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Sustainable Management of Land and Water Resources: Combating Desertification and Prevention of Land Degradation

A. THE CONVENTION TO COMBAT DESERTIFICATION AND DROUGHT AND ITS APPLICATION IN EUROPE

(1) OVERVIEW

1. Desertification was defined in Chapter 12 of Agenda 21 (UNCED, Rio 1992) as land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities. Desertification affects about one sixth of the world's population and 70 percent of all drylands amounting to 3.6 billion hectares and one quarter of the total land area of the world. The UN Convention to Combat Desertification and Drought (UNCCD) was adopted in 1994 and came into force on 26 December 1996. Up to the end of 2001, a total of 177 countries had signed as Parties to the Convention, of which 37 Parties were in Europe, including the European Commission. Five countries, Greece, Italy, Portugal, Spain and Turkey, constitute the Annex IV Group, having agreed to co-ordinate their action within the framework of a regional annex for the Northern Mediterranean, which is the fourth regional implementation Annex of the UNCCD, also adopted from the outset. The focus of this document will be on the countries actively participating in the UNCCD process in the Northern Mediterranean (Annex IV Group, mainly), in the Balkans and in the Caucasus, where human and biophysical-induced desertification processes are most active.

2. A number of countries in Southern Europe, that are Parties to the Convention and are significantly affected by desertification, should be encouraged to actively participate in the UNCCD process. Some of the countries that may need support to become involved, formulate their National Action Programme to Combat Desertification (NAP) and develop pilot activities, are Albania, Bulgaria, Croatia, Cyprus, Malta and Slovenia. Furthermore, Bosnia and Herzegovina, TFYR of Macedonia, Ukraine and the Federal Republic of Yugoslavia should be encouraged to become signatories to the Convention. Most of the countries mentioned above have obtained valuable experience in land restoration that could be shared with other countries. For example, in the 1980's Cyprus started an on-going project to afforest degraded land under

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extreme conditions that concentrated in recent years in four areas, Koshi, Liopetri, Karonia and the asbestos mine in Troodos forest, where several methods have been successfully used, including terracing. The long-term goal is to increase the country's forest cover from 19 to 30 percent. Countries of Central and Eastern Europe are regrouped into the Annex V of the UNCCD since 6 September 2001. For the time being, 3 NAPs were adopted, namely by Armenia, Moldova and Romania. Other affected country Parties of this Annex are preparing their NAPs (Azerbaijan, Bulgaria, Belarus, Georgia). Other Central and Eastern European (CEE) parties are Slovakia, Hungary, Poland and Czech Republic. The others are still in the process of ratification.

(2) *STATUS OF IMPLEMENTATION IN ANNEX IV COUNTRIES
(NORTHERN MEDITERRANEAN)*

3. The reports to COP-4 submitted in 2000 by Annex IV, countries show the status of the National Action Programme (NAP) to Combat Desertification, : it is under preparation in Spain; the summary of Greece's NAP was approved in 1999; the NAP for Italy was approved in February 2000; and the NAP for Portugal in June 1999. The NAP for Turkey should be in final form for approval by the end of March 2002; Greece, Portugal, Spain and Turkey mention among the priority programmes the national strategies for forest development and fire control, protecting watersheds, combating erosion and water management. Italy refers to the links existing between the various sectors of industry, energy, urbanisation and tourism in its environmental policies. The strategies proposed within the NAP framework mainly refer to the determination of areas affected by desertification; information and awareness-raising for the people living in these areas; the preparation of a compendium of drought-related problems; a review of past experience; the establishment of monitoring and warning systems; and networks for meteorological measurements. Strengthening scientific research and international co-operation in research is also envisaged as well. All Annex IV countries have created a co-ordination mechanism for the implementation of the Convention. The supplement to this document, ECA/32/02/2-Sup.1, provides more detailed information on the activities to combat desertification conducted by the countries of Annex IV.

(3) *STATUS OF IMPLEMENTATION IN COUNTRIES OF THE BALKANS
AND THE CAUCASUS*

4. Other countries in Southern Europe affected by desertification which reported to the COP-4 were Armenia, Azerbaijan, Georgia, Republic of Moldova and Romania. All countries refer to their national plans for social and economic development, which include the implementation of action to protect soils from erosion and other efforts relevant to the objectives of the UNCCD. The combat against desertification is a main priority in a wide range of sector policies and programmes. All countries single out agriculture and forestry as sectors particularly relevant to combating desertification, drought and soil erosion. Water management, energy and the social sector (rural development, improvement of living standards) are also mentioned in this regard. Land reform, privatisation and empowerment of local governments and local communities in natural resources management are considered as strategies favouring the fight against desertification. However, it is mentioned in some reports that privatisation, as well as reform of the agro-industrial sector and of land-tenure systems, can give rise to problems inhibiting the rational use of the land.

5. In spite of continuing socio-economic problems, this group of countries are well committed to the goals of UNCCD. It should be noted that Balkan or Adriatic countries (this last name was requested at the Barcelona convention which met in Monaco last September) are special as they can belong to both annexes IV and V. They are Northern Mediterranean and also Central and Eastern Europe. They will contribute to the future regional consultation and mechanisms for both annexes, depending therefore on their interest. Currently, Croatia and Albania are preparing a

NAP (and possibly Slovenia). Macedonia just acceded to the CCD. The other countries are not yet parties.

