ROMANIA

MINISTRY OF WATERS, FORESTS AND ENVIRONMENTAL PROTECTION

NATIONAL REPORT

ON THE IMPLEMENTATION OF THE UNCCD

IN ROMANIA

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(ii) Summary

The accession of Romania at the Convention to Combat Desertification is considered a positive step for the progress of Romanian economy, conservation of the environmental resources in Romania and integration in international community.

Romania has a rich experience in desertification and drought control, reality supported by the achievements acquired in scientific and technical plans, which demonstrates **the ability of the Romanian specialists in working out the difficult problems of desertification**. Nevertheless, financial resources of transposing into practice the experience accumulated in this field are not available.

The present report emphasizes the need of major and drastic interventions, with extension in the southern, southeastern, eastern and central parts of Romania, in order to obtain real results in desertification control. Consequently, Romania is looking for internal and external (as assistance) financing sources, essential to this action.

Signification of the terms used in this report is shown in Annex 1.

Geographical and climatic characteristics of Romania, with special reference to drought processes are shown in Annex 2. Characteristic for Romania's climate is the high frequency of drought, particularly in the low lands of the south, southeast and east of Romania where the annual main temperature is between 10.5 and 11.3 ^{0}C (sometimes 12.5 – 12.7 ^{0}C) and rainfall is bellow 500mm/ per year (sometimes 250 – 300mm). These climatic parameters became worse in the period 1982 – 1994, this being the most droughty period from the history of the country.

Regarding desertification, this systemic phenomena is a result of drought, among many others. According to the definition of Convention to Combat Desertification (CCD), about 2.2 millions ha (10 % of country area) situated in the South-East of Romania (East of Muntenia, Dobrogea, and the South of Moldova) and consisting mostly in crop field and a great surface of humid land in the Danube Delta, show lesser than 0.65 ratio between precipitation and evapotranspiration.

According to Palfay index (IP of 6….8) used today to characterize the dry regions, a region is considered dry if IP is higher than 6. More, in the range 6….8, IP indicates regions easy affected by drought, where the frequency of dry years is 40-65 %. A lower frequency of dry years there is also in the regions with IP less than 6. The zones with IP in the range 6...8 (see the map) covers 40 % of the crop land of Romania, namely in the South, South-East and East of Romania, and the regions with the IP in the range 4…6 represents 20 % of the crop land of Romania being settled not only in the South and South-East of Romania but also in West and the central part of the country.

The degradation process of the soil affects more than half of the land at national level (Annex 3), and the strongest degraded soils (surface erosion, deep erosion, landslides, wind erosion) represents about 7.262 million ha (30.6 %).

The region with the highest percent of degraded soil and land slides phenomena is situated in the Moldavian Plateau, Subcarpati (between the valley of Trotus and Olt), Getic Plateau and Transilvanian Plateau, i.e. in the East, South and Central – North-Eastern part of the country.

Wind erosion is occurring in the far North-West of the country (Carei Plain), West (Banat Plain), South (Oltenia and Baragan Plains), South-East (Black Sea shore, Danube Delta) and East (Tecuci Plain).

The crop fields under aridization are located in the South-East of Romania, just in the area with wind erosion (Dolj, Olt, Ialomita, Brãila, Galati counties).

The project **“ Development of rural areas in Romania – The Green Book”** funded by PHARE and having as beneficiary the Ministry of Agriculture and Food in Romania, analyzed the rural area with the purpose to identify the village problems and to define a strategy of rural development. The result of the project consisted in a map concerning the degree of rural development in Romania, according to certain risk factors, as follows: geographic, demographic, economic, settlement, technical equipment of the localities, social and ecological ones. At the national level this shows that those communities affected by drought and aridization have a lot of

troubles in their development. These zones need large support and quick intervention to avoid implacable deterioration of them.

Taking into account this state of the things, in Romania all actions that try to reduce the effect of drought and aridization are part of the national and sectorial strategies.

Chapter (iii) enumerates briefly national strategies that contain topics related to the objectives of CCD:

- Middle-term National Strategy for Economical Development of Romania
- National Strategy for Sustainable Development
- National Plan for Agriculture and Rural Development
- National Action Program for Environmental Protection
- Project of Strategy for Drought and Desertification Combat

The common topics of these strategies are referring to:

- Establishment of optimal size and economically efficient exploitation and development of the structural reforms with the purpose of farms consolidation;
- Priority for security against natural disaster and accidents: drought, floods, landslides. In this field it is mentioned the exploitation of existing construction.
- Strategy actions for sustainable management of forests, a finding of the fact that in Romania the consequences of natural disaster and climatic changes take proportions, so that the necessity of forest management under risk becomes clear.
- Sustainable management of water resources according to international rules.
- Building of financial tools for items connected to the environment, to set gradually the EU “aquis” in the area of water, environment protection in industry, agriculture, soil protection and degraded land

As a first measure of CCD implementation is the creation of Romanian National Committee for Desertification. This will be in charge with elaboration of national strategy and the projects for desertification combat and drought prevention, up-dating of the strategy, monitoring and prognosis of soil quality in the zone submitted to desertification, elaboration of project proposals for new law initiatives, identification of financial resources, mediatization of desertification and drought problems to aware the people and international community.

A p**roject of Strategy of combat desertification and drought in Romania** has been worked out on middle term (2000-2010). This is under the analysis of the institutions and ministries directly concerned and it is going to be achieved in the second quarter of year 2000.

In addition, the actual legislation in Romania, adopted along the recent 10 years, is referring to aspects of protection and improvement of water and soil resources that, implicitly, is referring to desertification and soil degradation*: Land Law No. 18/1991; Law on Land Reclamation No. 84/1996; Law on Environmental Protection No. 137/1995; Law on Cadastre No. 7/1996; Forest Code No. 26/1996; Law of Water No. 107/1996; Law on the Reclamation of Degraded Lands by Afforestation No 107/1999, Governmental Ordinance concerning the Association of Water Users for Irrigations No. 147/1999, Governmental Ordinance concerning the Establishment of the National Company "Land Reclamation" No. 23/2000.*

The above legal provisions are susceptible to be improved. They must be better connected to each other and must be adapted to EU legislation and international standards.

