69,622	67,888

Annual precipitation, mm	400	800	1,200
Annual soil loss, hectares	16.5	143	8
Annual soil loss, percent	0.03	0.2	0.01

This study gives an average annual soil loss rate of 0.1% but does not provide any data on vegetation degradation and thus does not give a full picture of desertification.

45. TUNISIA

The following changes in Tunisia were noted in the areas of different land uses in thousand hectares:

	1880	1980	Balance
1. Cereals cultivation	400	2,000	+ 1,600
2. Trees cultivation	200	1,600	+ 1,400
3. Total cultivated land [1+2]	600	3,600	+ 3,000
4. Grazing land	10,000	6,000	- 4,000
5. Loss of productive land to desert [4-3]			1,000

Calculations give the average annual loss of productive land by desertification as of an order of 10 thousand hectares within this last century. Thus an average annual desertification rate of 10% is characteristic of the desert fringes of Tunisia.

46. CHINA

Certain studies conducted by Chinese academic institutions show the present rate of desertification expansion on the fringes of the desert as being of the order of 210 thousand hectares per year; relating this figure to 33.4 million hectares of desertification-prone lands of China would give the present average annual desertification rate of 0.6%.

Some local studies even showed that the present annual rate of desertification was 1.3% in Kangbao County north of Beijing in Hebei Province, while in Fengning County it was 1.6%.

47. USSR

The annual desertification rate in certain districts of Kalmykia north-west of the Caspian Sea was recently estimated as high as 10%, while in others it was of an order of 1.5% or 5.4%.

The desert growth around the drying Aral Sea was estimated at about 100 thousand hectares per year during the last 25 years, which gives an average annual desertification rate of 4%. With the same annual rate of about 4%, desertification expands on the adjoining rangelands, greatly reducing their productivity.

48. SYRIA

An area of some 500 thousand hectares in the Anti-Lebanon Range north of Damascus was studied recently assessing the changes in land and land-use patterns from 1958 to 1982. It was found that the area of rocky shrub land and bare skeletal land has increased from 50 thousand hectares or 10% to 80 thousand hectares or 16% of the total. It gives a present average annual rate of desertification of 0.25% for this area.

49. YEMEN

Existing statistics show that the average for the country annual rate of cultivated land abandonment due to soil degradation has increased from 0.6% in 1970-1980 to about 7.0% in 1980-1984.

50. SAHEL

According to a recent (1989) publication (*Le Sahel en Lutte contre la Desertification: Leons d'Experiences*) of the results of a co-operative study in the western part of the Sudano-Sahelian region conducted jointly by Comite Inter-Etats de Lutte Contre la Sechresse au Sahel (CILSS) and Programme Allemand CILSS (PAC), in the southern parts of Mauritania, Mali and Niger the desertification rate during 1961 and 1987 was of an order of some 2 million hectares per year.

51. The above data from the case studies show very large variations in the annual rate of desertification in different parts of the world ranging from 0.1% to 10.0% giving a hundred times difference. The main conclusion is that the more arid an area is the higher its rate of desertification tends to be. If we assume, on the basis of the above case studies, that the annual rate of desertification is about 10% in arid lands, 1% in semi-arid lands and 0.1% in dry sub-humid lands, then calculations will give present annual increase of lands affected by desertification as follows: 156.9 million hectares in arid areas, 23.05 million hectares in semi-arid areas and 1.3 million hectares in dry sub-humid areas, making a total of 181.2 million hectares throughout the drylands of the world. This will give an average rate of current desertification progress of 3.5% per year. Further studies on the basis of the global monitoring system are needed to obtain more reliable data.

16 (IV) SITUATION IN AFRICA

52. Drylands in Africa, including hyper-arid deserts, comprise 1,959 million hectares or 65% of the continent and about one third of the world drylands. One third of this area are hyper-arid deserts (672 million hectares) which are uninhabited, with the exception of sparse thiny oases, while the remaining two thirds or 1,287 million hectares are made of arid, semi-arid and dry sub-humid areas with a population of about 400 million (two thirds of all Africans).

53. According to the present assessment, 1.9 million hectares of irrigated croplands or 18% of their total area, 48.86 million hectares of rainfed croplands or 61% of their total area, and 995.08 million hectares of rangelands or 74% of their total area in Africa are affected by desertification at a moderate or a higher degree.

54. Recurrent droughts constitute a permanent factor of life throughout the drylands of Africa. It is safe to state that practically every year there is a drought in some part or the other of the continent. Major droughts, however, regularly affect larger portions of the drylands. Such

disastrous events occurred recently in 1968-1973, 1982-1985 and 1990-1991 when many countries of Africa experienced substantial food shortages. With each drought cycle desertification increases.

55. Other factors contributing to desertification include uncontrolled population growth, inadequate agricultural practices, increase of livestock beyond the carrying capacity of 3natural rangelands, and deforestation (See Figures 5 and 7). The situation in this respect is illustrated by the following figures showing annual percentage rates of change in anthropogenic factors influencing desertification:

	AFRICA		SUDANO-SAHELIAN REGION	
	1977-1985	1985-1988	1977-1985	1985-1988
Population	3.0	3.0	2.7	3.0
Livestock	1.3	1.7	0.7	0.6
Fuelwood	2.9	3.0	2.5	2.3
Charcoal	3.1	2.9	-	1.5

17 [Figure 7](#). Global Statues of Desertification/Land Degradation Within World Drylands

56. The above data show very clearly that all major factors of desertification in Africa remain unabated leading to the progress of land degradation inspite of modest efforts to arrest it. Although satellite data show rather big fluctuations of rainfall-dependent northern and southern boundaries of green biomass production zones, both seasonal and annual, the overall trend is negative. There are clear manifestations of continued ecological degradation.

57. In 1989, UNSO circulated questionnaires to fifty African countries affected by desertification. 50% of government respondents saw a significant worsening of the situation, as reflected in falling groundwater levels, drying up of surface waters, rangeland degradation, rainfed and irrigated cropland deterioration and deforestation, while 17% rated it as slightly worse. In the same year, UNEP conducted similar survey in affected countries of Southern Africa with a general conclusion that the situation is worsening throughout the region without any exception. The effects of desertification are widely felt in affected countries, eroding the productive capacity of local and national economies and threatening the very survival of the people.

58. Civil strife is a complicating factor influencing resource systems and availability of food in many drylands of the continent. The corresponding problems in Ethiopia, Somalia, Sudan, Chad, Angola, Mozambique and other countries of Africa are well known. Being short-term in itself, this factor contributes greatly to the long-term process of land degradation in many ways, partly because of leaving land unattended which is not always good for natural recovery of land as opposed to general belief, particularly in a short-term perspective.

59. Desertification has a considerable bearing on overall economic performance and prospects in the majority of African countries affected by the process as these countries rely heavily on their drylands as the main resource base. Agricultural production per capita, the indicator that reflects the ability of the domestic agricultural sector to satisfy domestic consumer demand, is stagnating or even has declined from the levels of 1970s. Similarly, the average annual

growth of GNP per capita, which in Sub-Saharan Africa increased at 3.0 % between 1965 and 1973, fell by 2.8% between 1980 and 1986, by 4.4% in 1987 and by 0.5% in 1989. Furthermore, economic growth in Africa was lower in 1990 than in 1989, particularly in countries of the Sudano-Sahelian region. The following data on food production taken from World Economy Survey 1990, illustrate the overall deterioration of the situation in the majority of the African countries affected by desertification:

FIGURE

60. Particularly complex and serious situation seems to persist in the Sudano-Sahelian region of Africa. Although there are no directly measured data on desertification and its social and economic consequences for the region as a whole, certain case studies and published statistical data for some of the countries of the region show that the situation is not improving but rather getting worse. In Sahel, for example, within the last 20 years, from 1969 to 1989, agricultural production has fluctuated from year to year in conformity with rainfall patterns. However, the general trend within this period was positive and some growth of agricultural production was obtained. This trend of the growth was mainly on account of the cropping area, while the average yields were stagnating at a low level inspite of all technological and management efforts, clearly indicating the effect of continuing land degradation. The same might be said about other countries of the region as well. The above country data on agricultural situation in Africa support this view. Despite all the means employed in the region and periodically occurring more favorable weather conditions, the scale and aggressiveness of desertification continue to produce a chain of negative consequences for the environment and hence for the economy which measures already taken can only counter with difficulty. Reports prepared by UNSO underline the fact that desertification in the Sudano-Sahel is exacerbated by unpredictable and often severe droughts; desertification, or aridification, due to extended droughts the most recent one lasting almost 20 years; as well as dryland degradation. As a result of this extended drought, which reached nadirs in the early 1970s and mid-1980s, Lake Chad contracted at its low point to one third of its normal area, rivers have fallen, and the land has been severely damaged, especially by erosion. Although there has been a recovery of rainfall in 1991 in various places, drought is a chronic phenomenon which may be expected to recur in the region. An even more alarming situation is that traditional rural land use, especially agriculture, may be near the limits of expansion, so that further increases in production may be obtained only with higher inputs. Increased agricultural production may become economically unfeasible and highly destructive to the environment unless there is provision for financial assistance to cover the costs of the increased inputs and for environmental safeguards. Fuelwood supply has reached crisis proportions in certain regions and may reach an overall crisis even sooner than the already precarious food supply.

PART II

THE UNITED NATIONS PLAN OF ACTION TO COMBAT DESERTIFICATION (PACD)

18 A. MONITORING OF THE PACD AND ITS EVALUATION BY THE GOVERNING COUNCIL OF UNEP

1. Starting from 1978, the Governing Council of UNEP at each of its regular sessions and in accordance with the mandate given to it by the UN General Assembly, considered progress in the implementation of the Plan of Action to Combat Desertification regularly reporting its findings and decisions to the General Assembly through the Economic and Social Council.

2. In 1984 at its 12th Session, the Governing Council considered not only progress in the implementation of the PACD and the world status of desertification but the PACD itself. By paragraph 4 of decision 12/10 of 28 May 1984, the Governing Council reconfirmed the validity of the Plan of Action to Combat Desertification and the general appropriateness of the institutional arrangements established by the General Assembly for the follow-up of its implementation.

3. By paragraph 8 of its decision 15/23 of 25 May 1989, the Governing Council requested the Executive Director "to arrange for an external evaluation of the Plan of Action to Combat Desertification to be conducted and for the results to be presented well in time for the proposed United Nations Conference on Environment and Development in 1992, but not later than the Governing Council at its 16th session" (in 1991). The required evaluation was made during 1990 and the corresponding report was presented to the 16th session of the Governing Council as document UNEP/GC16./16/Add.1. 4. The external evaluation reconfirmed the validity of the principles contained in the PACD, and its utility as a tool for experts and technicians, but it showed that the modest implementation of the PACD during 1978-1989 was partly due to a certain deficiency of the PACD itself. It criticized the Plan for its lack of focus and for omitting socio-economic factors associated with desertification that should be better understood by politicians and decision-makers. The evaluation concluded that the PACD should remain a global strategy for desertification control and recommended the preparation and dissemination of a slightly revised version of the PACD and its guidelines.

5. After considering the above report on the external evaluation of the PACD, the Governing Council by its decision 16/22 of 31 May 1991 reaffirmed "its conviction that the Plan of Action to Combat Desertification is an appropriate instrument to assist Governments in developing national programmes for arresting the process of desertification" and also requested the Executive Director "to take into account when revising the existing recommendations of the Plan of Action to Combat Desertification, the approved findings and recommendations of the evaluation report and of this decision, and to include the revised recommendations in the Council's report on the status of desertification and implementation of the Plan of Action to the United Nations Conference on Environment and Development".

6. Part III of the present report responds to the above decision of the Governing Council and the relevant provisions of UN General Assembly Resolution 44/172 concerning the preparation of the documentation on desertification for the United Nations Conference on Environment and Development.

19 B. IMPLEMENTATION OF THE PACD 1978-1991

(I) INTRODUCTION

7. In compiling the present report, the material was obtained from relevant agencies and organizations, both within and outside the United Nations system, including: United Nations Environment Programme [UNEP], United Nations Development Programme [UNDP], United Nations Sudano-Sahelian Office [UNSO], the World Bank, Food and Agriculture Organization of the United Nations [FAO], International Fund for Agricultural Development [IFAD], World Food Programme [WFP], United Nations Educational, Scientific and Cultural Organization [UNESCO], United Nations Children's Fund [UNICEF], United Nations Development Fund for Women [UNIFEM], World Meteorological Organization [WMO], World Health Organization [WHO], International Labor Organization [ILO], United Nations Commission for Trade and Development [UNCTAD], International Union for the Conservation of Nature and Natural Resources [IUCN], United Nations Regional Commissions [ECA, ECLAC, ESCAP, ESCWA, ECE], Permanent Inter-State Committee on Drought Control in the Sahel [CILSS], Inter-governmental Authority for Drought and Development [IGADD], Organization of African Unity [OAU], African Ministerial Conference on the Environment [AMCEN], Southern Africa Development Co-ordination Conference [SADCC], European Economic Community [EEC]. Unavoidably, constraints of reporting length preclude the possibility of including the detailed contributions supplied. Therefore, only a summary and synopsis of major trends is outlined below, while a world-wide compendium of anti-desertification actions and projects is maintained and permanently updated by UNEP.

8. It may be observed that the recommendations contained in the PACD were wide-ranging and expected action from rural populations, governments, sub-regional and regional institutions, and the international community. Such expectations raised real problems for accurate evaluation of achievements and it is only possible to speak in general terms when looking back at what has been achieved. 9. As UNEP's Governing Council reviewed the first assessment of progress achieved in the implementation of the PACD carried out in 1984, the Council noted that measures carried out during the seven-year period had not produced substantial results in any of the countries and regions affected by desertification, nowhere had the PACD been implemented in its totality. 10. On the occasion of the Xth anniversary of the PACD in 1987, an attempt was made by the United Nations system to evaluate what had been achieved in the intervening period. This served to confirm that, despite 10 years of the PACD, desertification was still progressing virtually at the same rate as at the time of UNCOD. It was also confirmed that the process still affects all continents and, as observed previously, the most affected countries are linked to arid, semi-arid and dry sub-humid areas of Africa and Asia. In Africa, the Sudano-Sahelian region, after a recent series of droughts stretching for more than 20 years, remained the most permanently vulnerable, and it was estimated that the well-being of some 80-85% of the population of the region has been affected.