The preparation of NAPs is progressing in four countries, while in the Republic of Moldova, a 10-year NAP was adopted in January 2000. All reporting countries appreciate the catalytic support provided by international organisations and bilateral donors at the initial stage of the UNCCD process, but there is a need to further strengthen international co-operation and to ensure synergies between all environmental programmes and conventions. At the same time, it is generally felt that only a considerable increase in financing, both internal and external, will allow these Parties to maintain the momentum and to proceed more rapidly in the implementation process. An acute shortage of funds, as well as overall economic difficulties may force national authorities to change priorities in favour of pressing social needs to the detriment of environmental protection. There is also a trend towards new and innovative financial mechanisms to provide funds for environmental protection. On the other hand, democratisation, decentralisation, privatisation and land reform contribute to further develop the participatory process, to facilitate the activities of the NGOs and to ensure the increasing role of the local population. Efforts need to be made to maintain a high level of information exchange with local communities. More detailed information, based on the reports of these five countries, is contained in document ECA/32/02/2-Sup.1. Table 1 summarises the progress made by all reporting countries in Southern Europe in the implementation of UNCCD.

Table 1. Summary of progress in reporting countries in the implementation of the UNCCD

UNCCD Parties	Incorpor intersect & sector policies/ plans	NAP available	Ad hoc co-ordination mechanism	Financial constraints & need for funding schemes	Participatory process with community & local authorities	Pilot field projects
Annex IV Group						
Greece	x	x	x		x	6 areas
Italy	x	x	x		x	
Portugal	x	x	x		x	
Spain	x	final stage	x		x	S.E. Spain
Turkey	x	final stage	x	x	x	
Balkans & Caucasus						
Armenia	x	in prepar.	x	x		
Azerbaijan	x	in prepar.	x	x		
Georgia	x	in prepar.	x	x		
Moldova	x	x	x	x		
Romania	x	in prepar.	considered	x		

(4) *REGIONAL CO-OPERATION IN THE MEDITERRANEAN*

6. A Regional Conference on Desertification for the Northern Mediterranean Region was held in Almeria, Spain, in June 1995. It was agreed on that occasion to set up a regional reflection group to prepare guidelines for a Regional Action Programme (RAP). The first session of the Reflection Group was held in Madrid in July 1995, with attendance of representatives from France, Greece, Italy, Portugal, Spain, Turkey, the European Union and the Interim Secretariat of the UNCCD. The group of countries of the Northern Mediterranean Annex has organised workshops to identify priorities in preparation for the Regional Action Programme, consulting with the NGOs, as well as with the General Directorates of the EC related to desertification problems. The priorities have now been approved by the National Committees. During the Fourth Ministerial Meeting held in Rome (17 February 2000), Annex IV countries agreed to a UNCCD Northern Mediterranean unit, to invite Monaco to join the group as observer and allow the participation of NGOs at future meetings.

7. Future developments for the Annex IV Group are the extension to other affected Parties of the Northern Mediterranean Region, continued efforts to elaborate common projects on indicators, establish pilot areas, share information through a Clearing House Mechanism and develop synergies with North African countries and with other Parties to the Convention. The latter constitutes a geo-political aspect of utmost importance for the group of Annex IV countries, in view of the presence in the Mediterranean area of countries from the Balkans, as well as countries from North African and Eastern Mediterranean, which belong to the respective African and Asian Annexes of the UNCCD. Subscribing to the Ancona declaration of 20 May 2000 on the "Adriatic and Ionian Initiative", Italy, Greece, Albania, Bosnia and Herzegovina, Croatia and Slovenia decided to establish closer co-operation to solve specific environmental problems, implement all the UN environmental conventions and strengthen the impact of action by Annex IV countries.

8. In 2000, the Italian Government, as President of the Annex IV Group (currently this position is held by Greece), invited representatives of all Mediterranean countries, international organizations and NGOs to a workshop held at FAO Headquarters on 18 February 2000 on "Desertification, climate change, biodiversity and forest: synergies for an inter-regional agenda between Northern and Southern Mediterranean countries". The participants exchanged views on the issue of synergies between the various Conventions, as well as the Forest Principles, and expressed their willingness to explore appropriate ways and means to integrate their objectives when implementing the UNCCD. The workshop recommended that: a) National Action Programmes (NAP) to Combat Desertification and Subregional Action Programmes (SRAPs) should provide (NAPs) for synergies with other relevant Conventions; b) Integrated pilot projects should be promoted, based on a participatory approach, thus contributing to the implementation process, increase visibility and assist in identifying eventual gaps; c) Such projects and programmes should take into account socio-economic aspects and be based on further scientific analysis; d) Networking of information mechanisms should be encouraged to allow for exchange of relevant, comparable and reliable data, in view of implementing the UNCCD at Mediterranean level in synergy with other Conventions; e) Synergies should be extended towards other existing Mediterranean fora and main donors.

9. The uniqueness of the Mediterranean region has been acknowledged by international treaties and agreements, such as the Barcelona Convention (1976) and the Barcelona Declaration (1995), underpinning the Euro-Mediterranean Partnership. Annex IV countries aim to coordinate their actions and create synergies between regional and sub-regional programmes and other international programmes, i.e. the Mediterranean Action Plan (MAP), the Short and Medium Term Priority Environmental Action Programme (SMAP) and the Mediterranean Environmental Technical Assistance Programme (METAP). The MEDA programme of the European Union is

the financial instrument to implement the Euro-Mediterranean Partnership. METAP, supported by the European Investment Bank (EIB), the EC, the World Bank and UNDP, promotes technical support, and facilitates investment to 13 Mediterranean countries, in three priority areas: integrated management of coastal and water resources, prevention of pollution in (“hot spots”), and promotion of institutional consolidation, participation and partnerships. It should be noted that in accordance with Article 4 of the UNCCD, developing countries are eligible for assistance in the implementation of the Convention; however, Article 9 of Annex IV states that “in implementing national, subregional, regional and joint action programmes, affected developed country Parties of the region are not eligible to receive financial assistance under this Convention”.