The main institutions involved in combating desertification, protection and reclamation of degraded lands and drought prevention activities are: Ministry of Waters, Forests and Environmental Protection (MWFEP); research institutes subordinate to MWFEP, oriented on meteorology, hydrology, environmental

engineering, forestry, Danube Delta; districtual agencies of environmental protection; Forest National Company; Ministry of Alimentation and Agriculture (MAA); “Gheorghe Ionescu Sisesti “ Agriculture and Forestry Academy of Science and its all research institutes; Autonomous Company of Land Improvement; regional specialized institutes subordinate to the Ministry of Alimentation and Agriculture ruling; offices of cadastre and land organization, etc.; NGO and professional associations (like National Soil Science Society, “Progresul silvic” Society and Romanian Society for Sustainable Development). Local entities (Forest Branches, districtual Agencies of Environmental Protection, districtual offices of Pedological and Agrochemical Studies, Bureau of Cadastre and Land Organization) together with the districtual branches of National Agency of Agricultural Consultancy (subordinate to the Ministry of Alimentation and Agriculture) and the specialists from Regional Agricultural Research Stations (subordinate to Agriculture and Forestry Academy of Science) are providing the information to the final users and also they ensure the expertise for combat and mitigation of long lasting drought and aridization phenomena.

Regarding **international cooperation** (chapter vi),it is considered that under specific geographical, social and economical conditions of Romania, the actions to combat desertification and drought must be developed together with land reclamation and watershed management (mostly in the hilly and mountains area).

Chapter (vii) describes the actions that have been taken or will be taken to improve economic environment, institutional organizations, expertise concerning desertification and monitoring of drought consequences (research, forestry, hydrological reclamation).

The 2001 – 2050 evolution of the funds of Ecological Restoration Programme of degraded lands by forest ways is shown in the chapter (vii).In the structure of current year budget (2000) the allocated funds rise to $ 450,000 as a fund for degraded land improvement and $ 5,000,000 for reforestation of degraded lands.

Romania will contribute yearly at the SAPARD Program with $ 75 000 000. About 20 % of this amount will be allocated to rural communities settled in the area affected by drought and aridization.

Operative actions are undertaken to monitor and forecast the meteorological and hydrological events as well as the soil quality within the areas affected by desertification and drought. Also, the forest and forests soils have been monitored since 1990 both within an European and a national survey network (chapter ix).

(iii) The strategies and priorities established within the framework of sustainable development plans and/or policies

The main national strategies and action plans having components relevant for the objectives of Convention to Combat Desertification, are as follows:

- Middle-term National Strategy for Economical Development of Romania
- National Strategy for Sustainable Development
- National Plan for Agriculture and Rural Development
- National Action Program for Environmental Protection
- Project of Strategy for Drought and Combat of Desertification

In the Middle-term National Strategy for Economical Development of Romania, the objectives of the Convention to Combat desertification will be included in:

- Oriented policy – application of accompanying measures in agriculture with the purpose of food security and rural area improvement:
  - Establishment of optimal size and economically efficient exploitation. The policy here will target the increasing of the surface owned by discouraging small properties (less than a very certain surface). As well, it will encourage owners association, partnerships, fellowships based on competition and the interest of the farmers, by

encouraging of leasing and long term granting, with the purpose to allow promotion of modern techniques in agricultural crop.

- ◊ Deepening of structural reforms that develop agricultural land exploitation
- ◊ Offering consultancy and training for farmers and forest land owners

- ♦ Environmental protection, land planning and regional development by:
  - ◊ Action programs for conservation and protection of the nature, biological diversity and sustainable development of their compounds
  - ◊ Assessment of natural capital of Romania according to its diversity and vulnerability
  - ◊ Initiating of measures of reclamation of natural capital in deteriorated areas
  - ◊ Improvement of water resources management according to the provisions of Dublin Conference (1992) and Rio Summit (1992)
  - ◊ Ensuring the integrity of forest land in the situation of forest ownership changement, adopting very strict rules to avoid decreasing of forested area, increasing of the forested area to 27.3 % at national level until 2004-2005.
  - ◊ Realization of the national programme of sustainable soil utilization and the combat of the soil erosion
  - ◊ Building of financial tools for matters ralated to environment, in order to gradually transpose the EU “aquis” especially in the area of water, environmental protection in industry, agriculture,soil, degraded lands and organic protection .
  - ◊ Building of Environmental Fund as the main tool to support the important objectives provisioned both in the National Action Plan for Environment Protection and the National Plan for Accession to European Union

◊ Developing the integrated environmental monitoring and the environmental informational system as main tools for decision makers.

The strategy of Environmental Protection between 2000 and 2020 describes in detail the environmental aspects stated in the middle-term National Strategy for Economical Development of Romania. This strategy take into account both the tasks assumed at national level and those shared by Romania through international conventions. National Environmental Strategy and the National Action Plan take into account the Decision No. 2179 of the European Parliament and UE Council Board by integrating the environmental demands among those with high priority (within the fifth Actions Programme elaborated by the EU). National Strategy of Environmental Protection together the National Actions Plan involve high cooperation among Ministry of Waters, Forests and Environmental Protection, other ministries, local authorities, NGO-s, public, as well as international bodies.

Relevant topics for the Convention to Combat Desertification in the Strategy of Environmental Protection, are as follows:

◊ Priority for security against natural disasters and accidents, like drought, floods, land slides. Thus, it is mentioned that it is necessary to use actual constructions and to finish the works started years ago. According to the estimation of the World Bank experts, Romania has invested about

$ 25,000,000 in irrigation systems, from which only 20 % are used now. Rehabilitation and modernization of actual irrigation systems and optimum use of them may ensure constant yield for internal or abroad market.