(II) ROLE OF THE UNITED NATIONS SYSTEM AND THE INTERNATIONAL COMMUNITY

11. At UNCOD, the United Nations system as a whole participated actively, bringing in the special expertise of each agency, towards the solution of the problem of desertification. In drafting the programme of action to combat desertification, lessons were learnt from the experience of these agencies, and it was assumed that they would participate actively in the subsequent implementation of the PACD, as envisaged by the appropriate General Assembly

resolutions. Some of the pre-UNCOD initiatives which were tacitly subsumed in the PACD included inter alia the following:

- FAO/UNEP Project on Ecological Management of Arid and Semi-Arid Rangelands [EMASAR] in Africa, Near East and Middle East started in 1975;
- Relevant components of UNEP's Global Environmental Monitoring System [GEMS] using the satellite imagery interpretation established in 1972;
- UNESCO/MAB first launched in 1970 and having important components on the management of arid lands, like the Integrated Programme on Arid Lands [IPAL].

12. It was recommended by UNCOD and decided by the General Assembly to establish an Inter-Agency Working Group on Desertification [IAWGD] reporting to the UN Administrative Committee on Co-ordination [ACC] and the Governing Council of UNEP. This body was intended to serve as a forum for co-ordinating the work of various UN agencies and organizations, including the regional commissions, towards the implementation of the PACD. Regular annual sessions of the IAWGD were held, starting from 1978 and through 1991, providing an input to co-ordinated activities within the United Nations system and ensuring the avoidance of duplications.

13. The PACD was explicit in recognizing that whereas the main anti-desertification thrust was expected to come from a national level, there would be many other areas where support from regional or international organizations would be called for (Recommendation 26), or projects which could only be carried out in the framework of regional or international co-operation. Since UNCOD, the co-ordinating mechanism has been used successfully to ensure a tiered action programme which starts with activities at the grassroots level, through national, regional and global levels. At regional and global levels, activities of the United Nations system have been complemented by those of Non-governmental Organizations [NGOs], the International Council for Scientific Unions [ICSU] and the International Union for the Conservation of Nature and Natural Resources [IUCN].

14. The Consultative Group for Desertification Control [DESCON] was established by the General Assembly in 1978 as a mechanism for mobilizing resources needed for the implementation of the PACD. Its mandate was later expanded to include exchange of information and policy guidance. So far (1991) there have been eight DESCON meetings, while the total funds made available through this mechanism for approved projects have remained minimal. The changing role of DESCON has come as a disappointment to the developing countries and to all those who felt that with more financial resources available, it would be possible to put forward viable programmes for the control of desertification as recommended in the PACD. Despite problems with DESCON (see Paras 22-26 in Part IV), there have been some limited funds to enable recipient countries to carry out certain projects dealing with desertification. Between 1978 and 1985, some 50 projects at a cost of US \$ 15 million were completed, and that year (1985) there were some 20 projects under implementation at a cost of US \$ 51 million. These projects are a part of national programmes and the funding was provided through bilateral arrangements catalyzed by DESCON. The past and present assessments have, however, indicated that the problem of desertification was so large that in the absence of massive financial resources it was bound to get worse each year. Thus, in 1991 it can be concluded that there has been a failure to respond adequately to the needs of the PACD including through DESCON because of the apparent unwillingness on the part of the affected countries and the donors to make it work as originally conceived.

15. The UN General Assembly decided (Res. 32/172 of 19 December 1977, para. 8) to entrust the Governing Council and the Executive Director of UNEP as well as the Environment Co-ordinate Board [ECB], with the responsibility of following-up and co-ordinating the implementation of the PACD. Based on the Executive Director's reports, the Governing Council of UNEP considered various aspects of the problem of desertification and of the progress in implementing the PACD at each of its regular sessions since 1978, periodically reporting the results of considerations to the General Assembly through the Economic and Social Council. Within UNEP, a Desertification Control Branch was established which was later transformed into Desertification Control Programme Activity Center [DC/PAC]. This unit also provided a secretariat for IAWGD and DESCON.

16. With the Plan in place, UNEP, supported by the IAWGD, saw its primary role as consisting of the following:

- assisting countries to formulate national action plans for combating desertification;
- stimulating and co-ordinating action within the international community and the United Nations system in particular;
- assessing desertification at a global level and developing a methodology for the assessment;
- monitoring the implementation of the PACD at a global level;
- building a computerized data base on desertification and disseminating information for use in desertification control;
- promoting national, regional and global co-operative action through the establishment of networks of institutions and NGOs engaged in desertification control;
- co-operating with national, regional and international institutions in the assessment and monitoring of desertification through the application of relevant methodologies within the means of developing countries;
- creating and co-ordinating a network of regional and international training courses on desertification control, particularly for personnel from developing countries;
- sponsoring a few pilot projects for testing and demonstrating technologies for desertification control and integrated development in drylands.

17. UNEP has been in a position to sponsor and to fund the above skeletal programme areas from the Environment fund. But the main activities had to be funded through different mechanisms, such as the Trust Fund administered by UNSO, funds administered by the specialized UN agencies, the World Bank, Regional Development Banks and bilateral aid agencies.

18. Members of the IAWGD have been particularly helpful to UNEP in the technical aspects of the PACD implementation such as deriving criteria and techniques for the assessment of desertification [FAO, UNESCO, WMO], holding training workshops and seminars, and the preparation of field manuals for use in various anti-desertification activities.

19. UNEP has managed to work with the UN regional commissions quite successfully, and has succeeded in co-ordinating their work which is relevant to the recommendations of the PACD. Important break-through has included the establishment of several regional networks since 1984. UNEP Governing Council decision 12/10 of 1984 contained recommendations for stronger regional action and supported the establishment of regional networks primarily for training and demonstration. The following networks were established:

- Network on Sand-Dune Fixation - North Africa and Middle East [ESCWA];
- Network on Afforestation - Latin America [ECLAC];
- Regional Network of Research and Training Centers for Desertification Control in Asia and the Pacific - Asia and the Pacific [ESCAP/UNEP/UNESCO];
- NGO Network of Research and Information Development of Sustainable Livelihoods in the Arid and Semi-Arid Lands in Africa [ECA];
- Watershed Management Network - SADCC region of Africa [ECA];
- Chaco Arid Zones Network - Argentina [ECLAC];
- Dendro-energy Network - Peru [ECLAC].

In commenting on the establishment of these networks, the ACC recently noted that the networking approach represents an effective means of implementing the PACD (UNEP/GC/SS I/5/1988). There are other networks at global level established by one or more agencies working together. These include the MAB National Committees of UNESCO plus the MAB International Network of Biosphere Reserves.

20. At UNCOD, attempts were made to find suitable candidates of large anti-desertification projects for international action. These were transnational projects like the Trans-Saharan Green Belt in North Africa. Apart from their rather idealistic format, they helped to emphasize the fact that desertification is not limited by political boundaries. As part of that international approach there have recently been several new projects which are better researched and less idealistic. These include AMCEN's African Deserts and Arid Lands Committee [ADALCO] projects which involve true deserts (Sahara), adjoining river basins, economic communities (Common Market partners), and the African NGOs Network. These international collaborative projects also include the development of sub-regional data bases, monitoring systems for the Sahara, Somali-Chalbi and Kalahari-Namib deserts, and the selection and implementation of regional projects suggested by the Cairo Programme in line with the PACD.

21. Economic and social issues are central to international co-operation in responding to the PACD. The Plan had specific recommendations on dealing with some of these aspects but they have been the most difficult to quantify. It is important both at national and international levels to endeavor to sensitize planners, project managers and technical persons on these issues, to ensure that they give them the priority ratings required for adequate funding. There are certain achievements in this area, but it is difficult to say how substantial they are and what impact they provide for the implementation of the PACD.

22. The rehabilitation of the national wealth of natural resources in the form of land surely deserves a better deal, particularly through appropriate land surveys at the first stage. This issue has still inadequate priority. In the past, donor governments, inter-governmental organizations, aid agencies and non-governmental organizations have often failed to accord high priority to restoring degraded land and tend to favor projects of agriculture, even when the land resource base is fast being depleted by degradation. They were usually reluctant to fund pastoralist areas where nomadic or semi-nomadic peoples are fast degrading the rangeland by overgrazing.

23. In terms of financial and technical support for anti-desertification projects as contained in the PACD, UNDP has made the largest contribution in its normal process of funding various development programmes in the developing countries. Many of the UNDP funded projects were executed by the relevant UN agencies, and the greatest concentration of anti-desertification projects has been executed by FAO, particularly in the areas of rainfed croplands, rangeland and range management improvement, soil degradation, secondary salinization of irrigated cropland.

24. International effort to assist in combating desertification is illustrated by the following list of projects implemented or executed by the UN agencies between 1978 and 1990:

Table

25. A UNDP-UNEP joint venture enabled UNSO to assist, on behalf of UNEP, 22 developing countries in the Sudano-Sahelian region of Africa with their national programmes to combat desertification. These countries are most seriously affected by desertification, many of which are least developed countries. This activity covered a large area including: co-ordination of anti-desertification programmes within the region, promotion and encouragement of regional co-operation, provision of general policy guidelines for the direction and co-ordination of anti-desertification programmes, support for efforts undertaken to combat desertification at national level, working with various donors and mobilization of financial resources, assisting countries in the translation of the PACD recommendations into concrete projects, assisting countries in the preparation of their national PACDs, monitoring of the implementation of the PACD in the region.

26. Between 1974 and 1989, more than US \$ 200 million had been channelled by UNSO for projects in the region. Programmes that benefitted from these funds were relevant to the PACD, such as afforestation and reforestation, fuelwood conservation and the utilization of alternative sources of energy, rangeland conservation, soil management and sand dune stabilization, integrated land management, and planning and programming for natural resources conservation.

27. Although the funds, mobilized by UNSO are very far from adequate, the UNSO example demonstrates the fact that, if more funds were available, anti-desertification programmes within the framework of the PACD would have been on a more meaningful level throughout the world compared to the present. The Sudano-Sahelian region of Africa fared better than the other regions around the globe in respect of resources mobilization for anti-desertification activities. Some consideration was given to the possibility of replicating the "UNSO Experience" in other badly degraded lands of the world. Furthermore, the important role of UNSO in Africa is that its experience is now being shared by certain sub-regional inter-governmental organizations such as IGADD, SADCC, ECOWAS and COMIDES, which are dealing with anti-desertification programmes in their respective sub-regions of Africa.

28. Another example of the United Nations efforts to cope with the problem is the current provision, through World Food Programme, of some half billion dollars worth of food aid to projects which aim at reducing desertification impact on affected population. The WFP projects mainly focus on providing food-for-work in support of activities such as tree planting, building of soils and water conservation structures, and construction and rehabilitation of irrigation/drainage systems. Over the 1980-1990 period WFP supplied about US \$ 700 million of emergency food aid for victims of drought and crop failure in drylands. Some US \$ 127 million of emergency food aid was provided to those in 1991.

29. One of the most successful international actions catalyzed and co-ordinated by UNEP has been through sponsorship of training courses, seminars and workshops in collaboration with a number of countries. These were often repeated during the last ten years (number in brackets). The main themes of these were:

- Sand dune fixation (6),
- Reclamation of saline irrigated soils (5),
- Ecology, productivity and management of rangelands (10),
- Combating desertification through integrated development (4),
- Physics of desertification (1)
- Desertification control (5)
- Zootechnology in drylands (2),
- Creating desertification awareness (2),
- Drylands agriculture and machinery use (1),
- Protection of oasis and lands from sand dune encroachment (1),
- Role of forests and afforestation in combating desertification (1),
- Soil erosion and water conservation (2),
- Ecological studies in drylands (1),
- Afforestation techniques and suitable species (1),
- Use of aerial photographs and satellite imagery (1),
- Rainfed agriculture and soil conservation (1),
- Assessment of desertification (6),
- Soil laboratory techniques (1),
- Agricultural development in drylands (1),

- Role of women in combating desertification (6),
- Diagnosis, reclamation and conservation of gypsiferous soils (1),
- Eco-farming villages (1),
- Anti-desertification projects formulation (1).

30. The following data illustrate the participation of the countries in the organization of the above training courses, seminars and workshops sponsored by UNEP from 1978 through 1991 as well as the number of participating specialists, from developing countries affected by desertification:

Table

31. In addition to the above, the Southern India training courses on afforestation, organized by the "Millions of Trees Club" NGO, were attended by 1,600 local participants at grassroots level.

32. Various training courses related to combating desertification were also organized by members of IAWGD as well as by different inter-governmental regional organizations.

33. Thus, a total number of about 7,000 specialists, practically all from developing countries affected by desertification, have received their additional anti-desertification training through various international courses, seminars and workshops during the years of implementation of the PACD, to which 1,600 trainees at grassroots level in India should be added. Naturally, this is far below what is required at global level but it shows a good start.

34. Several recently launched international initiatives related to the anti-desertification campaign should be particularly mentioned. One is the 1990 initiative of FAO to undertake a large-scale International Scheme for the Conservation and Rehabilitation of African Lands, which is designed to provide a means by which African countries can develop their own programmes to fight land degradation. The scheme is specifically designed to enable countries to tailor these programmes to meet their individual needs. The second was also undertaken by FAO in 1990 - an international action programme on Water and Sustainable Agricultural Development which has a strong drylands water management component. The third initiative belongs to IFAD under its Special Programme for Sub-Saharan African Countries Affected by Drought and Desertification, which gave priority to improving food security by measures to preserve the environment and restore existing productive capacity and to ensuring that projects, once completed, would yield lasting benefits.

35. Certain concrete examples may be selected to illustrate the achievements of the international community in assisting countries struck by desertification in solving their respective environmental and developmental problems. One such good example is the Keita Integrated Development Project in Niger launched by FAO in 1984 with the support of the governments of Niger and Italy. As stated by Mr. E. Saouma, Director-General of FAO, "The Keita Integrated Development Project testifies to the dramatic achievements that can result when human energy and innovation are applied to tackle the challenges of rural development. In just five years, the people of Keita have transformed their district from a barren landscape unable to meet basic food requirements to a flourishing environment for crops and livestock. The Keita project has put into practice FAO'S objectives for integrated, sustainable

development." The project involved typically Sahelian semi-arid landscape with an area of some 257 thousand hectares, 205 villages and 156 thousand inhabitants. Unfortunately, however, such examples, are scarce throughout the world.

(III) ROLE OF REGIONAL AND SUB-REGIONAL CO-OPERATION

36. Co-ordination at regional level has been meaningful for various reasons. Desertification as an environmental phenomenon cuts across international boundaries, hence it calls for cross-boundary co-operation, particularly at sub-regional level where the experiences, efforts and technologies could be shared by neighboring countries having similar problems and similar ecological conditions.

37. In addition to the activities of the UN Regional Commissions, several sub-regional inter-governmental institutions and programmes were established that were specifically directed to the desertification problem throughout the developing countries affected by desertification, and more particularly in Africa.