B. SOME MAJOR CAUSES AND EFFECTS OF DESERTIFICATION IN THE FRAGILE ENVIRONMENT OF EUROPE

(1) INAPPROPRIATE LAND AND AGRICULTURE MANAGEMENT PRACTICES AND POLICIES

10. The Northern Mediterranean region is a complex mosaic of landscapes that has been settled and cultivated for millennia. Much of the region is semiarid and dry sub-humid, typical mediterranean climatic conditions being characterised by extended periods of dry spells with a regime of high rainfall variability and sudden intense downpours. The drought phenomenon can no longer be viewed in this region as an episodic event but rather as a recurrent consequence of climate change and desertification. Other factors compounding the problem are high population densities and concentration of industry, intensive agriculture and tourism along the coastline and the coastal plains.

11. Less favoured mountainous and hilly areas, on the other hand, are characterised by depopulation and abandonment of productive activities. Soil degradation, coupled with changing weather patterns, is making it uneconomic to run smallholdings, and is driving people away from areas that had been carefully cultivated and preserved to keep up productivity for 2000 years with terracing and sound irrigation.

12. Wild forest fires constitute a major cause of land degradation in Southern Europe. The number of fire outbreaks and the area affected throughout the Mediterranean basin have doubled since the 1970's. The countries with the largest area of forest and wooded land burnt each year during the past decade were: Spain-171,488 ha; Italy- 98,134 ha; Portugal- 97,176 ha; Greece- 42,487 ha; Turkey- 36,938 ha; France- 23,945 ha; Croatia- 10,107 ha; Bulgaria -5,943 ha and Georgia- 5,279 ha. The prolonged drought in the Eastern Mediterranean region in 2000 led to severe fires in several countries. By the end of September 2000, more than 150,000 ha had been burnt in Greece. The Balkan region (particularly Bulgaria, Romania and Croatia), and Turkey also suffered severe fires. In the Northern Mediterranean countries most wildfires are human induced; natural causes varying from country to country between 1 to 5 percent of the outbreaks. International fire agreements setting the framework for cooperation exist between France and Spain (1959), Spain and Morocco (1987), Spain and Portugal (1992), one is in preparation between Greece and Albania. FAO produced guidelines, based on the existing emergency response agreements, to foster co-operation among affected countries.

13. Land degradation is often linked to poor agricultural practices. Soils become saline dry, sterile, unproductive and unprotected in response to a combination of natural hazards - droughts, floods, forest fires - and human-induced activities - notably over-tilling, unsound irrigation practices and overgrazing. Crop yields in eroded soils are lower than those in protected soils because erosion reduces soil fertility and water availability. Physical changes imposed on watercourses by the construction of reservoirs, the canalisation of rivers and the drainage of wetlands, intensive application of fertilisers and pesticides, as well as contamination by heavy

metals are undermining the long-term health and the quality of the land and water resources.

14. The use of large amounts of fertilisers, pesticides and irrigation helps to offset the deleterious effects of erosion, but in themselves have the potential to create pollution and health problems, destroy natural habitats, and lead to high energy consumption and to unsustainable agricultural systems. In fact, the effect of erosion is to increase agricultural production costs by about 25 percent each year. Sediment originating from eroded agricultural land causes important off-site problems. These include damage to roadways and sewers, drainage disruption, undermining of foundations and pavements, gulying of roads, earth dam failures, silting of harbours and channels, loss of reservoir storage capacity, disruption of stream ecology and damage to public health, plus increased water treatment costs. In addition, by raising streambeds and burying streamside wetlands, sediment can increase the probability and severity of floods. Indeed, off-site soil erosion economic damage is nearly 40 percent of the total cost of the erosion. Thus, society would benefit when the off-site effects of erosion are avoided by implementing conservation measures.

(2) *INAPPROPRIATE MANAGEMENT OF SCARCE WATER RESOURCES
AGGRAVATED BY RECURRENT DROUGHTS*

15. Some 80 percent of the Region's available freshwater is used for irrigation. Groundwater levels are declining where water is pumped in excess of recharge, resulting in saline intrusion into coastal aquifers and higher pumping costs. The continuing growth of industry, tourism, intensive agriculture and other economic activities along the coastal areas is placing particular stress on the environment, and in particular on water resources. Flash floods and sediment released from upland areas generate torrential events that affect human settlements and infrastructure in downstream areas. Mudflows have occurred in Italy and Spain in recent years destroying homes, camping areas and facilities located in exposed sites. Rapid development in coastal areas can exacerbate degradation processes in places such as drought-stricken Sardinia and Sicily in Italy, Algarve in Portugal, the Costa del Sol in Spain, the Aegean Islands in Greece and the Antalya Province in Turkey. One of the emerging uses competing for scarce water resources is the irrigation of golf courses.