◊ The short term objectives (2000-2005) , are the following:

1. Protection, conservation and restoration of agricultural ecosystems through new technologies that ensure a sustainable development for increasing the productivity to 1-2 %, taking into account the actual stage of the reform in the agriculture.

2. Irrigation of 1-1.5 millions ha of crop land until 2005, forest belts on 20-30 000 ha.
3. Combat of soil erosion on 1-1,5 millions ha from existing 2,5 millions ha
4. Increasing of national forest area with 80-120 000 ha until 2005 and improving the structure of actual forests.

◊ The middle term objectives (2010) are as follows :

1. Forest fund will be developed intensively and extensively in the affected areas and it will reach in 2010 28% of the country area, including shelterbelt forests.

2. Organization of protected areas network (including "Nature network" and "Pan-European ecological network") and assurance of the necessary management

♦ The main objectives of the long-term strategy are the following :

1. Setting in function the works in the watersheds for a complex use of waters and finishing the works that have been started and interrupted; it will be take care off the management for the existing irrigation area(3.2 million ha), the works for soil erosion control (2 million ha) and establishment of forests shelterbelts in various regions, especially in Dobrogea and in other 4 regions which are frequently affected by drought

2. Protection, conservation and rebuilding of biological diversity by reduction and elimination of negative impacts that result from environment pollution, overexploitation of natural resources, inadequate utilization of land, rebuilding deteriorated ecosystems and habitats

3. The integrated monitoring system of all environment factors

In the National Strategy for Sustainable Development promoted by the Work Group of HG 305/15.04.1994 the problems approached by the Convention to Combat Desertification are included in the following:

· **The main objectives and measurement of strategy for protection, improvement and sustainable utilization of soils. It is recommended for the achievement of this strategy, at local and national level, the improvement of legislation, institutional and operational frame for the assurance of:**

>Maximum admissible limits regarding soil degradation;

>Promoting local and national decision to support the protection, improvement and sustainable utilization of soils;

>Identification of problems, causes and measures, including a better understanding of the links among these; inventory of the zones with problems;

>Evaluation of damage and its tendency by an impact and monitoring system;

>Development and improvement of structure and promptness of the research and education institutions involved in these problems.

· **The following concepts will be applied in sustainable management of water:**

>Water resources are managed on the watersheds by a global approach which joins social problems and economical development with natural ecosystem protection;

>An unitary quantitative and qualitative management.

· **Strategic actions for sustainable management of forest which start from the conclusion that in Romania the consequence of the natural hazards and global climatic changes tend to amplify, so it will be appear the necessity for a risk forestry :**

>Maintaining the integrity of the national forestry fond in the condition of changing the owner (state and private forests).

>Increasing the forestry fund until it will reach the optimal level (35% of national territory), with zonal differences : 10 % in the plain region, 25 % in the hill region and 65 % in the mountain region.

>Afforestation of degraded and abandoned crop lands (65000 ha until 2010 and 300000 ha until 2020)

>Planting shelterbelts for protection of the agricultural field (2000 km until 2010 and 10000 km until 2020)

>Establishment of green zones around the cities and other localities and torrents corrections (2500 km torrential network until 2020), as well.

>Ecological reconstruction of the structural deteriorated forestry by natural and antropic factors (20000 ha between 2000 and 2020)

>Biodiversity forest conservation

- Policies and measures for sustainable development of agriculture in Romania. Agriculture is considered a strategic national priority. Its development has to be made according to the following major objectives:

>On short term: fiscal stimulation and other specific methods, for little agriculture exploitation based on the subsistence production, with the achievement of assets for internal and external market

>On medium term: achievement on large scale of familial advantageous exploitations

>On long term: preponderance of modern familial agriculture exploitations

>Radical reorganization of agriculture lands use, protecting at maximum rate those favorable for agriculture

>Land fund policy according to the needs of a sustainable agriculture, which until 2020 will:

- provide modern production means on 3 million ha of arable soil;
- provide medium technological production means on 2.5 million ha of arable soil

- provide low technological production means on 1.2 million ha of arable soil
- Reduction of arable soil by sowing and afforestation of strong affected areas by damaging phenomena and processes, especially erosion and landslide (450000 ha of abandoned land).

· **Adequate monitoring systems for some agro-ambiental indicators by which it will be identified areas with environment risk.**

On long term, the *National Plan for Agriculture and Rural Development* has proposed a strategy that will contribute to the accession of Romania at the EU(98/C/202/08 JOCE 29.06.1998).

In the frame of this national plan specific problems of the Convention to Combat Desertification can be found in the following actions and priorities:

- Priority 2: increasing of the life standard for rural areas through improvement and development of rural infrastructure and suatainable agriculture:

- Measure 2.1: Development and improvement of rural infrastructure by:
  - Improvement of the environment quality and decreasing of pollution sources;
  - Keeping population into the rural areas.
- Measure 2.2 Land reclamation
  - Elaboration and implementation of local or regional projects for erosion control, protection against floods and elimination of humidity excess.
  - Attraction of investments in the private sector, for good anti – erosion works.
  - Consolidation of the rural exploitations by a new distribution of the small and dispersed lots in order to form larger or better organized lots

- Measure 2.5 : Management of water resources for agriculture through:

  • Sustainable management of water resources, reconstruction and conservation of environment quality in the rural areas;

  • Assurance of water needs for the agriculture crop in the humidity deficitary areas, in economic efficient condition .

• Priority 3: rural economy development by establishment and improvement private agriculture and forest exploitations, in the frame of a durable development

- Measure 3.1 Investments in agriculture exploitations:

  • Development and modernization of some productions process both in vegetal and animal growing sectors, allowing application of some modern technologies;

  • Increase of income, with positive effects for consolidation of rural communities, with low rate of economical development.