38. Even before UNCOD, African drought and famine problems had led to the establishment in 1973 of the Inter-State Committee for Control of Drought in the Sahel [CILSS], a body which was sponsored by the Club du Sahel uniting several industrialized countries and the developing countries of the western part of the Sudano-Sahelian region. CILSS was followed in 1973 by UNSO which was a mechanism for the co-ordination of the United Nations efforts to assist Sahel countries in combating drought. Later on, the mandate of UNSO was expanded to cover the combat against desertification in the Sahel and now this UN organ covers the whole region consisting of 22 countries affected by desertification. The activities of UNSO were referred to in Paras. 25-27 above.

39. The Committee of Ministers on Desertification [COMIDES] with its headquarters based in Dakar, Senegal, the Inter-Governmental Authority on Drought and Development [IGADD] covering the East-African sub-region, the Southern African Development Co-ordination Conference [SADCC], relevant activities of such sub-regional organizations as the Arab Maghreb Union [AMU] and the Economic Community of West African States [ECOWAS] are examples of sub-regional mechanisms, each with important mandates to make contributions in the implementation of some of the recommendations of the PACD. 40. The African Ministerial Conference on the Environment [AMCEN] has among its activities an important mechanism for the implementation of the PACD - the African Deserts and Arid Lands Committee [ADALCO]. This committee has decided to tackle some PACD projects like the Nubian Sandstone Aquifer, North-African Green Belt, Kalahari-Namib Action Plan, "savannization" and "sahelization" problems in Africa, etc. The Cairo Programme (of AMCEN) can be said to be closely in line with the need to address the PACD.

41. With relevance to the implementation of the PACD, the African Environment Agenda reflected the environmental aspirations enshrined in the Monrovia Doctrine of 1979. The Lagos Plan of Action, adopted in 1980 by the Assembly of Heads of States and Governments of the Organization of African Unity [OAU], set out the long-term development objectives of Africa, giving priority to regional food self-sufficiency, the elimination of poverty through the satisfaction of basic needs and national and regional self-reliance. The Cairo Plan of Action approved by AMCEN in 1985 aims at strengthening the co-operation with the objective of halting and reversing degradation of the African environment. In 1986, in response to the deepening crisis, the OAU adopted Africa's Priority Programme for Economic Recovery 1986- 1990 and the UN General Assembly adopted a programme as the United Nations Plan

of Action for Africa Economic Recovery and Development 1986-1990. All these regional co-operative initiatives incorporated drought and desertification as one of the priorities.

42. One good example of regional and inter-regional co-operation is the initiative by the European Economic Community within the framework of the Lomé Convention, through which assistance is provided to the African countries struck by desertification. Under IIIrd Lomé Convention, 1000 MECU were devoted to direct and indirect actions to fight against desertification through the European Plan of Action which combined EDF funds and Member States funds. It is recognized, as a result of past years experience, that there is a need for a much broader strategic approach to desertification than one limited solely to dealing with the most visible phenomena. Within the past 3-4 years a number of projects related to combat against desertification were implemented in different countries of Africa, among which 18% were specifically designed for management of natural resources and land use, 19% were sectoral production projects with at least 70% of funds devoted to controlling the deterioration of natural resources, and 63% were integrated rural development projects with at least 50% component related to combating desertification.

43. In the ESCWA region, UNEP has been co-operating with various inter-governmental organizations, some of them members of different networks interested in contributing to the PACD implementation. One such co-operation is with the Arab League Educational, Cultural and Scientific Organization [ALECSO] on the implementation of the North African Green Belt Project. The original feasibility study for this project was carried out by ALECSO for presentation to UNCOD. Further links with ALECSO were established when a joint UNEP/ALECSO sponsorship led in 1986 to the convening of the first Arab Ministerial Conference on Environmental Considerations in Development. Co-operation with the Arab Centre for Studies of Arid Zones and Drylands [ACSAD] centered around the preparation of national plans for combating desertification in West Asia. Countries which have benefitted from this include Syria, Jordan, Iraq and Yemen. Apart from these, several member countries of ESCWA have shown interest in extending the Green Belt concept in keeping with the recommendations of the PACD.

44. The above examples clearly show that the regional and sub-regional approach which has developed recently is the most promising and should be followed in the implementation of the PACD throughout the world.

(IV) ACTIONS AT NATIONAL LEVEL

45. The PACD underlines that effective action needs to be at national level. Success at national level is reflected at the regional level and ultimately at global level. Where funds for anti-desertification measures are limited, any action that is taken will depend on national priorities. Although attention on drought and desertification increased steadily throughout the 1980s, national government priorities were little concerned with their marginal lands or long-term conservation activities. The acute economic crisis forced them to concentrate on economic affairs such as energy provision, unfavourable trade balances and terms of trade, indebtedness and debt rescheduling. By emphasizing these concerns, structural adjustment plans often increased pressure on natural resources by stressing export production and foreign exchange earnings. This practice has often led to further degradation of the natural resource base, desertification.

46. As recommended by the PACD, countries affected by desertification would prepare national plans adapted to their specific natural, economic, social and cultural conditions. Till

present, only some 20 countries, out of 99 affected, have developed their national programmes to combat desertification. In the preparation of these national plans, the countries, upon their request, were assisted by UNEP as well as by other relevant UN agencies, e.g. FAO, ESCWA, UNSO. Attempts were made to incorporate these NPACDs into national development programmes or strategies. According to available information, the following situation in this respect can be reported:

- Countries with developed NPACDs and at the advanced stage of implementation: Argentina, Mali, Mauritania, Senegal, Tunisia;
- Countries with developed NPACDs and at the beginning of implementation : Benin, Botswana (National Nature Conservation Strategy), Burkina Faso, Chad, Jordan, Kenya (partial), Pakistan, Somalia, Sudan, Syria, Tanzania, Uruguay;
- Countries with NPACDs under preparation : Mongolia, Peru, Yemen.

47. Action at national level presupposes that plans have been approved and funds set aside for appropriate activities. But the truth of the matter is that most developing countries affected by desertification were concurrently struggling with major drought and other pressing economic and social problems. Under these circumstances, there was a wide preference for short-term investments with immediate returns rather than for long-term and low-yield investments such as were envisaged in dealing with desertification (25 years or more) to stop the process and to restore badly degraded land to an acceptable level of productivity once more. Furthermore, areas affected by desertification are often inhabited by pastoral nomads or semi-nomads who are usually socio-politically marginalized. Where this is the case, causes of failure include neglect over past long periods and the lack of adequate machinery on the ground.

48. Lack of financial resources to undertake such large-scale activities as proposed in the PACD was a major cause for the failure at national level. Because donor-countries and agencies showed a clear preference for bilateral aid, developing countries, which tried to marshal resources for anti-desertification activities, found themselves changing to short-term "more fundable" projects, usually those dealing with agricultural development.

49. Land degradation as a development issue cuts across many ministries in most governments in both developing and industrialized countries. This calls for co-ordination. The absence of this co-ordination has often led to dispersion of efforts at national level. Some development funds were available nationally for affected countries of Africa, Asia and Latin America, and there are examples of successful projects almost in each country. Efforts to co-ordinate some of these disparate projects at the sub-regional and regional levels produced series of Networks that have been established in the last years.

50. The active participation of the peoples themselves in the implementation of the PACD at national level has not been achieved in the majority of countries affected, although there are certain examples of massive public participation in some campaigns, e.g. afforestation campaigns in Algeria, India and Kenya. In 1988-1989, the grassroots participation or self-help projects were sponsored by members of IAWGD in Djibouti, Egypt, Ethiopia, Ghana, Guinea, Kenya, Mali, Mauritania, Senegal, Sudan, Tanzania, Uganda, Zaire, Zambia and Zimbabwe. Several eco-village projects are launched in China and throughout Africa. The potential for meaningful and successful action at national level has now been increased in Africa through a series of demonstration village projects set up under AMCEN. This innovative approach is beginning to attract funds even though donors still insist on bilateral negotiations.

(V) IMPLEMENTATION OF SPECIFIC RECOMMENDATIONS OF THE PACD

51. Recommendations 1-3: Assessment of desertification and improvement of land management

Assessment of desertification is essential for each affected country. This requires national machinery, especially to evaluate how desertification affects the people, and a programme of land use planning and management based on ecologically sound methods. Many developing countries plagued by poverty could not accord the priorities required to handle these recommendations appropriately. Shortage of human and technical resources prevented many countries from mounting proper assessment machineries. In order to institute land use planning, there should be a tradition of it in the country in question. It is therefore found that some countries have gone much further than others because of their own particular circumstances, for example where the tradition of land use planning has been in operation for other purposes like irrigation or commercial farming. As for creating public awareness and participation, there is some evidence of the achievements recorded since UNCOD. In general, however, there is still much more to be done.

52. Recommendation 4: Combination of industrialization and urbanization with the development of agriculture and their effects on ecology in arid areas

Industrialization and urbanization, if properly conceived and pursued, can reduce ecological pressures on drylands environment, thereby ameliorating desertification in these lands. During the last fourteen years, a series of workshops and training courses were carried out to enable people from developing countries to study the problems associated with urbanization and industrialization as they have an impact on desertification both in the USSR and China. A number of publications were issued by UNEP in this connection. Countries, which are sufficiently industrialized and urbanized are nevertheless succeeding in providing a relief to the hard pressed rural environment, in Latin America for example. In the Middle East the development of the oil industry has helped to relieve rural areas. Much more needs to be done by UNEP in co-operation with UNCHS (Habitat) and UNIDO for the realization of this recommendation.

53. Recommendations 5-10: Corrective anti-desertification measures

Corrective anti-desertification measures at national level are of primary importance in determining success or failure. There has been a lot of international support over the last fourteen years in the form of disparate projects, particularly in Africa, but they are still like a drop in the ocean in respect of the magnitude of the problem. A look at the projects shows that the majority of them consist of studies, planning and programming missions, seminars and workshops, with very few field-based actions. The assumption is that once sensitized the countries themselves should identify and plan the anti-desertification field projects. The most impressive field projects have recently concerned sand dune stabilization (China, Iran, Mauritania) water improvement (Burkina Faso), rangeland rehabilitation and reforestation, integrated rural development (Niger). Action to restore degraded irrigated lands is difficult and costly; it is easier to institute corrective measures in newly established irrigation schemes. Failure will always result at the national level where there is a lack of the tradition of management, and future efforts should be directed at assisting the countries to acquire the knowledge. Frequent and prolonged droughts, especially in Africa, and rapid population growth and unplanned demographic changes, including the problem of the refugees, remained

very serious obstacles for achievement and progress to be noticed. The results achieved so far seem to suggest that a broad-based rural development strategy is the real issue.

54. Recommendations 11 & 16: Monitoring physical conditions of the land and human conditions

Certain provisions of these recommendations were recently implemented in various parts of the world by establishing different monitoring or early warning systems at international, regional and national levels. At global level these are represented, for example, by the Global Environment Monitoring System [GEMS] and the Global Resource Information Database [GRID] of UNEP, several appropriate monitoring systems of FAO, WHO and WMO, including FAO's regular issue of Food Outlook (Global Information and Early Warning System on Food and Agriculture) and Desert Locust Bulletin. At regional level, there is regular FAO information on weather, food and agricultural conditions in Africa and in the Sahel in particular. At national level, an example may be given of regular issue of Early Warning System Bulletin of Turkana District in Kenya, another one being that of the establishment, with financial and technical assistance from UNSO, of the National Ecological Monitoring Centre in Senegal under the Ministry of Nature Protection. Another development is the initiative of the Government of France to establish a permanent monitoring system for North Africa in a large region covering areas both north and south of the Sahara. However, all these activities are not very well co-ordinated, particularly from a methodological point of view, and do not provide a comprehensive picture of the state of affairs on a regular basis. This is a very good start, indeed, but the efforts should be expanded.

55. Recommendations 12-15: Socio-economic aspects of combating desertification

As the analysis of numerous reports shows, social, political and economic aspects of desertification have been addressed both nationally and internationally over the last fourteen years, but not adequately enough to make significant impact on the problem. Obviously, much work needs to be done if land degradation is to be halted.

56. Recommendation 17: Insurance against the risk and effects of drought

Drought is closely related to desertification, to such an extent that even among the scientific community there is a risk of confusing one for the other. For industrialized countries which have large arid, semi-arid and dry sub-humid stretches of their land areas plagued with recurrent drought, elaborate drought insurance schemes have been put into practice to cushion their rural communities from these natural disasters. Since UNCOD, efforts have been made to ensure affected populations, particularly those in Africa, by the institution of "drought early warning systems" and the establishment of grain reserves (most of the time imported) to tide affected populations over the spell of drought. There are efforts to institute even more elaborate crop insurance schemes in many of the menaced countries in the developing world, but the economic base on which these are built is weak. The notion of drought risk insurance in drylands should be even more applicable to livestock and rangelands, because in the final analysis pastoral peoples rely more on their livestock than on their crops. Fourteen years after UNCOD, there is little evidence of a break-through in livestock and rangeland insurance against drought risk. For many of the countries concerned, particularly in Africa, foreign aid is still the main insurance against famine during the drought years.

57. Recommendations 18-20: Strengthening science and technology at a national level

The PACD clearly identified the lack of scientific and technological capabilities in many developing countries as an obvious obstacle to successful national campaigns against desertification. This issue seems to have received adequate attention. Probably, the largest number of anti-desertification projects have gone to training, education, information and institution-building. Agricultural research which is the key to rural development in drylands has also received much attention. Assistance to developing countries has come in the form of advice, technical and financial support, and training. In the area of energy-related science and technology, some success has been recorded particularly in two issues: the use of fuel-efficient stoves and solar heating to relieve pressure on the wood-fuel reserves, in addition to the search for alternative sources of energy.

58. Recommendation 21: Establishment of national machineries to combat desertification

Only a few countries have established special machineries for implementing the PACD at governmental level. The responsibility was mostly given to existing ministries or departments concerned with the environment, forestry or agriculture. Focal points were designated in many countries to provide the liaison and co-ordination with both regional or international and national institutions concerned with the implementation of the PACD. Nowhere in the world was a hierarchical national machinery established that would include provincial and local authorities, the latter mostly not being aware of any national plan or programme to combat desertification. However, a positive example of coming progress may be found in Kenya where the Ministry of Reclamation and Development of Arid, Semi-Arid Areas and Wasteland was established in 1989. This ministry is responsible for integrated development and protection and rehabilitation of the environment in 88% of Kenyan territory referred to in its name, which involves 22 districts, 25% of the country's populations and 50% of the national livestock. The ministry reports to the Inter-Ministerial Co-ordinating Committee on Environment and then to the National Environment Secretariat in the Office of the President. At local level, the ministry is planning to establish Arid and Semi-Arid Lands Centres for Management, Training, Demonstration and Adaptive Research in each of the districts to be complemented by Multi-disciplinary Mobile Extension Teams, which are envisaged as the key tool in providing the dialogue between land users and decision makers. This machinery started functioning by developing in 1991, the Environmental Action Plan for Arid and Semi-Arid Lands in Kenya to be adopted by the Government.