16. Drought can have an impact on many sectors of the economy and on the environment. Extreme drought periods, other than significant crop failures, have an impact on aquatic and land ecosystems, turning into not only a water shortage problem, but into a serious environmental problem. In Italy, the 1989-1991 drought reduced the flow of many rivers. The extraordinary low level of precipitation in the 90's in Spain had consequences on the decrease of run-off, more than 60 percent in the Tajo, Guadiana, Guadalquivir, Southeast river basins and Canary islands, and a significant reduction in the storage average regulation capacity of reservoirs. Drought conditions throughout most of Eastern Europe in 2000 affected maize and barley crops in particular, contributing to a drop of 2 percent in world output of coarse grains. In Romania, drought in 2000 affected the entire cropping season. In Bosnia and Herzegovina drought in 2000 and floods in 2001 affected wheat and maize crops. The cereal harvest in 2001 decreased in France, Spain and Italy because of adverse weather and reduced plantings. Even the United Kingdom was affected. In Cyprus farmers have been forced to uproot their citrus orchards due to the prolonged drought period, together with the high costs of production. The Ministry of Agriculture, Natural Resources and Environment declared 2001-2002 the Citrus Year in order to provide incentives to farmers and reverse the situation. Drought has also exacerbated forest pests in several Southern European countries, such as the Gypsy Moth in Bulgaria and Romania, the leaf insect in the Republic of Moldova, and the processionary caterpillar in TFYR Macedonia. FAO projects, under the TCP, were implemented in the first three countries to spray infested areas.

17. FAO assisted several Eastern European countries to help mitigate the effects of drought spells in 2000 and 2001. Armenia, Georgia, Romania and Moldova received emergency assistance projects under the TCP (distribution of seeds to drought- affected farmers). Emergency projects funded by donors were approved for Armenia and Georgia (emergency supply of seeds to drought affected farmers). Appeals were issued for: (i) Romania seeking US\$ 1,308,500 for urgent supply of maize seed to drought affected farmers; (ii) Armenia in 2000 seeking US\$ 7,000,000 for emergency supply of wheat seeds, barley seeds and distribution of animal feed, and in 2001 US\$ 5,000,000 for emergency distribution of locally produced potato seed, for winter wheat varieties, barley for animal feed and for the promotion of oil seed crops; (iii) Georgia in 2000 US\$ 15,550,000 for urgent supply of winter wheat seeds of bread making quality and related agricultural inputs to the drought affected farmers; (iv) Azerbaijan in 2001 seeking US\$ 40,065,000 for emergency supply of fertilizer, rehabilitation and expansion of a fishery breeding facility and for long term irrigation rehabilitation project.

Extent of desertification and land degradation in Europe

18. The FAO/UNEP/UNESCO global assessment of the intensity and extent of desertification shows that in areas of the Northern Mediterranean there are signs of land degradation covering 99.4 million ha. Within its Research and Development Programme, the EC has promoted and funded desertification studies and research in the Mediterranean area (MEDALUS and ARIDUSEUROMED). These activities have produced a large amount of information that was presented in a major conference held in Crete (Greece) in 1996. Table 2 indicates estimates of severe and very severe land degradation in Southern Europe (information not available for Malta) based on the FAO Terrastat database:

Table 2. Severity of human-induced land degradation in countries of Southern Europe

Country	severe		very severe		Total severely degr	
	%	area km2	%	area km2	%	area km2
Albania	14	4000	80	23000	94	27000
Armenia	11	3000	0	0	11	3000
Azerbaijan	56	49000	0	0	56	49000
Bosnia and Herzegovina	4	2000	96	49000	100	51000
Bulgaria	100	111000	0	0	100	111000
Croatia	50	28000	50	28000	100	56000
Cyprus	100	9000	0	0	100	9000
France	9	50000	0	0	9	50000
Georgia	10	7000	0	0	10	7000
Greece	47	62000	1	1000	48	63000
Italy	28	84000	0	0	28	84000
Macedonia	44	11000	45	11000	89	22000
Moldova	100	34000	0	0	100	34000
Portugal	0	0	21	19000	21	19000
Romania	89	212000	11	25000	100	237000
Slovenia	18	4000	61	12000	79	16000
Spain	35	175000	3	16000	38	191000
Turkey	69	535000	30	235000	99	770000
Ukraine	49	297000	27	162000	78	459000
Yugoslavia Fed. Rep.	31	39000	63	80000	94	119000

19. In September 2000, a report for UNCCD warned that considerable areas of land bordering the Mediterranean would be lost to desertification within 50 to 75 years. It based these estimates on current rates of erosion caused by climate change, land use changes and other human activities. The European Environment Agency has found that 150 million hectares are at a high risk of erosion in Mediterranean countries. An EU report on the environmental impact of olive oil production reveals that the intensified traditional and modern systems have potentially the greatest negative environmental impacts, particularly in the form of soil erosion, degradation of habitats and landscapes and depletion of scarce water resources. Some olive growing regions, particularly those in Southern Spain and Portugal, are already experiencing desertification due to inappropriate weed control and soil management practices, combined with the inherent high risk of erosion in many olive farming areas, as well as considerable run-off of soils and agro-chemicals into water bodies. Soil erosion was named by this report as being "probably the most serious environmental problem associated with olive farming".