  • Increase the economical power of the agriculture exploitation and the consolidation of the private owners;

  • Establishment of modern exploitations which will be efficient both for vegetal production and animal growing

- Measure 3.2 Establishment of the producers groups:

  • Mutual support between agricultural exploitations, including the use of new technologies and practices to keep and improve environment and rural landscape;

- Measure 3.3 Agricultural and environmental measures:

  • Promoting some utilization ways of agricultural land which are compatible with the environment, landscape and natural resources protection and improvement;

- Promoting of a sustainable agriculture, friendly with the environment;

- Measure 3.6 Forestry

Of the expected effects in the frame of the *National Plan for Agriculture and Rural Development* the following are directly relevant for the actions in the combat of desertification :

- 150000 ha land improved by actions against erosion and humidity excess, which represent 14 % of the most degraded lands.
- About 50000 ha included in cadastral funds which represent 12% of the specialized culture area;
- 30000 ha created and improved for irrigation, which represent 5 % of the actual used area;
- 9690 projects for investments in agriculture exploitations, which include 10000 farmers;
- 12600 equipment for agricultural mechanization;
- 200 producer groups financially supported, which represent 5000 farmers;
- 45000 ha covered by agricultural and environmental measure
- 36250 ha of forest (new forests);
- 215000 farmers or forest owners

"**Rural Development in Romania – Green Book** " Project, made with Phare funds and having Minister of Agriculture and Food of Romania as beneficiary, has as purpose the diagnose of rural region for main problems identification with which rural communities are confronted. The following pressure factors with which rural regions are confronted are relevant for the Convention to Combat Desertification :

>Existence of one or more physical and geographic risk factors such:

• Floods, landslide, low precipitation, low water resources. It is considered that although these risks are frequently, only about 1/5 of the country area is exposed to some serious situations from this point of view.

• From an economic point of view

- Low diversity of economical activities (the most part of the localities has an economy based on agriculture);

- Weak efficient agriculture (agriculture exploitation of small dimensions prevails);

• From the point view of the environment quality:

- Soils degradation, mainly by antropic actions;
- Degradation of the forestry fund

In the project a model of strategy has been elaborated for sustainable development which includes, among others, the following actions specific to the CCD:

> Hydrotechnical works

• Control works for the landslide by management of the slopes;

• Application of measure for the erosion control;

• Irrigation works in drought areas

> Promotion of the assurance system against risk factors:

> Increase the production potential of the agriculture lands by:

• Facilitating of the land circulation in order to reach the optimal value of the exploitations;

• Extending of the use of machinery in agriculture production process;

• Efficient use of the pesticides, herbicide and fertilizers;

- Extending and generalizating of the research results

Realization of a forestry based on sustainable management of the forest

- The completion of present legislation and elaboration of new normative acts which should be regulated in detailing forestry activity with specific aspects (financial sources for the ecological reconstruction of the forests which have been deteriorated by the pollution, drought, mining exploitation).

· **Protection and conservation of the present forestry fund by:**

- monitorization of protected and vulnerable areas from the forest fund;
- conservation and amelioration of the biological diversity
- prevention of ecological and economic risks in the process of forest management ;
- management of private forests in forest regime by establishment of private owner associations.

· **Extension of the forest area and other forest vegetation forms by:**

- afforestation of degraded lands, which are not proper for agricultural use;
- establishment of the shelterbelt networks for protection of agricultural lands, railway, roads, settlements
- correction of the torrents by complex hydro-technical works combined with forest measure
-stopping deforestation of the forest vegetation outside of forest land.

In the period of 1995-1998, a large multidisciplinary research program was commonly performed by the 14 research units. This program, financed by the National Agency of Science and Technology and co- ordinated by the Agricultural and Forest Sciences Academy, synthesized the actual state of scientific knowledge in drought.

Different research issues concerning soil degradation in areas exposed to desertification have been approached within this program. Erosion control techniques have been developed, along with techniques for controlling the salinity and compaction of soils as well as techniques for recovering and improving the degraded lands, due to erosion, acidification or other degrading processes .

The research has made evident the necessity to preserve and adopt new solutions for alternative uses of the areas which are very degraded in regions affected by drought and desertification, marginal lands for agricultural crop which cannot be economically recovered. Within the programme historical data climatic and production related series have been studied in order to carry out temporal distribution of drought and to assess some economic hazard indicators which are associated to agricultural practices when the drought period is prolonged.

(iv) Institutional measures adopted to implement the Convention

With respect to **institutional problems** it is to be underlined that the Romanian National Committee for Desertification Control (RNCD) is to be established. This committee is meant to address to the establishment of the national strategy and the projects to control desertification and to prevent drought effects, to update the strategy, to monitor and to forecast the soil and water condition and quality in areas exposed to desertification, to make proposals for new laws and actions to find out financial resources, to make people aware of the problems related to desertification and drought along with promoting international co-operation. RNCD is intending to integrate and synthesise the experience gathered in different research institutes by different local or nationally-wide research projects.

A draft of the middle-term (2000-2020) strategy to prevent desertification and drought has been carried out. This is revised by directly interested ministries and institutions and it will be finalized in the second semester of 2000.

Annex 5 shows the ecological reconstruction programmes by silvicultural means of degraded lands located in agricultural fund and creation of protection forest belts, for the period 2001-2050.

In addition, Romanian legislation, adopted during the last decade, refers to some problems related to amelioration and protection of water resources and soils and implicitly approaches the desertification process and soil erosion.

Therefore:

> *The Land Law no. 18/1991* states the establishment of soil reclamation sites where the soil is eroded and establishes a special fund for this purpose. The Government Decision no. 786/1993 makes this statement clear, by establishing the criteria to select the land which is supposed to be included in soil reclamation sites and the functions of commissions in charge. The Government Decision no. 267/1995 establishes the way of establishment and utilization of the special fund for soil reclamation sites.

> *Law on Land Reclamation No. 84/1996; Governmental Ordinance concerning the Association of Water Users for Irrigations No. 147/1999, Governmental Ordinance concerning the Establishment of the National Company "Land Reclamation" No. 23/2000* deals with the manner in which this sector is organized, being directly involved in preventing of desertification and soil degradation.