59. Recommendation 22: Integration of anti-desertification programmes into development plans

Land degradation (desertification) is a multi-sectoral in its extent, and it would be pointless to create a development sector called "desertification control" and expect it to be funded separately. Therefore, all actions against desertification should be included in appropriate sections of general development programmes or strategies. The recent assessment and the discussions in successive sessions of UNEP's Governing Council and DESCON provided guidance in this field. Several countries, including Mali, Mauritania, Senegal, Syria, Tunisia, have since developed national plans of action to combat desertification and have managed to integrate them with national plans of development. Programmes of action to implement these plans were submitted to round-table meetings of donors for support. Unfortunately, no support was found for considering these plans in their totalities.

60. Recommendations 23-28: International action

These recommendations were implemented during the past fourteen years at a larger degree. The PACD, though recognizing that action is primarily the responsibility of governments with their national institutions, equally recognized that co-ordination of national, regional and international programmes in the general campaign against desertification was essential. This is the role that was given to UNEP and its specific organ, Desertification Control Programme Activity Centre [DC/PAC]. In this sense, it was understood that UNEP would work closely with other United Nations bodies, through IAWGD, ACC and DESCON. This role in the Sudano-Sahelian region of Africa was largely played, on behalf of UNEP, by UNSO having an appropriate mandate through the UNDP/UNEP Joint Venture. Their joint role was to elaborate on desertification assessment and control methodologies, co-ordinate and support scientific and technological research and training, facilitate exchange of information, and provide financial and technical support for the implementation of the recommendations outlined in the PACD. The account of these activities during the past fourteen years is given in Paras 11-35 above.

(VI) CONCLUSION

61. Unfortunately, it must be admitted that little evidence of progress emerges from the numerous reports concerned directly or indirectly with desertification control, either in relation to the natural resources situation or to agricultural production in the affected regions and countries. In spite of all development and desertification control programmes launched during recent years, the situation has not improved, although there are some local examples of success.

62. Major efforts in implementing the PACD were directed to supporting measures rather than to concrete corrective field operations. As the present assessment shows, the area of lands affected by desertification is not decreasing, although some trees were planted throughout the world and some areas of shifting sands were stabilized. Neither major improvement of degrading irrigated croplands nor control of soil erosion in rainfed cropland nor substantial improvement of rangelands were achieved. The whole rural environment in the drylands of the world continues to deteriorate adversely affecting the socio-economic conditions of their inhabitants.

PART III

Policy Guidelines and Course of Action for Combating Desert

20 A. POLICY GUIDELINES

ROLE AND PLACE OF ANTI-DESERTIFICATION MEASURES WITHIN THE PROGRAMMES FOR SOCIO-ECONOMIC DEVELOPMENT AND PROTECTION OF THE ENVIRONMENT

1. Sustainable socio-economic development and protection of the environment are inseparable pre-requisites of human survival. This means that anti-desertification programmes should be managed as integral parts of socio-economic development of land resources and societies of the drylands.

2. Prevention of desertification where it is likely to occur and remedying its consequences where it has already occurred are the bases of sustainable development of land resources in drylands. Protection of land against degradation under increasing human pressures must constitute an essential part of the general strategy for agricultural development. This strategy should include anticipating and preventing the expected negative effects of man's action upon the land. If taken too late, corrective measures will be too costly or impracticable.

(II) GENERAL GOAL AND PRACTICAL TARGETS

4. The main goal of implementing the Plan of Action to Combat Desertification remains the same as it was formulated in 1977 by the United Nations Conference on Desertification and endorsed by the United Nations General Assembly, namely :

"The immediate goal of the Plan of Action to Combat Desertification is to prevent and to arrest the advance of desertification and, where possible, to reclaim desertified land for productive use. The ultimate objective is to sustain and promote, within ecological limits, the productivity of arid, semi-arid, sub-humid and other areas vulnerable to desertification in order to improve the quality of life of their inhabitants. A campaign against desertification should take place as a priority among efforts to achieve optimum and sustained productivity. For the countries affected, the implementation of the Plan of Action implied more than a campaign against desertification, it is an essential part of the broad process of development and the provision of basic human needs."

5. To reach this goal, the following practical targets are set to be achieved by the year 2020, which should be addressed nationally, regionally and internationally on the basis of experience gained and taking into account certain achievements and failures in implementing the Plan of Action during 1978-1991:

Main environmental/developmental targets :

- a. Preventing further deterioration of the world food security and sustaining productivity of land affected by, or prone to, desertification through the introduction of environmentally sound, socially acceptable and fair, and

economically feasible land use systems based on social equity and appropriate technologies;

b. Protection of non-degraded or slightly degraded lands prone to desertification and reclamation of desertified lands for productive use or their conservation for natural rehabilitation, as appropriate;

c. Provision of adequate insurance against recurrent droughts and famine in the drylands;

d. Improvement of the quality of life of the inhabitants of lands affected by desertification, including health, sanitation and family planning and achievement of the goal of satisfying basic human needs in the extensive areas of world drylands;

e. Prevention of adverse desertification impact on global climate change and biodiversity including germplasm materials for many crop and fodder plants.

Targets for the supporting measures :

a. Incorporation of national actions to combat desertification into broader national development policies, plans or programmes;

b. Mobilization of national, regional and international technical and financial resources needed for the full implementation of the Plan of Action to Combat Desertification;

c. Mobilization and strengthening of national, regional and international institutional capabilities for implementing the Plan;

d. Introduction of land-use, economic and social policies conducive to sustainable development of land and water resources;

e. Making land-users the main actors in designing and implementing the Plan and ensuring full public participation in anti-desertification campaigns;

f. Development of indigenous national and ecoregional scientific research and technology capabilities;

g. Co-ordination of current and new national, regional and international sectoral programmes (including those for combating desertification) within broader environment/development programmes;

h. Establishment of a global network of national, regional and international institutional and technical facilities for current operational assessment and continuous monitoring of desertification;

i. Strengthening of regional programmes and international co-operation in the campaign against desertification;

j. Provision of free flow of technology on favorable terms to areas affected by, or prone to, desertification;

k. Improvement of infrastructures needed to provide support for the NPACD in areas affected by, or prone to, desertification.

(III) MAIN PRINCIPLES IN IMPLEMENTING THE PACD

6. The following main principles could form the basis of the global anti-desertification strategy:

a. The United Nations Plan of Action to Combat Desertification as adopted in 1977, remains valid;

b. National Plans of Action to Combat Desertification (NPACDs) for all the countries affected by desertification should be fully incorporated, including appropriate financial and institutional provisions, into national programmes for development;

c. The current status of desertification in the territories affected, including the status of rural population and the state of land, should be assessed and continuously monitored. These data should be taken into account at all stages of planning and implementing national development programmes;

d. The way to prevent the exhaustion of resources of drylands starts with providing alternative means for meeting basic needs of affected societies. The people must be able to satisfy their short-term needs without over-taxing land resources;

e. Social, political and economic causes of over-taxing land resources and resulting physical manifestations of desertification should be the bases for formulating appropriate national policies and courses of preventive and corrective actions;

f. Participation of land users, including small-scale farmers and pastoralists and women in particular, should be ensured at all stages of planning and implementing the NPACDs;

g. Tangible incentives and short-term benefits for land-users, including small-scale farmers and pastoralists, to ensure their active participation in anti-desertification campaign should be developed;

h. Ecological stabilization of agricultural lands through sustainable utilization of natural resources and appropriate land use policies should be the focus of the NPACDs;

i. Ongoing programmes addressing land resources in areas concerned, e.g. soil and water conservation, reforestation or afforestation, agricultural development, rangeland improvement, etc, should be co-ordinated and incorporated into the NPACDs;

j. A small-scale local community-based approach should be preferred in developing and implementing the NPACDs in order to strengthen the role of local institutions, e.g. village or farmers' committees, as managers of communal natural resources and major implementing agencies;

k. Conservation of land and water resources in drylands that prevents ecological degradation, reclamation of degraded lands and development of terrestrial resources of drylands for agricultural and non-agricultural uses should constitute integral elements of programmes for combating desertification;

l. All NPACDs should contain integrated, in-built chapters dealing with drought (relief and insurance measures) that will complement long-term anti-desertification actions;

m. For countries which have both arid and humid regions within their territories, the NPACDs should be transformed into National Environment Action Plans for integrated management of natural resources in order to cover the problem of land degradation for the country as a whole but with separate chapters for ecologically different areas;

n. Combating desertification at national level (a) should involve traditional systems used by local people to promote popular participation in programmes of desertification control and (b) requires the establishment of effective institutional machinery for integrating desertification control programmes into overall national development plans and priorities;

o. After decades of trying to save the soil "from the people", a more promising approach should be adopted: to help land-users save the soil and water for themselves, for improved plant production, i.e. to practice Conservation Farming and Land Husbandry (Landcare) instead of Soil and Water Conservation.

p. The following principles, adopted from the Den Bosh Declaration (1991), should be followed in the PACD implementation:

- land use practices in drylands should be restructured in such a way that demands for sustainable land use and environmental protection will be met;
- the developed countries [regions/provinces within the partly affected countries] should recognize their role and responsibility for sustainable land use and socio-economic development in drylands by improving the international [national] economic relations in order to increase and stabilize incomes for farmers/pastoralists and hence create incentives for appropriate investments in drylands;
- the international community should accept the need to provide technical and financial assistance in specific fields to promote the PACD;
- population policies should be implemented in order to improve, in the long run, prospects for sustainable development in drylands;
- governments and society at large should recognize that agriculture/pastoralism and rural people of drylands collectively play an important and in many countries vital role in ensuring food security and maintaining the renewable natural resource base; this recognition must be reflected in the allocation of adequate financial resources, pricing policies, in the decentralization of institutions and in the empowerment of dryland people with particular attention to the poor;

- fair terms of exchange should be established among drylands producers, industry and consumers within the countries affected;
- farmers/pastoralists, particularly small-scale and resource-poor ones, men and women, should have better access to education and training, appropriate technologies and resources;
- campaigns to increase public awareness of the need for and approach to sustainable development of drylands should be undertaken.

21 B. COURSE OF ACTION

(I) NATIONALLY

(a) Guiding Policies

7. National Plans of Action to Combat Desertification (NPACDs) should be prepared on the basis of the above outlined general Policy Guidelines and taking into account specific ecological and socio-economic conditions in different countries affected by desertification. These Plans should be fully integrated in national programmes of socio-economic development and accorded their appropriate places, priorities, resources, etc. They may either be (i) a part of the National Nature Conservation Strategy, or (ii) a part of the National Environment Action Plan, or (iii) an independent programme, but in any case they must be a part of the National Development Programme. The current World Bank's initiative of multi-donor National Environmental Action Plans [NEAPs] which is already being implemented in some 20 countries of Africa and Latin America, and which aims to define a time-bound plan outlining environmental policy needs, institutional and legal reforms, corrective measures to on-going development programmes, and new investment programmes needed in this sector, could be considered as an important mechanism in resolving problems of desertification.

8. A useful way to address the causes of desertification is to construct a multi-level set of explanations for the cause of land degradation. Such a "chain of explanations" contains nested explanations, commencing at the site with physical symptoms such as falling crop yields or excessive soil erosion; it continues its explanation by broadening into land use practices, that cause erosion such as overstocking; then it examines the resources, assets, skills and technologies of the land-users in, for example, the constraint of supplying additional family labor; widens further to the nature of agrarian society in, for example, distribution of land rights and the general division of labor; continues with the nature of the state, including conservation laws, effectiveness of institutions and government policies; and finishes with the international world economy which may well in part explain desertification through foreign debt crises, oil and food prices and structural readjustment prepared by international financial institutions. These are not mutually exclusive explanations. However, each level in the "chain" may prompt possible interventions, the success of which in preventing desertification and rehabilitating its consequences will depend on their compatibility with other levels in the chain. These "pressure- points" for attention should ensure a balanced addressing of the causes of the problem.

9. The NPACDs should integrate four closely interrelated elements: (i) prevention of land degradation in areas prone to desertification by applying appropriate land use policies and conservation strategies; (ii) reclamation of already desertified lands and bringing them back to their productive state, starting from least affected and gradually proceeding to more seriously

affected in accordance with an economic and social feasibility pattern; (iii) full conservation/reservation of lands most seriously degraded down to the desert-like condition for their natural recovery or future rehabilitation actions, (iv) integrated development of land resources in drylands for their sustainable utilization in agricultural and non-agricultural uses.

10. The NPACDs should be prepared taking full account of national land-use and agricultural policies. They should aim at reducing conflicts and competitive demands on land. They should also aim at achieving the objectives of agriculture: food sufficiency and security, sustainable production, employment of the population, settlement of pastoralists if profitable, etc. National policies should provide for empowerment of local communities, so that individual production units have assured access to land, water and such resources as are critical for production and reproduction.

11. The NPACDs should be within national socio-political policies taking full account of: (i) equity of public participation, (ii) balance of urban and rural interests, (iii) organization of rural populations into community groups or institutions (to replace tribal structures, for instance), (iv) self-reliance or dependence on external aid, (v) national food security or dependence on international trade and assistance, etc.

12. The above provisions of the NPACDs should be translated into legislative instruments. New national environmentally and development oriented land use policies should be developed, adopted through appropriate national legislation and implemented through competent institutions. These policies should contain, inter alia, explicit provisions for the following aspects: (i) security of resource tenure, (ii) extension of appropriate technologies, (iii) provision of credit, (iv) sustained extension programmes, (v) reinforced systems of local food security, and (vi) support of rural institutions.

13. The implementation of the NPACDs needs to be managed by an authoritative and effective national machinery with efficient institutional infrastructure, particularly at local grassroots level.

14. The implementation of the NPACDs should be supported by the effective national scientific and technological capabilities. These need to be associated with a national programme for extension services that provide for the transfer of scientific and technological knowledge to the field and the working people, farmers and pastoralists in particular.

15. In formulating the NPACDs, reference for detail should be made to specific recommendations of the Plan of Action to Combat Desertification as adopted by UNCOD in 1977.