C. POLICIES, STRATEGIES AND TECHNICAL APPROACHES TO COMBAT LAND DEGRADATION AND DESERTIFICATION

(1) *THE DEVELOPMENT OF INTEGRATED POLICIES AND ENVIRONMENTAL STRATEGIES AT DIFFERENT LEVELS*

20. The rehabilitation of degraded land is essentially a long-term effort, which requires a policy and institutional framework, ensuring the agreement and participation of pastoralists, farmers, foresters and other land users to correct the management deficiencies that have led to resource degradation. Desertification control programmes need to be integrated into national development plans, and institutional and legal constraints should be bridged to facilitate co-management of projects and participation of local communities in decision-making. Priorities should be set to ensure that short term economic benefits are not given priority over long term sustainability, while acknowledging that conditions that favour enhanced production are also likely to favour resource conservation. Tackling reversible damage to the resource base merits priority action, but all sustainable development action must offer long-term benefits. Incentive schemes for sound use of land and water resources, and the development of mechanisms to generate the funds required, should fairly compensate off-site benefits to society caused by environmental protection, and soil and water conservation measures.

21. Of prime importance is participation of the local people, reinforcing their control over resources to ensure their long-term commitment. Conflicts are likely to occur whenever: (i) it is not possible to establish a reciprocal interaction between parties; (ii) entitlements to key resources are inequitable; (iii) the need for access to a resource is unpredictable; (iv) procedures for settlement of disputes are not defined; (v) historical rights and duties have been ambiguous. Conflict resolution in aspects such as the use of common lands and the access to water sources, and ensuring supply of agricultural inputs, access to credit, to markets and to transfer of technology services are some of the key elements. A variety of decision-making tools should address local peculiarities to stimulate and support bottom-up demand, especially by assisting people-led organisations and initiatives. Measures for combating desertification should be based on detailed knowledge of natural and cultivated ecosystems, particularly their dynamic features, and the interaction between physical and socio-economic factors. Certain damaging practices, resorted to by local societies, as means of survival during stress periods, should be replaced by alternative, non-destructive solutions. Traditional knowledge and experience should be promoted whenever they have a potential to protect and improve the land.

(2) *THE PROMOTION OF SUSTAINABLE FARMING PRACTICES*

22. A permanent or semi-permanent organic soil cover (either a growing crop or a dead mulch) protects the soil physically from sun, rain and wind, feeds soil biota and permits the management of the soil, altering its composition, structure and natural biodiversity as little as possible and defending it from degradation processes (e.g. soil erosion and compaction). Applicable principles of Integrated Soil and Nutrient Management (ISNM) are to maximise ground cover and input of organic matter, use of leguminous species, selective use of plant nutrients, land-use in accordance with suitability for each purpose and overcoming the yield-limiting factors for crops. Crop rotations should alternate with

soil regenerating leguminous plants. A varied crop rotation is also important to avoid disease and pest problems. At farm level, the decrease of organic matter in the soil can be countered by incorporating green manure, applying improved fallow periods, returning crop residues into the soil and improving cropping practices. With better management, carbon dioxide (CO₂), the most significant single 'greenhouse gas' contributing to climate change, can return to the soil as organic matter, thus fulfilling the aim of the Kyoto Protocol, namely, that "sinks, including forests and agricultural soils, can count towards meeting the target".

23. Farmers, scientists and agricultural extensionists met in Madrid in October 2000. The meeting was organised jointly by FAO and the European Conservation Agriculture Federation (ECAAF) to promote this method of crop production expanding on the trend towards no-till/low-till agriculture, its aim being to conserve, improve and make more efficient use of natural resources through integrated management of available soil, water and biological resources combined with external inputs. Some of the techniques used are direct sowing (non-tillage), reduced tillage (minimum tillage), incorporation of crop residues and establishment of cover crops in perennial woody crops (of spontaneous vegetation or by sowing appropriate species) or between successive annual crops. Soil micro-organisms and soil fauna take over the tillage function and soil nutrient balancing. The straw over the soil decreases water evaporation, while each tillage operation increases it. Furthermore, the contamination of surface water and the emissions of CO₂ to the atmosphere are reduced and bio-diversity increases. There are significant fuel and labour savings from no tilling. In conventional agriculture, tillage operations require considerably higher inputs in machinery investment and maintenance, fossil fuels and labour inputs as compared with Conservation Agriculture, especially direct sowing/ no-tillage. For example, in no-till olive crops a saving of about 60 to 80 litres of fuel and 3 to 5 hours of labour per hectare annually is estimated, as compared with conventional tillage. Farmers also till to prepare the land for seeds, and to expose and eliminate pests and diseases. With Conservation Agriculture, different sowing equipment must be bought or adapted. This farming method also minimizes use of chemical pesticides, so farmers must learn to control pests and diseases through integrated pest management (IPM).

(3) *THE IMPROVEMENT OF ANIMAL HUSBANDRY AND GRASSLAND MANAGEMENT*

24. Livestock production can be fully integrated into sustainable farming systems by making use of the recycling of nutrients, reducing the environmental problems caused by intensive livestock production. Integration of livestock into agricultural production enables the farmer to introduce forage crops into the crop rotation, thus widening it and reducing pest problems. Forage crops can often be used as dual-purpose crops for fodder and soil cover.