> *The Law on Environmental Protection no. 137/1995* refers to the manner of organizing the environment protection. A large chapter deals with soil protection. *Inter alia*, the law states the authorization of technologies used to produce chemical fertilizers. An inter-ministry commission has been set up for this purpose.

> *The Cadastre Law no. 7/1996* states, among other things, the budgeting of cadastre activity, including soil and agro-chemistry studies, needed periodically in order to assess changhes occurred in soil quality, implicitly due to desertification and degrading processes.

> *The Forest Code no. 26/1996* refers to the management of the national forest fund, and states measures to be adopted in order to ensure the forest fund integrity and improvement.

> *The Law of Water no. 107/1996* provides, *inter alia*, the conservation, improvement and water resources protection.

> *The Law on Reclamation of Degraded Lands by Forestation No 107/1999* with respect to afforestation of degraded lands establishes measures to improve land conditions through afforestation works.

All these legal issues are supposed to be updated and completed. They need a better correlation and should be adapted to the European Union legislation and international standards, as well.

With respect to **legislation field**, *the Law of Soil Protection* is to be mentioned which is being elaborated together with another project aiming at land management and unification.

(v) The participation of organisations and institutions to prepare and implement the action programme

The main institutions involved in activities related to desertification control, protection and improvement of degraded soils and drought prevention are as follows:

> Ministry of Waters, Forests and Environmental Protection, in charge with environment quality supervision, authorisation of economical activities which potentially threaten the environment, supervision of the quality surface water, forest management, and so on.

> Research institutes affiliated to the Ministry of Waters, Forests and Environmental Protection: Hydrology and Meteorology Institute, Institute for Environment Engineering, Forest Management Institute or Danube Delta Institute.

> County-level agencies, local bodies of Ministry of Waters, Forests and Environmental Protection, in charge with environmental impact assessment.

> The National Forest Company through its regional departments, in charge with forest soil protection, afforestation of high degraded lands. A special role is assigned to the Forest Research and Management Institute in charge with scientific grounding of technical solutions.

> Ministry of Agriculture and Food with assignments related to agricultural cadastre, rational use of soil resources, rural development and soil amelioration.

> The Academy of Agricultural and Forest Sciences “Gheorghe Ionescu-Sisesti”, which co-ordinates the research in agriculture and related fields, including forestry and environment protection.

> Research and development institutes and regional research stations.

> Universities of agriculture and forest sciences

> The Autonomous Regie of Land Improvement with its regional branches, which is subordinated to the Ministry of Agriculture and Food, being in charge with creation, maintenance and exploitation of irrigation systems, along with drainage and soil erosion control.

> Regional specialised institutions integrated with the Ministry of Agriculture and Food such as offices for soil studies and agro- chemistry, cadastre offices land management offices.

> Non-Governmental Organisations and professional associations, among which the Romanian National Society for Soil Sciences, “Progresul Silvic” Society and Romanian Association for Sustainable Development.

Local institutions (Forest Inspections, County-level Environment Protection Agencies, Soil and agro-chemistry Offices, Cadastre and Land Management Offices) along with county branches of the National Agency for Agricultural Consulting (subordinated to the Ministry of Agriculture and Food) and specialists from local Agricultural Research stations (subordinated to the Academy of Agriculture and Forest Sciences) ensures for the time being the follow-up process, aiming at controlling of the soil erosion and diminishing the effects of prolonged droughts.

(vi) The consultative process in support of the preparation and implementation of the national action programme and the partnership agreement with developed country Parties and other interested entities

Romania has accessed to the Convention to Combat Desertification and has actively participated to Balkanic Working Group for Drought.

National Romanian Committee to Combat Desertification (NRCCD), stipulated in this Convention, is being established.

NRCCD is going to represent Romania in all actions of the Convention.

The co-operation will be carried out through:

- participation to studies, strategies and elaboration of technological recommendations;
- access to information from international data bases;
- finding financial support to elaborate and to put into practice concrete projects concerning our national territory;
- participation of Romanian experts at projects concerning other territories.

On the other hand, it is important that Romania to take part at regional actions concerning Balkanian, Charpatian, Danubian and other areas in the proximity of our country.

Also, NRCCD is going to establish institutional framework through which the expertise of the Romanian specialists could be taking into account by other party countries at the convention to Combat Desertification.

The results of Romania's participation at international projects developed in the framework or with the support of other international conventions (Convention of Climate Changes, Convention of Bio-diversity Conservation) are used within current drought control activities.

As far as **international co-operation** is concerned, it is considered that under the specific natural and socio-economic conditions of our country, the actions of desertification and drought control have to be correlated with actions regarding ecological reconstruction of degraded lands management of torrential watersheds, especially in hilly and mountainous areas of the country.

(vii) Measures taken or planned within the framework of the national action programmes, including measures to improve the economic environment, to conserve natural resources, to improve institutional organisation, to improve knowledge of desertification and to monitor and assess the effects of drought

- Zones with desertification and drought phenomena have been identified after preliminary evaluation of degraded lands which is to be detailed.
- It is necessary to carry out a better and detailed account of these areas and a better specification of those, as soon as possible:
  - Accurate delimitation of sub-humid-drought zone, according to criteria adopted by CCD and correlation of the range of this area with pedo-climatic and agro-ecosystems micro-zones delimited and described by ecology and soil science.
  - Revision of drought zone frames taking into account correlation between criteria used by different Romanian institutions with information from recent specialised international literature and correlation between these criteria and agricultural experimental and production response data to drought impact.
  - Identification, within desertification and drought phenomena areas, of areas affected at present by degradation phenomena, of total degraded and non productive areas and of those with potential risk of degradation in the near future.