(b) Practical Steps

16. Scarcity of resources often necessitates that actions required at national level be phased out by certain priorities which could be different in different countries. However, some general priorities might be recommended as follows:

PREVENTIVE, CORRECTIVE AND REHABILITATION MEASURES

Recommendation 1: To introduce improved land use systems in areas affected by, or prone to, desertification:

- STEP 1 - to introduce an integrated approach to the utilization of every piece of land in accordance with its ecological characteristics, natural capabilities and constraints; this should ensure complementarity between farming, pastoralism and forestry and between economic and social goals of individual farmers/pastoralists, local rural communities and of the country as a whole in the utilization of the existing land resources, bearing in mind their limited amount and differences in natural productivities. For doing this, land- use planning should be undertaken at all levels from the farm level through local/provincial and up to the national level;
- STEP 2 - to introduce improved land/water/crop management systems based on innovative or adapted indigenous technologies in the existing irrigated lands with the following priorities: (1) prevention of land degradation on 102 million hectares of non- degraded or slightly degraded lands; (2) implementation of corrective measures on 34 million hectares of moderately degraded lands and (3) reclamation of 9 million hectares of severely and very severely degraded lands; these improvements should aim at enhancing food production, efficient use of scarce water resources, reclamation of degraded soils, prevention of water-logging, secondary soil salinization and/or alkalization, prevention of air, water and soil pollution with excess of agricultural chemicals; the improvements should be undertaken line-in-line with the improvement of the living conditions of the peoples engaged in irrigated agriculture and of the infrastructure of these territories; the development of new irrigation systems for crop production, particularly for the cash crops should be considered in view of the improvements achieved in the existing irrigation systems;
- STEP 3 - to stabilize rainfed croplands using the most potentially productive soils and avoiding marginal ones, particularly those that better belong to rangelands, and to introduce improved soil/crop management systems based on innovative or adapted indigenous technologies, particularly using the agroforestry approach, with the following priorities: (1) prevention of land degradation on 242 million hectares of non-degraded or slightly degraded lands, (2) implementation of corrective measures on 183 million hectares of moderately degraded lands, and (3) reclamation of 33 million hectares of severely and very severely degraded lands; these improvements should be directed to the growth of crop production, economical and effective use of land resources, reclamation of degraded soils, prevention of water and wind erosion of soils, prevention of environment pollution with the excess of agricultural chemicals; these improvements should be undertaken in parallel with the improvement of living conditions of the peoples affected and of the infrastructure of these territories; the development of new lands for rainfed agriculture in drylands should be discouraged by all means for the time being;
- STEP 4 - to introduce improved rangeland/husbandry management systems based on innovative or adapted indigenous technologies with the following priorities: (1) prevention of land degradation on 1,233 million hectares of non-degraded or slightly degraded lands, (2) implementation of corrective measures on 1,267 million hectares of moderately degraded lands, and (3) reclamation of 2,066 million hectares of severely and very severely degraded lands; these improvements should aim at enhancing production, rehabilitation of exhausted rangelands, prevention of degradation of soil and plant cover; the improvements should be undertaken line-in-line with the improvement of the living conditions of the peoples affected and of the infrastructure of these territories; the establishment of extensive complementary irrigated pastures instead of intensive crop production irrigation systems, whenever

appropriate, should be considered within the general framework of land use improvements;

- STEP 5 - to undertake major afforestation/reforestation programme throughout areas affected by, or prone to, desertification, taking the agroforestry approach whenever appropriate; this programme should be directed to the establishment of protective forest belts for various purposes (around fields, roads, settlements, processing and other facilities, etc.) - shelter belts, windbreaks, etc., and to the creation of forest plantations;
- STEP 6 - to undertake, whenever appropriate, a major campaign on stabilization of shifting sands and for their protection for natural rehabilitation.

The above measures for improvement of land use systems in the areas affected by, or prone to, desertification should be adopted and prioritized in space and time, within the NPACDs. Reference here is made to Recommendations 2, 6, 7, and 19 of PACD-77.

Recommendation 2: To develop and introduce appropriate and improved agricultural and pastoral technologies, that are socially and environmentally acceptable and economically feasible and compatible with new land use systems. The new technologies which are to be developed and adopted need to: (i) address immediate and short-term needs for food and income; (ii) to be based on existing practices, i.e. modify rather than replace; (iii) diversify farming practices; (iv) minimize capital/resource requirements and external inputs; (v) provide economic returns; (vi) meet labor availability.

Reference here is made to Recommendations 6, 7, and 19 of PACD-77.

Appropriate technologies to be considered, include, inter alia:

- in irrigated farmlands
 - provision of adequate drainage facilities;
 - introduction of water conservation schemes, including efficient systems of water delivery, water harvesting, broad-bed-and-furrow systems, ridging and tied- ridging, small dams;
 - irrigation water quality control;
 - introduction of new irrigation-responsive crop varieties;
 - biological control of crop pests and diseases;
 - introduction of an ameliorative field into crop rotation;
 - watering in accordance with current plant needs and the state of soil moisture to avoid soil deterioration and to economize on water;
 - reduction of surface soil evaporation;

- reduction of chemical systems of plant nutrition by introducing adequate biological systems, use of organic and green manure and adopting adequate crop rotation and mixed cropping;
- in rainfed croplands
 - introduction of soil-conservation-oriented cropping and soil cultivation practices, including anti-erosion technologies as appropriate, based on reduced requirement for external input and, at the same time, increased efficiency of added inputs: various mechanical structures such as bench terraces, contour drains, contour ditches, contour ridges, small hollows and lunettes, also biological techniques such as mulching, barrier hedges, etc.;
 - introduction of integrated systems of soil fertility management, where all input and output factors are manipulated in a judicious way;
 - introduction of new, more productive crop varieties;
 - diversification of farming practices in time and space and crops (mixed cropping);
 - reduction of the chemical system of plant nutrition and plant protection by introducing appropriate Integrated Plant Nutrition systems based on combinations of crop residue mulch, animal manure and mineral fertilizers with minimum tillage;
 - introduction of crop/land-use rotation systems as appropriate, e.g. farming-tree (pasture), farming-tree plantation like gum-arabic shift cultivation, farming- grazing-forestry, etc.
 - creation of shelter-belts and other appropriate field protective tree plantations;
- in rangelands
 - improvement of rangelands by reseedling, periodical withdrawal from use, etc.;
 - introduction and maintenance of rotational grazing system;
 - limiting the number of animals to the rangeland carrying capacities;
 - introduction of new and more productive stock varieties;
 - creation of animal food supplies (including reserve supplies) at watering points;
- in mixed farms
 - appropriation of specific plots for every particular land use in accordance with slope and soil characteristics and the conditions of water availability;

- introduction of agro-forestry approach: shelter belts, biomass transfer techniques, live fences, fodder banks, fuelwood trees on range, reclamation forestry, etc.

Recommendation 3: To establish adequate communication infrastructure and sufficient processing and marketing facilities in areas affected, or prone to, desertification in order to provide rural producers with adequate outlet for increased production thus creating an incentive for agricultural development. Recommendations 4 and 19 of PACD-77 should be referred to.

Recommendation 4: To develop and conserve available water resources in areas affected by, or prone to, desertification and to introduce improved water management systems with particular attention to the development of advanced and efficient irrigation systems. Recommendations 5, 8 and 26 of PACD-77 should be referred to.

Recommendation 5: To reclaim for productive use or to protect for natural rehabilitation, as appropriate, severely desertified lands which became desert recently or were inherited from the past and originated from the adverse human impact on the environment. Reference here is made to Recommendations 9 and 10 of PACD-77.

Supporting Measures

Recommendation 6: To establish or to strengthen the national institutional capabilities for implementing the NPACD, including hierarchical networks up to the grassroots level:

- to establish or to strengthen, as appropriate, national anti-desertification authority (Commission, Advisory Board, Department, etc.) within the Government with access to the highest executive and decision-making level;
- to establish anti-desertification commissions-boards within provincial/divisional/district or other local governing or executive bodies in accordance with the existing administrative division in a country;
- to establish land-users' anti-desertification committees in all rural communities affected;
- to organize working co-operation between local authorities, extension services and land- users committees in planning and implementing anti-desertification measures including full-scale technical assistance to farmers and pastoralists;
- to support existing or newly established national non-governmental organizations (NGOs) including co-operatives, women, youth and children organizations and school associations in particular, and to strengthen their working co-operation with the government and local authorities concerned with the implementation of the NPACD, with a view of their active participation in the national anti-desertification campaign.

In implementing this recommendation, reference here is made to Recommendations 3, 18 and 21 of PACD-77.

Recommendation 7: To launch nation-wide major anti-desertification awareness/training campaign through existing mass-media facilities, educational network and newly created or

strengthened extension services, fully ensuring people's access to the knowledge of desertification and to the Plan of Action to Combat Desertification:

- to organize a series of demonstration sites at the existing or newly established experimental stations, plots, villages (ecovillages), etc. showing examples of anti-desertification land use and appropriate technologies ensuring free access of local populations to these establishments;
- to publish in local languages and distribute through national anti-desertification networks or appropriate extension services locally adapted varieties of simple but attractive colorful pamphlets or leaflets related to the problem of desertification and its combat;
- to establish in all relevant national and local newspapers, radio and television programmes a special anti-desertification regular page or a corner in order to provide the public and land users in particular with day-to-day information with specific emphasis on problems involved in different localities, technological advice, stories of success;
- to introduce in rural areas affected by desertification special courses on desertification in all public schools at an appropriate level of education;
- to organize, through existing or newly established extension services and anti-desertification networks, an anti-desertification in-job training of farmers and pastoralists in the areas affected by desertification providing them with appropriate learning materials.

Recommendation 20 of PACD-77 should be referred to in this respect.

Recommendation 8: To introduce a "loop model" in the existing or newly established extension service in the areas affected by desertification. The first step in this model is to provide understanding of the rationale and ecological stability of traditional resource management systems and the indigenous knowledge related to them. The second step is to use external and local expertise to investigate why these traditional practices are no longer adequate and to identify areas where management has to be adjusted. The third stage, completing the loop, requires the interaction of local and external expertise to develop potential innovations which solve the resource management problems. These must then be tested in the field with the communities or producers who have been involved in developing them, before the large scale introduction throughout the area. This loop process requires intensive communication between the local population, extension service and research centers. Extension agents should be trained in how to listen to the people, how to capture indigenous knowledge, how to learn from the adaptive strategies that local people have developed in response to often difficult and inhospitable environments.

Recommendation 9: To finalize the operative large-scale local and national assessment of the current status of desertification, including (a) the status of rural populations, (b) the state of lands and physical causes of their degradation, (c) the trends of local climate changes (d) social, economic and political causes of underdevelopment and resulting immediate causes and processes of desertification, and to provide the Government with appropriate detailed and up-to-date information related to desertification.

Recommendation 10: To develop, adopt through appropriate national legislation and introduce institutionally new national environmentally/developmentally oriented land use policy which would be directed to the improvement of land use, appropriate management of the commons, provision of incentives to small farmers and pastoralists, ensuring the involvement of women, and encouragement of private investment in the development of drylands. This policy should contain, inter alia, explicit provisions for the following institutional aspects: (a) security of resource tenure, (b) adoption of appropriate technologies, (c) provision of credit, (d) sustained extension programmes, (e) reinforced system of local food security, (f) support of rural institutions, (g) appropriate pricing policy.

Recommendations 2, 13 and 17 of PACD-77 should be referred to while tailoring for the required actions.

Recommendation 11: To develop and introduce effective national insurance schemes against recurrent drought and famine. Recommendation 17 of PACD-77 should be referred to in this respect.

17. In various countries affected by desertification the implementation of the above practical steps will undoubtedly vary in accordance with differences in ecological, socio-economic and political conditions. Some countries have already started their national anti-desertification campaigns and introduced appropriate programmes which are being implemented on a scale compatible with the available resources. Others are unable to start purposeful action because of civil strife and political instability. Still others are even one step back due to recent or current civil wars. Therefore, the situation varies greatly throughout the world. Consequently, a uniform world-wide time frame for the global implementation of the Plan of Action to Combat Desertification, cannot be envisaged. Furthermore, the combat against desertification is a long- term process and not a one-act operation.

18. Countries affected by, or prone to, desertification might wish to set their own priorities in implementing their NPACDs. However, it seems logic that first practical step would be to implement Recommendations 6 and 7 above, within 3-5 years. Recommendations 8, 9, 10 and 11 may take a longer time probably up to the year 2000. Implementation of Recommendations 1 and 2 could start simultaneously on a trial basis. The Plan can thus become fully operational throughout affected areas by around the year 2000. Full scale reconstruction will take longer time probably through the year 2010 by which time Recommendations 1 and 2 could be fully implemented. The stabilization period will take still a longer period probably up to year 2020 by which time Recommendations 3, 4 and 5 would have been implemented.

19. The full implementation the Plan of Action to Combat Desertification should result in: (a) ensuring that objective of arresting desertification is attained; (b) living, health and cultural conditions of populations affected will be substantially improved; (c) the environment of areas affected will be improved and stabilized; (d) productivity of affected lands will be sustained; (e) the economy of areas affected will be improved and stabilized; (f) populations of areas affected will be involved in a progressive socio-economic development.

20. A programme for the implementation of a world-wide direct action to combat desertification may be based on one of the following options:

- i. Implement programmes of direct preventive measures in productive drylands that are nor desertified or only slightly desertified (about 30% of the productive drylands;

total cost estimate is US \$ 1.4-4.2 billion per year; this, however, will not save territories that are moderately desertified from further deterioration;

ii. Implement the above programme plus programme of direct corrective measures in productive drylands that are moderately desertified (areas with 10-25% loss of productivity in cropland and 25-50% in rangeland); total cost estimate is US \$ 3.8-11.4 billion per year;

iii. Implement a comprehensive programme of direct measures to combat desertification in all productive drylands (preventive-corrective-rehabilitation); total cost estimate is US \$ 10.0-22.4 billion per year.

The above options could be considered as the sort of action priorities that could be adopted globally and nationally. They could be modified as appropriate with the areas concerned.

(II) REGIONALLY

21. The experience of the 80s clearly indicated that the regional approach to international co-operation in solving major environmental and development problems is the most promising one. This was particularly exemplified by the achievements of UNSO in the mobilization of resources needed for combating desertification in the Sudano-Sahelian region of Africa. Some practically oriented regional programmes were recently developed, e.g. by the Arab League through the Arab Centre for the Study of Arid Zones and Dry Lands (ACSAD), by the African Ministerial Conference on the Environment (AMCEN) through the African Deserts and Arid Lands Committee (ADALCO) and the Inter-governmental Authority on Drought and Desertification (IGADD), by the Asian NGO Coalition for Agrarian Reform and Rural Development (ANGOCO), by the Inter-State Committee for Control of Drought in the Sahel (CILSS), by the UN Economic and Social Commission for Asia and the Pacific (ESCAP) through the Regional Network of Research and Training Centers on Desertification Control in Asia and the Pacific (DESCONAP), by the Southern Africa Development Co-ordination Conference (SADCC). These initiatives should be fully utilized and further developed.