25. Grasslands are a varying resource and shifts in climate affect their potential productivity. Soil nutrient depletion and selective grazing leads to vegetation changes, indicated by changes in plant cover, biomass and biodiversity and the occurrence of unpalatable plant species and weeds, causing long-term effects on forage productivity. In many cases revegetation of depleted ranges and establishment of fodder shrubs may be needed. Options for managing inter-year variability and drought include: maximizing grazing distribution; sale of stock as soon as drought forecast is indicated; keeping an

efficient herd or flock with minimal unproductive animals; use of special-purpose pasture; use of fodders not used in normal years; expansion of areas available for grazing; weaning and selling stock earlier; and provision of supplementary feeds. Measures to control herd numbers or grassland productivity during critical periods include drilling boreholes, dry-season grazing in proximity to water, crop residues and browse or tree resources. Grazing management involves the manipulation of livestock, stocking rate, grazing season and grazing intensity to maximize livestock production per unit area on a sustainable basis.

(4) *THE ENHANCED MANAGEMENT AND PROTECTION
OF FORESTS AND TREES*

26. Another front in combating desertification is forest protection (against fires, pests and uncontrolled grazing), as well as afforestation of degraded lands to check erosion and conserve water resources in upland watersheds. As an added value, afforestation and revegetation can also contribute to the carbon sequestration objectives of the Kyoto Protocol. Some 88 percent of Spanish forests have the main role of protecting soil against erosion and regulating the water cycle under conditions of steep slopes and low, irregular rainfall. In Turkey, only 44 percent of the designated forestland consists of productive forests, while the remaining 56 percent consists of degraded forests, rangelands and eroded areas. Trees and shrubs also play an important role in combating wind erosion, by means of windbreaks, shelterbelts and sand-dune stabilization. They also contribute to nitrogen fixation, to incorporation of organic matter and the recycling of nutrients from deeper layers in the soil; revegetation with halophyte species can reclaim saline soils. The International Forest Policy Dialogue within the UNFF gives special attention to the underlying causes of deforestation and forest degradation. The particular needs of affected countries in Europe, to protect and restore their forests, should be taken into account.

(5) *THE PROMOTION OF WATER MANAGEMENT AND CONSERVATION*

27. Water management and conservation is another key area in combating desertification. Action should preferably take place within the framework of integrated river basin development and include activities in the tributary catchments (integrated watershed approach). In the downstream area and in the aquifers, within a multipurpose concept to reconcile the competing demands on water resources. The availability of water can be optimized by increasing water yield in the catchment area, while protecting water quality, introducing biological and structural measures for water harvesting, reducing evaporation losses, spreading floodwater and zoning flood channels and replenishing groundwater storage. Protection against salinity and water pollution and checking sedimentation in reservoirs and irrigation systems, can extend the lifetime of valuable infrastructure, and reduce dredging and water treatment costs. Especially useful for semi-arid areas is the introduction of water harvesting measures such as micro-catchments, contour bunds for trees, semi-circular and trapezoidal bunds, contour ridges for crops, contour stone bunds, permeable rock dams and water spreading bunds. In dry areas where atmospheric humidity is frequently high, trees and shelterbelts can also contribute to water harvesting by capturing hidden precipitation.

D. POSSIBLE FAO SUPPORT TO PRIORITY ACTION TO COMBAT DESERTIFICATION IN THE REGION

28. FAO has been active for decades in combating desertification through monitoring and normative programmes, as well as field projects. Action related to the conservation and management of fragile ecosystems in arid, semi-arid and sub-humid regions ranges from land and water management to legal aspects, and includes soil conservation, management of rangelands and animal production, forest management, reforestation, sand dune reclamation, salinity control in irrigated land and promotion of sustainable energy sources. Appendix 2 in document ECA/32/02/2-Sup.1 provides more detailed information on FAO activities that can support national-level action in countries of the Region. Special support to the UNCCD process is enabled through the *ad hoc* Interdepartmental Working Group on Desertification, co-ordinating the relevant FAO inputs on the implementation of international initiatives and some national programmes in the area of dryland development, desertification control and drought mitigation. The FAO Strategic Framework and Medium Term Plan 2002-2007 give emphasis to programmes and projects addressing conservation and sustainable use of natural resources, protection of fragile ecosystems, as well as disaster prevention, mitigation and preparedness. Sustainable management of natural resources is one of the four key areas of concentration of FAO's mission statement for Europe, the emphasis being on integrated management (in particular in watersheds) and on the rehabilitation and protection of ecologically fragile environments in Central and Eastern European countries. Therefore, the Organization should now be in a better position to respond to the specific needs of drought and desertification-affected countries in the Northern Mediterranean, the Balkans and the Caucasus.

29. Following discussions with the UNCCD Secretariat, during which priorities were identified on FAO was well equipped to assist member countries, a Memorandum of Collaboration (MOC) was signed in December 1998 covering six areas: i) Implementation of Action Plans and networks at national and regional levels to which FAO could provide technical assistance; ii) Support to UNCCD regional networks; iii) Production and dissemination of technical best practices and related awareness documents; iv) Awareness documents to provide convincing information on the status, trends and costs of desertification and its control, suitable for the media and general public and for decision-makers, donors, NGOs and institutions; v) Assessment and monitoring of desertification and drought at global, regional and national levels; vi) Technical support to the UNCCD bodies, in particular advisory and technical support to the Global Mechanism and submission of technical papers to international, inter-regional and sub-regional meetings organized by the Secretariat. A Memorandum of Understanding (MOU) was also signed between FAO and the International Fund for Agricultural Development (IFAD) to promote collaboration in assisting countries in the implementation of the UNCCD. Active cooperation is under way, with the Global Mechanism jointly supporting at national, subregional and international levels the implementation of the UNCCD.