- It probably have been made, not enough efforts and with not relevant results, to keep working and to adapt to new agricultural structures at least of some irrigation, drainage and erosion control systems, which have been built previously.
- Private agricultural owners who work the entire area of agricultural land (after the Land Law from 1991 was put into practice) are partially supported by the state, starting with 1996.
- It has to be mentioned that this support is granted to the entire agricultural land of the country without any differentiation concerning areas affected by drought and desertification phenomena.
- Scientifical research has drawn up various solutions to diminish and prevent soil degradation (including on areas affected by desertification phenomenon), to prevent and diminish the effects of drought for irrigation and non-irrigation agricultural technology on these areas, for afforestation and rational use of the forest fund, etc.

Researches carried out by the Romanian specialised research institutions have taken into consideration various aspects concerning the drought and desertification phenomena considering all the issues regarding to natural and antropical factors.

Different analyses concerning climatic, hydrological[1)] and pedological[2)] factors have been accomplished on drought phenomenon. Also research work has been done regarding the effects of drought, desertification and soil degradation, onto water and soil resources, forest land[3)] and agricultural crops.

It have been approached different aspects concerning research of the processes of soil degradation on areas with desertification phenomenon and methods for prevention of erosion, pollution, salinisation, compaction and others similar phenomena have been designed. Also, mitigation methodologies for degraded lands (erosion, acidification, etc.) have been elaborated. It was evidenced the necessity to use more effective methods for hard-degraded lands where classical approaches are not economically efficient.

Cultivation technologies have been drawn up for irrigated and non-irrigated areas for different crops, hybrids and varieties, and also regarding to the soil processing, fertilisation and irrigation technology.

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1) National company "National Institute of Meteorology, Hydrology and Water Resources Management"
2) Research Institute for Soil Science and Agrochemistry
3) Forest Research and Management Institute

Existing irrigation systems were evaluated and designed realistic modernisation methods.

Also, monitoring systems for hydric stress evaluation by use of mathematical modelling of georeferenced data, have been established.

- Control of desertification and drought has been done, especially during last 40 years, through significant works for hydrological improvement regime. Large areas within desertification and drought zones have been equipped for irrigation. Potential irrigated areas represent 3211,1 thousand hectares from which nowadays can be utilised only 15 – 20% owed to the incompatibility of large irrigation systems with land fragmentation into small properties, taking into account lack of equipment, water cost and because of maintenance work deficiency, as well.

- Control of the desertification and drought has been done, especially during the last 40 years,through important forestry works such as anti-erosion and anti-drought land management, ecological re-building of degraded land, afforestation in zones without forest vegetation, as follows:

    - The system of the *Robinia pseudacacia* (black locust) wind break shelterbelts with protection against drought and for the stabilization of flying sands (mobile dunes) from region of Oltenia, accomplished through by afforestation. The action had started in1852 and had continued more than one century.

- Experimental shelterbelts system and other forestry plantation in the steppe of the southern part of Baragan Plain.
- Shelterbelts system against wind erosion and drought established in the hilly plain of Transilvania, at Cean.
- The restoration of the broad degraded lands with strong erosion from Vrancea, by the implementation of a complex system of antierosional and hydrological technical solutions.
- Forest plantations with the main role in protection of the soil and improvement of droughty climate which have been established in extreme site conditions of Dobrogea Plateau.
- Agrosilvicultural systems for the management of the areas with high propensity for erosion and desertification from Moldavian Plateau, in Perieni zone.
- The complex planning systems of torrential watersheds from several mountain and hilly areas of the country.

Recently, in Romania, it has been drawn up several studies concerning the desertification and drought control, especially in the areas very strong affected by these phenomena (in South, South-East and East of the country).

The main studies are:

- *„The feasibility study on forest restoration in Romanian Plain“*. This study was elaborated by specialists of Japan Forest Civil Engineering Consultants Foundation (JFCECF) in 1999 (field survey in 1997-1999) in collaboration with Romanian specialists from the Forest Research and Management Institute and Forest National Company as a result of the agreement signed on the 26th of April 1997 between the Ministry of Waters, Forests and Environmental Protection (MWFEP) and Japan International Cooperation Agency (JICA). The research covered about 115800 ha of forests in Olt and Dolj Counties and surveyed the forest decline fact finding (9200 ha of stand show different decline degree; 5200 ha of these are characterised by a

moderate and strong decline degree). In accordance with the financial analysis, the total cost for the implementation of the forest restoration is 10,610,000 US$.

- *„The forestry ecological reconstruction of the degraded lands in Dabuleni Zone ".* The study was elaborated by the Forest Research and Management Institute of Romania in this year, 2000. The study established technical solutions for afforestation of 1095 ha of degraded lands (dunes levelled and prepared for agricultural uses) which had been taken over from agriculture. The total cost of the works is 1,600,000 US$.

- *„The ecological reconstruction and the establishment of forest shelterbelts on lands which were taken over from agriculture in Small Island of Braila"*– Study elaborated by the Forest Research and Management Institute of Romania in 1999 which is also a feasibility study. The study established afforestation technical solutions for 2169 ha of degraded lands (which are under the influence of fluctuation of Danube River water level). The total cost of works is 4,400,000 US$.

  Also it is necessary to perform regional projects for:

  - economical analysis of the irrigation systems in different areas;
  - the re-implementation of some traditional agricultural methods adjusted at the dry-farming system;
  - the desertification process control from South Oltenia (sandy lands, damaged by wind erosion) and especially in the South-East of the country (Dobrogea), started in the last years;
- the reclamation of degraded lands unproper for agriculture in Moldavian Plateau and in hilly zones of Vaslui, Galati, Vrancea, Buzau, Prahova counties
  - setting up forest shelterbelts in regions affected by the desertification and drought in Moldavian Plateau, Dobrogea Plateau, Romanian Plain, Baragan, south of Oltenia and west of Transilvania ;

- damaged forestry ecosystem restoration from wet areas of the country (the meadows of internal rivers)
- systems of integrated agrosilvicultural measures for the control of the damage phenomena (desertification) and development of the rural zones as well;
- the programs for the establishment of optimal water management methods in hydrological areas, during the prolonged droughty period.