22. In addition to the above, the concept of eco-geographical regions of the world should be fully utilized, preferably combining the anti-desertification efforts of countries at different levels of development within united anti-desertification programmes, e.g. Mexico-USA, China- Mongolia-USSR, India-Pakistan, Afghanistan-Iran-USSR, etc.

23. Institutional support for regional co-operation should be provided in order to plan, co-ordinate and monitor joint regional activities and to mobilize the resources needed for the implementation of the regional programmes. This support should be organized either through existing inter-governmental regional bodies or through those newly established for this purpose. The UN Regional Commissions and the existing regional inter-governmental organizations should be fully involved and be responsible for these regional actions.

24. The UN General Assembly could be invited to consider the establishment of small sub-regional offices, probably within UNDP, analogous to UNSO, for some of the eco-geographical sub-regions in order to assist the sub-regions and their countries in the mobilization of the resources and technical assistance with possible creation of these as joint ventures between UNDP, IFAD, WFP, FAO and UNEP whenever appropriate.

(III) INTERNATIONALLY

25. International co-operation at a global level in implementing the Plan of Action to Combat Desertification is to be organized on a partnership basis between all countries of the world as this environmental/development problem is of a global magnitude and should not be considered as just another aid programme of the richer countries to poorer ones. This co-operation is needed in the following areas:

- Mobilization of financial resources and provision of financial assistance to the countries which cannot cope with the problem by themselves;
- Development of pricing and trade policy that would favor agricultural development and sustainable productivity of drylands;
- Provision of technical assistance to the countries in need;
- Development of appropriate anti-desertification technologies and technology transfer to the needy countries on favorable terms;
- Monitoring and co-ordination of the anti-desertification campaign at a global level;
- Information exchange;
- International legislation, as appropriate.

26. The first task might be addressed bilaterally through adjusting the World Bank, UNDP and UNEP's Global Environmental Facility or the establishment of a special facility within the United Nations for funding the implementation of the Plan of Action to Combat Desertification. The second task should be more vigorously and effectively addressed through GATT and other relevant UN structures.

27. Provision of technical assistance in combating desertification to needy countries should be organized bilaterally or through the existing specialized agencies and organizations of the United Nations system e.g. UNDP, FAO, WMO, WHO, UNEP, UNESCO, etc. For this purpose, all existing technical assistance or other relevant international programmes of these UN bodies, e.g. Man and the Biosphere programme of UNESCO, Environment Action Plan of the World Bank, Global Environment Facility of the World Bank/UNEP/UNDP, Tropical Forestry Action Plan of the World Bank/FAO/UNDP/WRI, Energy Sector Management Action Programme of the World Bank/UNDP, Tropical Diseases Research Programme of the World Bank/UNDP, World Soils Policy of UNEP, World Conservation Strategy of IUCN, Programme of Action of the World Conference on Agrarian Reform and Rural Development (WCARRD, 1989), International Action Programme on Water and Sustainable Agricultural Development of FAO, International Cooperative Programme Framework for Sustainable Agriculture and Rural Development of FAO, etc., for the areas and regions identified as being affected by, or prone to, desertification should be fully co-ordinated within national development programmes aiming at prevention and rehabilitation of desertification impacts in accordance with the specific recommendations of the PACD.

28. Development of appropriate anti-desertification technologies, both modernized high-input and indigenous low-input, should be organized and internationally co-ordinated through existing national, regional and international research centers, particularly through the network of the Consultative Group on International Agricultural Research (CGIAR) or a comparable network to be specialized in drylands development and desertification matters. The transfer of

technology developed internationally to needy countries should be organized through the existing international channels of technical assistance. The transfer of technology developed nationally on a commercial basis should be organized with assistance from the above mentioned environment or anti-desertification funding facility.

29. A world machinery for monitoring desertification and its operational assessment by using remote sensing technology with computerized data processing should be established. This machinery could be a section of the enlarged EARTHWATCH, including GEMS, GRID and the Desertification Database of DC/PAC in UNEP. The establishment of a network of the regional monitoring/assessment facilities should be considered, that would be co-ordinated and backed-up by the EARTHWATCH. The existing facilities, e.g. in Dakar, Ashkhabad, Jodhpur, Damascus, Nairobi, Lanzhou, etc. could be part of the global network. It would be important to stress that the desertification assessment/monitoring network should not constitute a separate establishment but, be a part of the general global environment assessment/monitoring system which would regularly provide all necessary data on the status of the natural resources (soil, water, air, vegetation, animals, etc.) and peoples (number, health, etc.) of the world. The main immediate task would be to establish a Global Baseline Reference Database for future assessments of changes and trends.

30. World capability for advanced training in desertification assessment/monitoring should be substantially strengthened, particularly in such world centers as FAO; the International Institute for Aerospace Survey and Earth Sciences in Enschede, the Netherlands; the USA Environmental Systems Research Institute, Inc.; Belgian Catholic University in Leuven, etc.

31. Responsibility for over-all global monitoring and co-ordination of the anti-desertification campaign should be given to UNEP with its existing inter-governmental and inter-agency mechanisms, including IAWGD and DESCON.

32. UNEP and UNDP should, once in five years starting from 1995, jointly review the implementation of the PACD and of corresponding development programmes in the areas affected by desertification in order to suggest, in time, necessary corrective measures at an international level.

33. International legislation concerning the drylands should be developed: the desert fringes which are prone to desertification should be internationally and nationally declared as "PARTICULARLY SENSITIVE AREAS" with all legal implications concerning their use and protection, e.g. prohibition of agricultural development in dry steppe virgin lands.

PART IV

22 FINANCING THE PLAN OF ACTION TO COMBAT DESERTIFICATION

23 A. DESERTIFICATION COSTS

24 (I) COST OF THE DAMAGE

1. There is no methodology for an accurate estimation of total economic loss due to desertification as there are far too many unaccountable losses involved, particularly off-site and social losses. Direct on-site losses can be calculated more or less reliably taking into account an estimated loss in productive capacity (income foregone) due to land degradation in different land use systems. This could be roughly calculated based on the experience of several countries with varying economic situations.

2. In 1977, UNCOD studies calculated that the process of desertification made a significant contribution to land degradation throughout the drylands of the world and that the losses in productive capacity (income foregone) because of this, amounted to nearly US \$ 26 billion per year. It was further estimated in 1980 that the cost of not stopping land degradation in drylands over the next 20 years was in the region of US \$ 520 billion, excluding the price of suffering of the millions of affected people.

3. The following basic figures for the average yearly income foregone due to desertification were assumed for the present assessment, at 1990 prices:

US \$ 250 per hectare of irrigated land at least moderately degraded;

US \$ 38 per hectare of rainfed cropland at least moderately degraded;

US \$ 7 per hectare of rangeland at least moderately degraded.

4. Based on the above figures and taking into account the total areas affected by degradation in each of the land use categories (43 million hectares of irrigated land, 216 million hectares of rainfed cropland and 3,333 million hectares of rangeland), the following figures for annual average income foregone due to land degradation were arrived at, in million US \$:

Continent	Irrigated land	Rainfed Cropland	Rangeland	Total
Africa	475	1,855	6,966	9,296
Asia	7,953	4,647	8,313	20,913
Australia	63	544	2,529	3,136
Europe	474	450	564	1,488
N. America	1,465	441	2,878	4,784
S. America	355	252	2,084	2,691
Total	10,785	8,189	23,334	42,308

5. Naturally, global direct annual loss (income foregone) of US \$ 42.3 billion is a very rough average estimate as the actual figures vary greatly from country to country and from continent to continent. This figure just shows an order of magnitude of the loss involved. It also shows

that the cost of inaction over the next 20 years will be of an order of US \$ 850 billion as compared with the earlier, 1980, estimate of US \$ 520 billion.

6. The inter-continental comparison however, gives an idea of differences between various regions of the world. The major loss occurs apparently in Asia due to the largest area affected; then follows Africa, while Europe loses the least amount.

7. As for different land use systems, the major loss occurs due to degradation of global rangeland because of its enormously large area which is affected. Losses in irrigated land and rainfed cropland are more or less the same. However, large differences exist between continents in this respect and, of course, between individual countries.

8. If the 1980 figure is taken as the lowest estimate and the 1991 figure as the highest, both being rather conservative, then the calculations show that the world's inability to combat desertification during fourteen years from 1978 to 1991 has already cost the world some US \$ 300 to 600 billion in income foregone.

9. Presently, there is not even a rough estimate available of the off-site and other indirect economic losses due to desertification. Some studies suggest that it might be 2-3 or even up to 10 times higher than the direct on-site losses. This question should be more extensively studied and, of course site-specifically, as the differences between various ecological and socio-economic situations throughout the world do not permit any generalization in this respect.

25 (II) COST OF PREVENTION, CORRECTION AND REHABILITATION

10. Actions of combating desertification are inseparable from actions of resource development and management in drylands. Schemes that aim at arresting degradation of rangelands, rainfed and irrigated croplands, at sand dune stabilization, at establishing large-scale green belts, at introducing soil and water conservation systems in resource management, or at reclaiming new areas for productive use, are apt to be costly. In the majority of developing countries fully or partly dependant on their dryland resource base and having accumulated problems of poverty and underdevelopment, costs will be higher. While the projects designed for preventing further land degradation and sustaining its productivity might have reasonable costs and economic feasibility, the rehabilitation projects are generally non-competitive in terms of market values, especially when compared with prevalent rates of interest. Rates of return for the capital investments in these projects are rather low. Investments in land rehabilitation projects commonly do not pay well financially, but their social and humanitarian values as means of ensuring food security and participation in production are immense.

11. In 1980, it was estimated that a 20 year world-wide programme to reclaim desertified lands would require about US \$ 90 billion or US \$ 4.5 billion a year; developing countries in need of financial assistance would require US \$ 48 billion of this amount or US \$ 2.4 billion a year. There was no attempt made at that time to estimate the cost of preventive measures to arrest further desertification of lands that were not affected or only slightly affected by the process.

12. It is assumed that drylands that are not affected or only slightly affected by desertification would require measures directed to prevention of land degradation and sustaining their

productivity. Moderately affected land would require certain corrective measures in addition, e.g. provision of adequate drainage in irrigated croplands. Drylands, which are severely or very severely degraded, need serious efforts for their rehabilitation and return to productive use. In different land use systems, the costs of preventive, corrective and rehabilitation measures will be quite different, not speaking about the differences between the costs in different ecological and socio-economic situations in various countries of the world.

13. The following global average indicative figures for the costs of direct anti-desertification measures* in different land use systems and for various degrees of land degradation were obtained on the basis of an analysis of large numbers of relevant projects in different parts of the world, in US \$ per 1 hectare:

Degree of Land Degradation	Irrigated Lands	Rainfed Croplands	Rangelands
Slight to none	100-300	50-150	5-15
Moderate	500-1,500	100-300	10-30
Severe	2,000-4,000	500-1,500	40-60
Very severe	3,000-4,000	2,000-4,000	3-7

* Description of thus costed relevant measures for each land use system and for each degree of land degradation are given in Tables 9-11 in the Annex. Measures do not include insurance against recurrent drought. The range of cost figures in each of the land use systems is mostly determined by the specificity of local natural and socio-economic conditions at the site of every particular project and not by the fact that it is implemented either in a developed or in a developing country or in any specific continent; there are certain extremely low and extremely high costs in some instances throughout the world but they are excluded from these global average ranges.

14. Taking into account the above costs and the relevant figures for the world status of desertification (Tables 1-3 in the Annex), the calculations give the following costs of direct anti-desertification measures, which should be considered as showing only an order of magnitude for the world as a whole, in billion US \$ (see details in Tables 9-11 in the Annex):

	Preventive measures	Corrective measures	Rehabilitation measures	Total
Irrigated lands	10-31	17-50	21-41	48-122
Rainfed croplands	12-36	18-55	22-59	53-150
Rangelands	6-18	13-38	80-120	99-176
Total drylands	28-85	48-143	123-220	200-448
Per one year for a 20-Year programme	1.4-4.2	2.4-7.2	6.2-11.0	10-22.4

15. Compared with 1980s estimation of US \$ 90 billion, or US \$ 4.5 billion a year for a 20-Year programme, the present estimate of US \$ 171-363 billion, or US 8.6-18.2 billion per year, for the corrective and rehabilitation measures in drylands affected by desertification at least moderately is three to four times higher due to the following reasons: (a) more accurate land degradation assessment in 1991, and (b) growth of world prices and costs of land

reclamation. No similar comparison can be made for the cost of preventive measures in drylands as it was not calculated in the 1980 studies.

16. Taking the global indicative sums and averages for a 20-Year programme, the simple comparison would show the following pattern, in billion US \$:

	Annual income forgone due to desertification	Annual cost of preventive measures	Annual cost of corrective measures	Annual cost of rehabilitation measures	Total annual cost of all measures
Irrigated lands	10.8	0.5-1.6	0.9-2.5	1.0-2.0	2.4-6.1
Rainfed cropland	8.2	0.6-1.8	0.9-2.8	1.1-3.0	2.7-7.5
Rangelands	23.3	0.3-0.9	0.7-1.9	2.0-6.0	5.0-8.8
Total drylands	42.3	1.4-4.2	2.4-7.2	6.2-11.0	10.0-22.4

17. The above comparison will give the following simple cost/benefit ratios: 1/2.5 for irrigated croplands, 1/1.5 for rainfed croplands, 1/3.5 for rangelands, and 1/2.5 for the whole anti-desertification campaign in the drylands. It would be misleading, however, to use these figures as accurate guiding points for an economic evaluation of the PACD, because the time profiles of costs and benefits are different. This is the result of the fact that anti-desertification programmes have a long gestation period and benefits do not appear until many years after. Therefore, the above global calculations provide only a general picture of an order of magnitude, while the accurate economic cost/benefit analyses should be made site-specific on a county-by-country basis in order to obtain meaningful operational estimates.