30. FAO has a number of activities that can contribute towards monitoring the major changes in climate, land use and vegetation cover, to drought preparedness and identifying of land degradation processes: (i) the Agro-Ecological Zones Project; (ii) the Global Information and Early Warning System on Food and Agriculture; and (iii) the Global Terrestrial Observing System (GTOS). Furthermore, FAO maintains a broad range of information systems and databases, which are under constant being upgraded. WAICENT, the World Agriculture Information Centre, provides and disseminates on Internet FAO data and statistics on agriculture and land use by country. LRIS (Land Resource Information and Decision Support System) is a toolbox providing information on world soils distribution, with basic survey data, agro-ecological zones information to calculate production potentials, crop adaptation and response data and a system to model land use and production systems. The Forest Resources Assessment Programme, (FRA) in co-operation with the UN/ECE for Europe, provides regional statistics on forest

resources and deforestation. The Food Insecurity and Vulnerability Information and Mapping System (FIVIMS) is a decision geo-referenced support tool developed to indicate areas and populations affected by risk of hunger and malnutrition, and factors contributing to food insecurity. The Emergency Centre for Locust on Control Operation (ECLC) is an information and geo-referenced system monitoring desert locust infestation in affected countries. FAOCLIM, the agroclimatic database, covers monthly data for 28,100 stations and 14 observed and computed agroclimatic parameters. AGROMET includes monitoring and modelling of crop development and extreme events (droughts, pests) as an input to early warning systems on food security. As a contribution to the UNCCD, FAO compiled the existing statistical data related to desertification, aggregated at national level, in CD-Rom format.

31. As noted by Annex IV countries, there is need for aridity and drought appraisals at regional level. In response to this need and in view of the threats of climate change and its influence on desertification and drought, it is advisable to strengthen FAO's activities, in close cooperation with WMO's Commission for Agricultural Meteorology, for the improved use of tools for crop forecasting, the use of weather and climate forecasts at farm-level decision-making, the development of techniques that optimise the use of climate resources under variable and sometimes extreme conditions, and the possible application of crop insurance. FAO has significant experience in crop forecasting, particularly in semi-arid areas. Standard tools (including software) have been developed combining ground data and satellite products to produce crop yield maps on a near real-time basis. FAO has also potential for assisting Member Countries in their efforts to mitigate emissions of greenhouse gases, increase the resilience of production systems against the vagaries of climate and improve their adaptive capacity. This includes Conservation Agriculture, carbon storage in biomass and soil, improved use of fertiliser, improved ruminant digestion using improved feeds and the promotion of bio-energy as a sustainable substitute for fossil fuels.

32. FAO, in collaboration with the International Soil Reference and Information Centre (ISRIC) in the Netherlands, implemented the project SOVEUR on land degradation status and soil vulnerability in Central and Eastern Europe. In addition, a very large project on land degradation assessment in Drylands (LADA) was launched in 2000 and was endorsed during COP-5 by the CST. LADA is a global initiative covering more than 100 countries affected by desertification. It aims to provide standardised information (maps, databases, etc.) at different levels, from local to global on state, causes, impacts of land degradation and possible remedial measures, and to build capacities in concerned countries. Data on land degradation would cover soils, water resources, vegetation resources (woodlands, croplands, rangelands), animal resources, as well as, to a certain extent, climate and bio-diversity, carbon stocks in soils and biomass. LADA is currently funded in its PDF-B preparatory phase by UNEP-GEF and FAO. It is initiated and monitored by a wide range of partners (e.g. UNCCD Secretariat, UNEP/GEF, the Global Mechanism, FAO and others), and is executed by FAO. The first meeting of the Advisory Group and Steering Committee of LADA was held in Rome (23-25 January 2002).

33. A number of FAO networks in the Region are contributing or have the potential to provide significant inputs into regional efforts to combat desertification:

- **The AFC/EFC/NEFC Committee on Mediterranean Forestry Questions (*Silva Mediterranea*)**, founded in 1922, currently comprising 26 countries (including 12 countries in Southern Europe and the European Union), is a forum set up to promote the exchange of experience and to coordinate efforts (i.e. Mediterranean Forestry Action Plan). *Silva Mediterranea* has six research networks: Forest Fires; Multipurpose Species (especially geared to combating desertification); Silviculture of cedrus species; Silviculture of cork oak species; Silviculture of stone pine species; Selection of genetic resources of resinous species.
- **ESCORENA** has four REU/RNE co-operative networks, jointly sponsored with CIHEAM that are of special interest to Mediterranean countries: Nuts; Olives; Pasture and Fodder Crops; and Sheep and Goats. Furthermore, the Sustainable Rural Environment and Energy (SREN) network conducts work on research methodologies on organic farming.
- **Network on Protected Soils in Central and Eastern European countries** involving 43 national co-operating institutes.
- The European Forestry Commission's **Working Party on the Management of Mountain Watersheds** has an extensive network of specialists in areas such as torrent control, soil and water conservation, re-vegetation, land restoration and socio-economic issues. More than 50 percent of the sessions of the Working Party have been held in Northern Mediterranean countries. The 23rd session which will be held in Davos (Switzerland), in September 2002 will be of special significance: it marks the 50th anniversary of the Working Party and the observance of the International Year of Mountains.