Future actions for the control of the desertification and drought are the following:

- **Identification and zoning of the desertification and drought problems**. At present, this zoning is known at national level but it is necessary to be detailed at the level of affected regions. It is also necessary to intensify the actions for the achievement of a geographical informational system (G.I.S.) according with the data basis and in an integrated vision about desertification and drought. This should be made for the insurance of the permanent rendal topical conditions and operative acquisition of the information for different purposes.
- The main solutions for **the prevention and decrease of the soil degradation** in the areas affected by desertification, are included in the specific technologies for the exploitation of agricultural and forest lands:
  1. The specific agricultural exploitation methods can be applied only under a basis of an economically efficient agriculture, being necessary to analyse and to adopt different technical and financial solutions that are supported by the state. Desertification and drought control would be understood as a national problem; the state has to assume some duties (partial subvention or preferential credits); it is not only a farmers' problem.
  2. A distinct problem is the erosion soil process control. The management of these lands which comprises the soil erosion monitoring, will be

based on the improvement of the lands which belong to the same owner (farmer) and on the increase of the farm area buying or renting these lands.

- **The soil and underground water pollution control** is another problem with distinct aspects. The main role in this field plays the pollutant factors (industry, mining, town planning or agricultural itself).
- On **the forestry lands**, the main measures for desertification control refer to the achievement of the forestry management stipulations. The forest protects the soil but in its turn the forest should be protected to function in good conditions. In every form of ownership, the forest administration must take care of the maintenance of the physical and functional forestry integrity through:
  1. Practice of an ecological sylviculture according to the sustainable management of forests.
  2. Conservation of the biodiversity, stability, productivity and natural regeneration capacity of forests.
  3. Permanent health monitoring and stopping of forests decline.
  4. Afforestation.
  5. Intensive tending operation.
- As far as **the strong degraded lands rehabilitation** (by excessive erosion or salinity or drawing out of forest and agricultural production by some industrial, mining, town planning activities) is concerned, the past conception was to use these lands for agricultural crops. At present, this opinion is reanalysed, to adopt alternative solutions for using these lands as forests, meadows and recreation places. In Romania, referring to high degraded productive lands (about 2 millions ha), the politic framework has been created for their rehabilitation, but financial resources are not identified yet.

- **Drought prevention and reduction** bases, at least in actual economical status of our country, on non-irrigated agriculture techniques. Irrigated agriculture remains in this stage a technique required on vegetable lands around urban areas and sandy soils. For the lands equipped with irrigation system, according to the national interest requirements, the state will continue to provide subventions. The modernization of existing irrigation systems, particularly the reduction of water loss in channels and reorganization of irrigation systems exploitation, are conditions for future development irrigated agriculture.
- **Monitoring and forecasting**. The current activities concerning monitoring of soils and waters quality, and of climatic conditions are to continuously diversified and modernized. Solutions for financing those activities are looked for maintaining the present weather forecast, hydrological, forest soil and vegetation monitoring network, for their endowment with modern equipment.
- The present stage of **research and extension,** as a result of previous activities emphasises the necessity of continuing of modernisation and updating this field. Actual tackled researches are going to update the technologies according to future private agriculture, market economy and the new agricultural structures, by actioning in different way according to the types of existing agricultural exploitation taking into consideration economical and social reasons, too. Researches regarding the adjustment of the features of Romanian agriculture and silviculture according to the criteria and standards used by European Union are developed.

It is very important to involve high experienced organizations/ groups in the research field, into the elaboration of the decision support system and of farms management methods in the condition of prolonged water deficit. In this activity will be involved non-governmental organizations which work in this field.

- Knowledge spreading and development of mass opinion regarding desertification and drought it is an important condition for improving the approach of this

problem in which are directly involved the state, the agricultural and forests land owners, the written and audio-vision media and all the people as well.

(viii) Financial allocations from national budget in support of implementation as well as financial assistance and technical cooperation received and needed, identifying and prioritising requirements

The evolution of fund required by the project of program regarding the ecological restoration of degraded lands from landed stock using forest means in 2001-2050 period (Annex 5) is shown in figure 1. The average reforestation costs took into consideration is 6,000 $/ha. For the lands which need special rehabilitation works in order to control depth erosion and landslide (600,000 ha) the average reforestation costs are 10,000 $/ha.

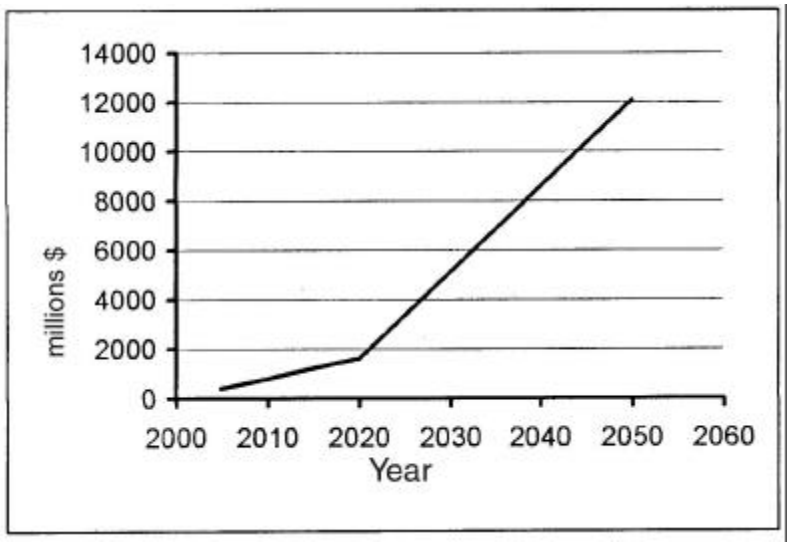

Fig. 1. The evolution of funds required for ecological restoration through forest means of degraded lands from agricultural landed stock.

In the budget for year 2000 , the amount of 450,000$ is destined for reclamation of degraded lands and 5,000,000$ for degraded lands reforestation.