18. The above global costs of direct preventive, corrective and rehabilitation anti-desertification measures should be divided between the industrialized and other countries (18) which need no financial assistance and those developing countries (81) which need external assistance to implement their programmes to combat desertification. The present assessment gives the following pattern in billion US \$, for a 20-Year programme:

	Preventive measures	Corrective measures	Rehabilitation measures	Total cost
Irrigated lands, total	10-31	17-50	21-41	48-122
In industrialized countries	4-13	7-20	7-14	20-40
In developing countries	6-18	10-30	14-27	28-82
Rainfed croplands, total	12-36	18-55	22-59	53-150
In industrialized countries	5-14	7-24	8-18	21-34
In developing countries	7-22	11-31	14-41	32-116
Rangelands, total	6-18	13-38	80-120	99-176
In industrialized countries	3-9	6-14	33-48	39-82
In developing countries	3-9	7-24	47-72	60-94
World drylands, total	28-85	48-143	123-220	200-448
In industrialized countries	12-36	20-58	48-80	80-156
In developing countries	16-49	28-85	75-140	120-292

19. The majority of developing countries affected by desertification are the poorest countries in the world, including the least developed ones with very weak economies, overburdened

with persistent poverty and growing foreign debts. It may thus be assumed that, in order to implement anti-desertification preventive, corrective and rehabilitation measures in 81 developing countries with a total cost of US \$ 120-292 billion within 20 years, some 50% of the cost could at least be covered by the countries themselves while 50% need to be provided through the external assistance. Naturally, there will be a great difference between individual countries in this respect: some will require only 10% in external assistance, while others might demand almost 90%. The following is a summary of the above calculations on a yearly basis, in billion US \$:

Preventive measures	Corrective measures	Rehabilitation measures	Total	
Total global cost	1.4-4.2	2.4-7.2	6.2-11.0	10.0-22.4
Cost to 18 countries not requiring external assistance	0.6-1.8	1.0-3.0	2.4-3.0	4.0-7.8
Cost to 81 countries requiring external assistance	0.8-2.4	1.4-4.2	3.8-8.04	6.0-14.6

20. All above figures indicate the costs of only direct anti-desertification measures, (preventive, corrective and rehabilitation), while the support measures which are recommended in Part III of this report, were not costed because of great differences between the countries concerned. These costs are to be borne almost totally by the countries themselves as they concern the appropriate administrative, legislative, economic and policy adjustment as well as education, training and extension. In any case, it is advisable to bear in mind, that the total cost of combating desertification, including the cost of full implementation of the recommendations of the PACD ensuring sustainable development of drylands, might be several times higher than the above figures of direct costs. Incidentally, the ratios between direct and indirect costs of an order from 1:4 to 1:10 are more or less common in the implementation of the majority of the World Bank, IFAD or FAO large-scale projects concerned with land development and rehabilitation.

26 B. FINANCING THE PACD

27 (I) SUMMARY OF PAST EXPERIENCE

21. The UN General Assembly by its Resolution 32/172 of 19 December 1977 taking note of the report of UN Conference on Desertification 29/8-9/9/1977 (UNCOD) requested regional commissions to take intensified and sustained action in support of national efforts to combat desertification, to assist governments, at their request, in the implementation of the PACD; it further requested the organs, organizations and other bodies of the UN system to support international action to combat desertification within the context of the PACD. The General Assembly also authorized the Executive Director of UNEP to convene immediately a consultative group, which would meet as and when required, comprising of representatives of organs and organizations of UN system, such other organizations as might be required, donor countries, multilateral financial agencies as well as developing countries having substantial interest in combating desertification, to assist in mobilizing resources for the activities undertaken within the framework of implementing the Plan of Action. The General Assembly also endorsed in principle the creation of a special account within the United Nations for implementing the Plan of Action.

28 DESCON

22. In 1978 the Executive Director of UNEP in response to the above convened the Consultative Group for Desertification Control [DESCON] to its first session, and stated at the opening that "it was not a creation of a new organization but mechanism and forum ensuring that resources are invested in the most effective way; and the scope of work will develop and expand as experience is gained from the field and as new horizons of cooperative actions and new sources of support are explored". The first session established procedures for mobilizing resources. Many government representatives, however, expressed their preference of dealing with national projects through existing and established bilateral negotiation mechanisms; and that support to transnational projects could be sought through mechanisms like DESCON.

23. Though UNEP Governing Council and UN General Assembly requested the Executive Director of UNEP, to examine ways and means to enhance efficiency of DESCON and repeated appeals to DESCON to intensify its efforts to mobilize funds/resources for the implementation of the PACD, donors maintained their preference to use bilateral negotiation mechanisms and recipient countries kept on presenting to DESCON projects of inadequate national priority. This was the issue dividing the Group members and restraining the full realization of the fund raising function of DESCON for its all subsequent sessions, until the Ad-hoc working group established by DESCON-6 and the DESCON Special Session in 1988 recommended discontinuation of the mechanism. The Group at its 7th Regular Session in December 1990 resolved to recommend to the General Assembly (through the Governing Council of UNEP) to amend the Group's mandate and discontinue the direct resource mobilization function altogether.

24. In the course of six regular sessions of DESCON various forms to improve Group's performance were tried and new dimensions to its functions were added, i.e.:

(i) By its Resolution 38/165 of 28 February 1984, the General Assembly decided to expand the mandate of DESCON to also "include information exchange on anti-desertification policies and programmes of its participants, in addition to its basic mandate";

(ii) And by its Resolution 39/168 of 17 December 1984 decided to expand the Groups mandate to also include explicitly responsibility for advising the Executive Director of UNEP on:

(a) The progress and effectiveness of activities implemented under the Plan of Action, identifying constraints and possible solutions to problems, taking account of relevant evaluations and case studies;

(b) Programme priorities of the United Nations Environment Programme related to problems of desertification;

(c) Measures required to improve implementation of the Plan of Action on a regional and world-wide basis.

25. By end of 1986 it was obvious, as reported by the Executive Director of UNEP to the 15th Governing Council (ref. UNEP/GC.15/9/Add.4), that DESCON's capacity to secure financial resources for projects presented to it had been inadequate to the needs of the Plan of Action.

Over the eight-year period 1978-85 (DESCON 1-5) a total of 74 projects were submitted to the Group of which only 29 have been implemented either in part or in their entirety. The total funding amounted to US \$ 47.3 million as compared with estimates of a total cost of US \$ 540.6 million for all 74 projects.

26. In addition at DESCON-6 in 1987 another 13 projects worth US \$ 29.0 million (and requiring about US \$ 24.0 million external assistance) were presented. Many donors and UN organizations expressed interest, but no firm funding commitments were made. At DESCON-7, 9 countries (Argentina, Mali, Somalia, Syria, Tunisia, United Republic of Tanzania and Yemen) presented to the Group their National Plans of Action to Combat Desertification; and SADCC presented its sub-regional (Kalahari-Namib) action plan. Six of these plans (excluding Argentina, Nigeria and Syria) contained projects requiring funding assistance worth over US \$ 720 million, but no interest to pledge funding was expressed by donors through DESCON mechanism; they however expressed their preference (once gain) to consider such projects (of NPACDs) through existing and established bilateral negotiation mechanisms.

Special Account

27. As of 31 December 1988 a total of only 166,886 US Dollars has been paid to the account. UN General Assembly by its Resolution 44/172 of 19 December 1989 decided to close the account and requested the Executive Director of UNEP to take necessary steps to do so. With interest added to the collections, the account, as at 31 January 1991, stood at US \$ 313,854, the amount of which has been utilized in 1991 for the preparation of the expert studies requested by the General Assembly at its resolution 44/172. As at 31 March 1991 the status of contributions showed a balance of unpaid pledges as US \$ 12,404.

UNSO Joint Venture of UNEP and UNDP

28. During 1979-1990 UNDP and UNEP together have contributed US \$ 20.6 million (10.0 million for programme and 10.6 million for institutional support) to the Joint Venture with the United National Sudano-Sahelian Office (UNSO) which was created by UN GA Res. 33/88 of 15 December 1978 for the implementation of the PACD in the Sudano-Sahelian Region. In addition to this seed money, US \$ 198.3 million were made available to UNSO Trust Fund between 1974 and end 1987. More than 75% or approximately US \$ 151 million of this pertained to the projects related to the implementation of the PACD in the region. In 1988-1990 an additional US \$ 92.8 million were mobilized by UNSO through its Trust Fund, thus totalling the UNSO Trust Fund contributions up to the end of 1990 the sum of US \$ about 290 million.

Other Sources of financing

29. The national expenditures as well as bilateral contributions for the PACD implementation by donor countries and international agencies both within and outside of the United Nations system are not known. Only scattered information from a few donors and agencies is available presenting no clear global picture.

30. Many international agencies and organizations such as the World Bank, UNDP, UNEP, UNSO, FAO, IFAD, UNESCO, WFP, WHO, WMO and others, have contributed financially to the implementation of the PACD. In the majority of the projects financed by these bodies,

however, it would be very difficult to separate funding for anti-desertification actions per se and that for other activities implemented in the countries affected by desertification.

31. Some information on the level of financing of the PACD may be found in the reports of relevant organizations, although it would be incomplete and just showing the examples:

- UNEP's expenditures (excluding annual contribution of US \$ 0.5 million to the UNSO Joint Venture of UNDP/UNEP) for 73 projects including global assessment, co-ordinating and catalyzing activities as well as the assistance to developing countries, amounted to US \$ 28.1 million for the period of 1978-1991 or some US \$ 2.0 million per year;
- UNSO, within its UNDP/UNEP Joint Venture and through its Trust fund, has mobilized about US \$ 312 million during 1979-1990 or some US \$ 28 million per year, out of which the sum of US \$ 141.6 million were spent on financing 202 projects directly related to combating desertification in 22 countries of the Sudano- Sahelian region; projects of assistance to the region increased from US \$ 15 million in 1986 to US \$ 27 million in 1989; new operational activities approved by UNSO in 1990 totaled US \$ 40 million: rehabilitation of gum arabic plantations in Kordofan and Darfur provinces in the Sudan, sand-dune stabilization in Mauritania, integrated resource management projects in association with the local population, the Ecological Monitoring Centre in Senegal, the tree seed centres throughout the region, etc.;
- FAO is currently supporting 184 projects related to combating desertification in developing countries, mainly in Africa, with financial assistance of US \$ 85 million;
- UNDP in the Fourth Country Programme (1987-1991) approved 125 projects directly related to drought and desertification, with a financial contribution of US \$ 129 million, 111 at national level and 14 regional projects;
- the World Bank in 1990 approved 11 free-standing environmental loans related to combating desertification, mainly for African countries, as against only 2 in 1989;
- the European Economic Community, within a new Environment Title of the IVth Lomé Convention (1991), has committed a package of grant aid and other forms of financial assistance amounting to nearly US \$ 14 billion over the next 5 years to the African, Caribbean and Pacific (ACP) countries, which encourage governments to draw up long-term plans for placing environmental concerns including desertification in the centre of national development strategies.

32. It is estimated that in 1986 Africa received US \$ 490 million in assistance related to problems of desertification and drought, which was approximately 3.5% of the total assistance for that year. The level of total official development assistance to Sub-Saharan Africa was US \$ 13.4 billion in 1988 (only US \$ 28.9 per capita). Net resources flows to Sub-Saharan Africa in 1989, measured in 1986 prices and exchange rates, declined in real terms overall from US \$ 19.4 billion to US \$ 18.3 billion.

33. Some idea on the achieved level of financing of the PACD at global level might be derived from the fact that all national loan and saving systems, local government budgets and formal credit institutions, multilateral and bilateral lending agencies, and regional development banks, over the past thirty years contributed about US \$ 16 billion to agricultural

programmes, that is nearly US \$ 0.5 billion a year. Only a fraction of this went to the areas affected by desertification and still smaller fraction to anti-desertification measures per se. It should also be noted that financing of agricultural activities, both related to anti-desertification actions and in more humid areas, is but a small proportion of total funding by major international institutions, being however larger in the international assistance programmes, where it has fluctuated from 18 to 44% over the last ten years. With bilateral donors, contributions to agriculture have fluctuated from 10 to 18% of their ODA figures over the same period.

34. Other estimates indicate that some US \$ 0.6 billion per year provided aid for activities related to combating desertification in the developing countries during early 80s. These figures may suggest a comparable estimate of US \$ 0.85 billion per year at present available to activities related to desertification.

35. The above data show very clearly that the amount spent by the world community during 1978-1991 on direct or supporting actions to combat desertification was far below the amount needed for the implementation of the PACD and for achieving substantial results. Likewise, the existing mechanisms for mobilization of the resources and financing the PACD appeared to be inadequate.

29 (II) MOBILIZATION OF RESOURCES

36. Financial assistance to developing countries struggling against desertification should satisfy the following criteria : it must be additional, that is over and above regular budgets and conventional extra budgetary resources, predictable, sustainable, and with a degree of automaticity. Net additional financing and technical assistance to developing countries for combating desertification should be provided by the donor community and international institutions on terms which will not further exacerbate debt and trade problems of recipient countries but rather enhance their development process.

37. In order to mobilize the resources, structural adjustment in public revenue generation and reallocation of expenditures at country level and the structural adjustment in the allocation of expenditures, grants and loans by donors, both bilateral and multilateral, should be undertaken. Particularly, the state of financing of the PACD and drylands development in general should be reconsidered and substantially increased.

38. Reallocation of resources and mobilization of additional resources for financing the PACD in developing countries will be greatly facilitated if the process is oriented by a shared view of priorities, opportunities and constraints in the PACD implementation within a flexible system for accumulation, analysis and exchange of information among the various actors at local, national, regional and international levels.

39. At national level, the role of local financial institutions, which can probably operate with a greater sensitivity to local needs and conditions, should be emphasized.

40. In provision of funds and credits, small-scale and/or resource-poor farmers/pastoralists and local communities at grassroots level should be targeted in order to ensure strong local economic bases for community development and to answer farmers/pastoralists needs in a direct way, rather than to finance the national agricultural sector which often targets exports' production and the consequent degradation and exhaustion of natural resources leading to

desertification. Rural micro-enterprise projects that focus on long-term sustainability should constitute the major recipient body for the financial and technical assistance.

41. Sources of additional financing of the PACD vary and may include inter alia the following:

- national budgets;
- funding by national private and co-operative, state and local financial institutions;
- funding by major international financing agencies like the World Bank, IFAD, WFP, regional development banks;
- funding through multilateral and bilateral aid programmes;
- loans from governments and world capital markets on concessionary basis;
- reduction of external debts;
- debt-for-PACD swaps;
- funding and in-kind participation by international, regional, national and local NGOs;
- funding and assistance from major international agencies, e.g. UNDP, FAO, UNEP, UNESCO, WMO, ILO, WHO, etc., in respective fields of their interests;
- Global Environmental Facility of the World Bank/UNDP/UNEP;
- savings from disarmament;
- special drawing rights-development links;
- Earth Saving Bonds;
- Ecotourism;
- world-wide Environmental Lottery, etc.;
- trust Funds and Foundations;
- additional funds mobilized by the world community specifically for the PACD implementation through inter alia international taxation of trade flows and revenue taxes, taxation of reverse transfer of technology, tax on surpluses in balance of trade, consumption taxes, income from the use of international commons, military taxes, proceeds from IMF gold sales, carbon dioxide tax (emission tax and sink destruction tax), GNP general tax, etc.