34. Other networks which are also able to contribute are: (i) The Global Network on Integrated Soil Management for Sustainable Use of Salt-affected Soils; (ii) (WOCAT) The World Overview of Conservation Approaches and Technologies, which has compiled a database and updated land degradation and rehabilitation maps on more than 200 reported successful soil and water conservation techniques and institutional implementation approaches from almost 30 countries; (iii) the International Fire Management Network (IFMN), established to prioritise the 19 recommendations the Fire Action Plan issuing from the International Expert Meeting on Forest Fire Management organised by FAO, in co-operation with the International Tropical Timber Organisation (ITTO) in March 2001; (iv) A Drought Information Network, launched in November 2001, with FAO and ICARDA as the main founders, and CIHEAM and the European Commission as collaborators, following the FAO-ICARDA-EC Expert Consultation and Workshop on Drought Mitigation in the Near East and the Mediterranean, held in May 2001.

E. RECOMMENDATIONS ON FAO SUPPORT THAT MAY BE FORWARDED TO THE 23RD FAO REGIONAL CONFERENCE FOR EUROPE

34. A far-reaching vision of the opportunities in inter-regional cooperation should lead countries of Annex IV of the UNCCD:

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- to seek the involvement of other affected countries in Europe in action to combat desertification, and mainly those in the Mediterranean, in the Balkans and in the Caucasus, and secondly,
 - to build bridges for cooperation with countries in North Africa and in the Eastern Mediterranean who are Parties to the African and Asian Annexes of the UNCCD.

In line with the conclusions of the workshop “Desertification, climate change, biodiversity and forest: synergies for an inter-regional agenda between Northern and Southern Mediterranean countries” synergies should be developed between the various Conventions, as well as with the Forest Principles, to implement the UNCCD. NAPs, as well as Subregional Action Programmes, should envisage these potential synergies and take advantage of the various networking and information-sharing mechanisms, in particular those in the Mediterranean area.

35. Partnerships should be developed to strength and harmonise efforts of the many institutions and programmes that are active in the Mediterranean basin in order to be cost effective. FAO should make available its capability and expertise within these partnerships to support regional and national initiatives. Spain, a pioneer country in efforts to combat desertification and having currently the Presidency of the European Union, would be well placed to lead an undertaking making a breakthrough in new avenues for inter-regional co-operation.

36. Taking into account the Memorandum of Collaboration (MOC) signed by FAO and the Executive Secretariat of UNCCD, FAO should use its comparative advantage, in well-targeted areas, optimising and tailoring the use of its capabilities in accordance to the particular needs of the most affected Member Countries in the Region. Partnerships should be developed aiming at fostering co-operation to: i) further document land degradation processes; ii) gather information and build knowledge on technologies and best practices; iii) transfer these and provide assistance to countries of the Region which lack adequate capacity; iv) increase networking among countries; iv) link to the EU opportunities.

37. The Commission may wish to consider the convenience of conveying to the 23rd FAO Regional Conference for Europe the following specific recommendations addressed to the Organization:

(i) FAO should be ready to assist those countries needing advice in the formulation and implementation of their NAPs, and should also provide assistance to countries in the Region who need guidance in order to start pilot activities and demonstration projects in affected areas, taking into account approaches, successful techniques and best practices and building on the experience obtained in the Region.

(ii) FAO should actively follow-up the recommendations of the Fire Action Plan and in particular foster the establishment of fire agreements establishing partnerships between countries in the prevention and combat of wild forest fires.

(iii) As reflected in some of the reports from European countries to COP-4, there is need for external assistance in establishing and implementing the state-of-art monitoring and information systems on desertification. FAO’s LADA project could provide a standard approach and a common frame of reference for the assessment of desertification, as a step forward in determining the real extent and the magnitude of biophysical impacts of desertification processes.

(iv) Information systems and clearing houses are most helpful for the definition of common strategies and for technical and scientific co-operation. Among the various potential areas, Annex IV countries have proposed the creation of a network to gather, evaluate and disseminate information about traditional knowledge and practices for safeguarding the quality of the regional landscape. FAO, in cooperation with other partners, should assist in the development of this network, and in classifying and evaluating traditional knowledge, as well as innovative, environmentally- sound and cost-effective practices.

v) FAO should intensify efforts to foster new approaches and strategies of Sustainable Agriculture in Europe as a major strategy to prevent, and even reverse, much of the damage to land productivity that resulted from the industrialisation of agriculture in Europe. Among other areas, conservation agriculture, and water and livestock sustainable management need to be very much strengthened in cooperation with all concerned stakeholders from the public and private sectors, as well as the civil society, in the framework of revitalised environmentally friendly policies of the European Commission.

38. Member Countries in the Mediterranean, the Balkans and the Caucasus might consider requesting FAO to formulate a broadly-based regional umbrella project to strengthen national efforts to combat desertification and drought in cooperation with interested agencies. The GEF, IFAD, the Global Mechanism, the EC and donor countries in the Region could be interested in funding this catalytic effort, as well as pilot country projects.

LIST OF ACRONYMS

COP: Conference of the Parties to the UNCCD

CST : Committee on Science and Technology of the UNCCD

GEF: Global Environmental Facility

LADA: Land Degradation Assessment in the Drylands

MAP: Mediterranean Action Plan co-ordinated by UNEP

METAP: Mediterranean Environmental Technical Assistance Programme of the EC

NAP: National Action Programme to Combat Desertification

NFP: National Forestry Programme

RAP, SRAP: Regional (Sub-regional) Action Programme under the UNCCD

UNCCD: UN Convention to Combat Desertification and Drought

UNCSD: UN Commission for Sustainable Development