42. Forms of financial assistance to developing countries, which cannot cope by themselves with the problem, could vary as well and include such as:

- concessional loans, mainly from financial institutions;

- "soft-term" loans with long-term repayment schedules;
- grants;
- technical and financial assistance on non-reimbursable concessional terms.

43. New international or regional mechanism(s) that could be created, or existing mechanism(s) developed, to manage the process of mobilizing and allocating the financial and technical resources required to address global environment/developing issues, including desertification, might include the following:

- DESCON in its revised and revitalized form;
- international financial corporation that could provide finances on concessionary basis to anti-desertification programmes;
- international anti-desertification convention;
- global anti-desertification trust fund;
- consortium arrangements.

44. Within the scope of the United Nations Conference on Environment and Development, probably, a United International Environmental Fund (Consortium) might be considered, with an appropriate share of the PACD.

Annex

Table 1. Extent of desertification/land degradation in irrigated areas within the drylands of the world, by continents, in thousand hectares

Continent	Total irrigated land	Desertified					
		Slight to none	Moderate	Severe	Very severe	Total moderate +	Percent desertified
Africa	10,424	8,522	1,779	122	1	1,902	18
Asia	92,021	60,208	24,335	5,788	1,690	31,813	35
Australia	1,870	1,620	100	130	20	250	13
Europe	11,898	9,993	1,340	460	105	1,905	16
N.America	20,867	15,007	4,930	730	200	5,860	28
S.America	8,415	6,998	1,047	310	60	1,417	17
TOTAL	145,495	102,348	33,631	7,540	2,076	43,147	30

Source : H. Dregne, ICASALS, 1991

Table 2. Extent of desertification/land degradation in rainfed cropland areas within the drylands of the world, by continents, in thousand hectares

Continent	Total rainfed cropland	Desertified					
		Slight to none	Moderate	Severe	Very severe	Total moderate +	Percent desertified
Africa	79,822	30,959	43,187	5,153	523	48,863	61
Asia	218,174	95,890	100,638	18,578	3,068	122,284	56
Australia	42,120	27,800	13,900	400	20	14,320	34
Europe	22,106	10,252	8,538	3,227	89	11,854	54
N.America	74,169	62,558	10,770	721	120	11,611	16
S.America	21,346	14,711	5,950	561	124	6,635	31
TOTAL	457,737	242,170	182,983	28,640	3,944	215,567	47

Source : H. Dregne, ICASALS, 1991

Table 3. Extent of desertification/land degradation in rangelands of the world, by continents, in thousand hectares

Continent	Total rangeland	Desertified					
		Slight to none	Moderate	Severe	Very severe	Total moderate +	Percent desertified
Africa	1,342,345	347,265	273,615	716,210	5,255	995,080	74
Asia	1,571,240	383,630	485,221	691,602	10,787	1,187,610	76
Australia	657,223	295,873	277,040	55,310	29,000	361,350	55
Europe	111,570	31,053	27,372	51,937	1,208	80,517	72
N. America	483,141	71,987	116,102	284,858	10,194	411,154	85
S. America	390,901	93,147	88,007	184,431	15,316	297,754	76
TOTAL	4,556,420	1,222,955	1,267,357	1,984,348	71,760	3,333,465	73

Source : H. Dregne, ICASALS, 1991

Table 4. Global status of desertification/land degradation in drylands of the world, by continents

Continent	Irrigated lands			Rainfed croplands			Rangelands			Total agriculturally used drylands		
	Total m. ha	Degraded		Total m. ha	Degraded		Total m. ha	Degraded		Total m. ha	Degraded	
		m. ha	%		m. ha	%		m. ha	%		m. ha	%
Africa	10.42	1.90	18	79.82	48.86	61	1342.35	995.08	74	1432.59	1045.84	73.0
Asia	92.02	31.81	35	218.17	122.28	56	1571.24	1187.61	76	1881.43	1311.70	69.7
Australia	1.87	0.25	13	42.12	14.32	34	657.22	361.35	55	701.21	375.92	53.6
Europe	11.90	1.91	16	22.11	11.85	54	111.57	80.52	72	145.58	94.28	64.8
N. America	20.87	5.86	28	74.17	11.61	16	483.14	411.15	85	578.18	428.62	74.1
S. America	8.42	1.42	17	21.35	6.64	31	390.90	297.75	76	420.67	305.81	72.7
TOTAL	145.50	43.15	30	457.74	215.56	47	4,556.42	3,333.46	73	5,159.66	3,562.17	69.0

Source : H. Dregne, ICASALS, 1991

Table 5. Extent of soil degradation, by degrees, in world drylands

Degree	Dry sub-humid		Semi-arid		Arid		Hyper-arid		Total	
	million hectares	%	million hectares	%	million hectares	%	million hectares	%	million hectares	%
None	1071.2	82.7	1886.0	81.8	1176.8	75.0	876.4	89.6	5010.4	81.7
Slight	66.5	29.8	152.5	6.6	208.3	13.3	60.8	6.2	488.6	7.9
Moderate	129.0	10.0	200.2	8.7	141.1	9.0	39.0	4.0	509.3	8.2
Strong	25.8	2.0	63.2	2.7	41.1	2.6	1.8	0.2	131.9	2.1
Extreme	2.2	0.2	3.5	0.2	1.7	0.1	0.1	0.0	7.5	0.1
TOTAL	1,294.7	100.0	2,305.4	100.0	1,569.0	100.0	978.1	100.0	6,147.7	100.0
Degraded	223.5	17.3	419.4	18.2	392.2	25.0	101.7	10.4	1,137.3	18.3

Source : GEMS/GRID 1991 based on GLASOD 1990

Table 6. Extent of soil degradation, by types, in world drylands

Degree	Dry sub-humid		Semi-arid		Arid		Hyper-arid		Total	
	million hectares	%	million hectares	%	million hectares	%	million hectares	%	million hectares	%
None	1071.2	82.7	1886.0	81.8	1176.8	74.1	876.4	89.6	5010.4	81.5
Water	141.0	10.9	213.2	9.3	113.3	7.1	10.9	89.6	478.4	7.8
Wind	46.8	3.6	150.3	6.5	253.3	16.0	80.0	8.2	512.4	8.3
Chemical	22.5	1.7	40.9	1.8	37.3	2.4	10.8	1.1	111.5	1.8
Physical	13.2	1.0	15.1	0.7	6.5	0.4	0.1	0.0	34.9	0.6
TOTAL	1,294.7	100.0	2,305.5	100.0	1,587.2	100.0	978.2	100.0	6,147.6	100.0

Source : GEMS/GRID 1991 based on GLASOD, 1990

Table 7. Extent of soil degradation, by types and degrees, in world drylands, in million hectares

Degree	Water	Wind	Chemical	Physcial	Total
Slight	175.1	197.2	44.3	10.8	427.3
Moderate	208.5	215.4	31.4	15.0	470.3
Strong	79.0	18.0	24.2	8.9	130.1
Extreme	4.8	1.8	0.8	0.0	7.5
TOTAL	467.4	432.4	100.7	34.7	1,035.2

Source : GEMS/GRID 1991 based on GLASOD, 1990

Table 8. Extent of soil degradation in drylands, by continents and zones of aridity

Continent	Dry sub-humid		Semi-arid		Arid		Hyper-arid		Total	
	million hectares	%	million hectares	%	million hectares	%	million hectares	%	million hectares	%
Africa	37.3	13.9	109.5	21.3	172.5	34.2	36.1	5.3	355.4	81.1
Asia	78.3	16.2	141.4	20.4	150.7	24.1	64.0	23.0	434.4	22.3
Australia	4.8	9.2	33.9	11.0	48.9	16.1	0.0	0.0	87.6	13.2
Europe	61.3	33.4	33.4	31.8	4.8	43.2	0.0	0.0	99.5	33.2
N. America	18.3	7.8	53.3	12.8	8.5	9.7	0.1	0.0	80.2	10.9
S. America	23.6	11.5	48.4	18.1	7.6	16.9	1.6	0.0	81.2	15.0
TOTAL	223.6	17.3	419.9	18.2	393.0	25.0	101.8	10.4	1,138.3	18.3

Table 9. Estimated indicative average global cost of direct antidesertification measures in irrigated lands within the world's drylands

Major target		A. Prevention of desertification	B. Corrective measures to sustain productivity	C. Rehabilitation of degraded land and its return to productive use		Total
Degree of land degradation		1. Slight to none	2. Moderate	3. Severe	4. Very severe	
Loss of productivity %		0-10	10-25	25-50	50-100	
Main preventive, corrective or reclamation actions		Masking of soil and water quality, improvement of soil and water management, introduction of improved crop varieties and appropriate agrotechnologies	Provision of adequate drainage plus as in 1	Intensive leaching and drainage, biological reclamation, later on as in 2	As in 3 plus additional heavy reclamation measures including chemical treatment as appropriate	
Cost per 1 hectare in US \$		100-300	500-1,500	2,000-4,000	3,000-5,000	
Africa	Area t.ha	8,522	1,779	122	1	10,424
	Cost million \$	852-2,557	890-2,669	244-488	3-5	1,987-5,719
Asia	Area t.ha	60,208	24,335	5,788	1,690	92,021
	Cost million \$	6,021-18,062	12,168-36,503	11,756-23,152	5,070-8,450	35,015-86,177
Australia	Area t.ha	1,620	100	130	20	1,870
	Cost million \$	162-486	50-150	260-520	60-100	532-1,256
Europe	Area t.ha	9,993	1,340	460	105	11,898
	Cost million \$	993-2,998	672-2,010	920-1,840	315-525	2,900-7,373
North America	Area t.ha	15,007	4,930	730	200	20,867
	Cost million \$	1,500-9,500	2,465-7,395	1,460-2,920	600-1,000	6,025-20,815
South America	Area t.ha	6,998	1,047	310	60	8,415
	Cost million \$	700-2,100	524-1,571	620-1,240	180-300	2,024-5,211
World total	Area t.ha	102,348	33,531	7,540	2,076	145,495
	Cost million \$	10,235-30,704	16,766-50,297	15,080-30,160	6,228-10,380	48,309-121,541

Table 10. Estimated indicative average global cost of direct antidesertification measures in rainfed croplands within the world's drylands

Major target		A. Prevention of desertification	B. Corrective measures to sustain productivity	C. Rehabilitation of degraded land and its return to productive use		Total
Degree of land degradation		1. Slight to none	2. Moderate	3. Severe	4. Very severe	
Loss of productivity %		0-10	10-25	25-50	50-100	
Main preventive, corrective or reclamation actions		Monitoring of soil quality, introduction of appropriate agrotechnologies and improved land management	Introduction of agroforestry plus as in 1	Agrotechnological and biological land amelioration plus as in 2	As in 3 plus additional heavy technical land reclamation works; fixing sand dunes as appropriate	
Cost per hectare in US \$		50-150	100-300	500-1,500	2,000-4,000	
Africa	Area t.ha	30,959	43,187	5,153	523	79,822
	Cost million \$	1,548-4,644	4,318-12,956	2,577-7,730	1,046-2,092	9,489-27,422
Asia	Area t.ha	95,890	100,638	18,578	3,068	218,174
	Cost million \$	4,795-14,384	10,064-30,191	9,289-27,867	6,136-12,272	30,284-84,714
Australia	Area t.ha	27,800	13,900	400	20	42,120
	Cost million \$	1,390-4,170	1,390-4,170	200-600	40-80	3,020-9,020
Europe	Area t.ha	10,252	8,538	3,227	89	22,106
	Cost million \$	512-1,538	854-2,561	1,614-4,841	178-356	3,158-9,296
North America	Area t.ha	62,588	10,770	721	120	74,199
	Cost million \$	3,129-9,388	1,077-3,231	361-1,082	240-480	4,807-14,181
South America	Area t.ha	14,711	5,950	561	124	21,346
	Cost million \$	736-2,207	595-1,785	281-842	248-496	1,860-5,330
World total	Area t.ha	242,200	182,983	28,640	3,944	457,767
	Cost million \$	12,109-36,326	18,298-54,895	14,320-42,960	7,808-15,616	52,535-149,797

Table 11. Estimated indicative average global cost of direct antidesertification measures in rangelands within the world's drylands

Major target		A. Prevention of desertification	B. Corrective measures to sustain productivity	C. Rehabilitation of degraded land and its return to productive use		Total
Degree of land degradation		1. Slight to none	2. Moderate	3. Severe	4. Very severe	
Loss of productivity %		0-25	25-50	50-75	75-100	
Main preventive, corrective or reclaimative actions		Monitoring of vegetation, introduction of improved rangeland management and pastoralism	Reduction of stock number per unit area of rangeland plus as in 1	Artificial revegetation with appropriate rest period; later on as in 1	Continuous rest period for natural recovery with full protection	
Cost per 1 hectare in US \$		5-15	10-30	40-60	3-7	
Africa	Area t. ha	347,265	273,615	716,210	5,255	1,342,345
	Cost million \$	1,736-5,209	2,736-8,208	28,528-42,973	16-37	33,016-56,427
Asia	Area t. ha	383,630	485,221	691,602	10,787	1,571,240
	Cost million \$	1,918-5,754	4,852-14,557	27,664-41,496	32-76	34,466-61,783
Australia	Area t. ha	295,873	227,040	55,310	29,000	657,223
	Cost million \$	1,479-4,438	2,270-6,811	2,212-3,319	87-203	6,048-14,771
Europe	Area t. ha	31,053	27,372	51,937	1,208	111,570
	Cost million \$	155-466	274-821	2,077-3,116	4-8	2,510-4,411
North America	Area t. ha	71,987	116,102	284,858	10,194	483,141
	Cost million \$	360-1,080	1,161-3,483	11,394-17,091	31-71	12,946-21,725
South America	Area t. ha	93,147	88,007	184,431	15,316	380,901
	Cost million \$	466-1,397	880-2,640	7,377-11,066	46-107	8,769-15,210
World total	Area t. ha	1,222,955	1,267,357	1,994,348	71,760	4,556,420
	Cost million \$	6,115-18,344	12,673-38,021	79,774-119,661	215-502	98,777-176,528