Romania will contribute to SAPARD Program, dedicated to reconstruction and rural development, with 75,000,000 $/year (50% founds earmarked from the budget and 50% funds from local resources).Approximately 20% of this sum will be destined to rural communities in zones affected by drought.

(ix) Indicators used for monitoring

Monitoring actions and meteorology forecasting, agro-meteorological, hydrological, as well as monitoring actions of soils quality in zones that are submitted to desertification and drought, according to monitoring network of soils quality at European level, are operative. Also, wood and forest soils have been monitoriying since 1990 within the framework of representative statistic test network, installed at both national and European level.

The research activity concerning meteorology and hydrological forecasting of the humidity regime of the soil and agricultural crop, the degrading processes of soil, is necessary to be modernized and developed, particularly through larger utilization of the teledetection, informatics and mathematics simulation methods. It is necessary to correlate mathematics simulation from different research units, to compare evaluation of models taken over from literature or elaborated in country for adoption, in currently monitoring activity, of an unitary system adequate to local conditions. Regarding this matter, it is necessary to establish an operative collaboration between Romania and neighbour countries (Bulgaria, Yugoslavia, Hungary, Ukraine and Republic of Moldova).

Annex 1

General overview. terminology

The Action Plan for Combating Desertification, adopted since 1977 by the United Nation Conference had not the expected results, being recorded even a worsening of desertification processes. Therefore, the problem of desertification was mentioned at the United Nations Conference for Environment and Development held in Rio de Janeiro in 1991.

As a consequence, The United Nations Assembly has created through Resolution No.47/188 of December 22 1992 an Inter-Governmental Negotiation Committee which has elaborated the Convention to Combat Desertification (CCD) which was adopted in Paris on June 17, 1994 and entered into force on December 27 1996. Romania officially ratified this Convention by the law Nr. 626/1997. The last two decades with great climatic and hydrological changes, irrational use of land, and the increasing area of pollution and desertification phenomena determined the ratification of the Convention to Combat Desertification by Romania.

According to the CCD the following use of terms is used in this Report:

- "Combating desertification" includes activities which are aimed at prevention and/or reduction of land degradation, rehabilitation of partly degraded land and reclamation of desertified lands inclusive by using of species and crops adapted to these conditions.
- "Land degradation" means reduction or loss of the biological or economic productivity of the land due to various processes including human-induced

activities, such as wind and water erosion, deterioration of the physical, chemical and biological or economic properties of soil, long-term loss of natural vegetation;

- “Desertification” means land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities
- “Mitigating the effects of drought” means activities related to the prediction of drought and intended to reduce the vulnerability of society and natural systems to drought.
- “Drought” means the naturally occurring phenomenon that exists when precipitation has been significantly below normal recorded levels, causing serious hydrological imbalances and adversely affect land resource production systems
- “Land” means the terrestrial bio-productive system that comprises soil, vegetation, other biota, and the ecological and hydrological processes that operates within the system
- “Arid, semi-arid and dry sub-humid land” means land where the ratio between rainfall and potential evapotranspiration is in the range 0.05 – 0.65.

Annex 2

Geographical, Climatic and Land Use Characteristics of Romania

2.1 Geographical and Climate Characteristics

Romania is placed in South East part of Central Europe in the lower Danube catchment and in the Black Sea basin. Romania is placed on the intersection of 45^{o} latitude parallel and 25^{o} East Longitude meridian and is ranging on 4^{0} 37' 59" latitude interval.

From a geographical point of view Romania has three main relief structures (mountains, hill region, and plains). These relief structures, concentric distributed have poised area (30 % mountains, 37 % hills and plateaus, 33 % plains) and range from sea level up to 2550 m. Linked with relief distribution the climate, soils and vegetation show a vertical distribution.

The climate has a moderate-excessive character with the following regional characteristics: sub-mediteranean climate in South and South-East, oceanic influenced climate in West. A characteristic of Romania's climate is the high frequency of droughts mainly in the low areas of South, South East and East – where the average annual temperature ranges in 10.5 – 11.3^{o}C (sometimes 12.5 – 12.7^{o}) interval, and the cumulated rainfall is below 500 mm/year (sometimes in the range 250 – 300 mm/year). After 1980 year these drought characteristics increased the period 1982-1994 being the droughtiest period in the recorded climatic history of Romania.

2.2. Land Use

Romania has an overall area of 23.8 mil. ha. of which 14.8 mil. ha agricultural land (including 9.3 mil. ha arable land, 0.3 mil. ha orchards, 0.3 mil. ha vineyards and 4.9 mil. ha pastures) and 6.3 mil. ha forest land; there are 0.41 ha arable land per capita. The rest of 2.63 mil. ha consists of water areas, human sites, roads, etc. (in 1998). Annex 4 shows a general overview of the average size and structure of households.

More than half of the forest-covered area has an ecological and environment protection function (forests for water, soil, climate and biota protection: 53 %).

Considering the natural context of Romania (slope areas more than 67 % of the total country area, geomorphologic and litologic characteristics in favour of erosion processes) the decreasing area covered by forest is the main cause of water and wind land degradation. The forest-covered area continuous decreased from 80-85 % at the millennium beginning to 26.7 % today (under the European average of about 33 %, and at about 1/3 under the optimum considering the natural conditions of vegetation). The forest is not uniform distributed over the country: (1) only 7 % in plain area where the climate becomes more arid, (2) only 28 % in hill and plateau area where soil erosion and landslides processes increase, and (3) 65 % where is the starting points for flooding.

From the 19 million ha (7 %) of the catchment area with extreme high streams about 44 % is forest and 56 % has agriculture land use. Most of these catchments have land with mixed forestry and agriculture use. Therefore, here are necessary integrated hydrologic and anti-erosion ameliorative works.

Annex 3

Size and Effects of Desertification Processes in Romania

3.1. Size and effects of drought

Desertification as a systemic process is a result beside other processes of drought. According with the Convention to Combat Desertification about 2.2 million ha (about 10% af the country area) in South East Romania (East of Muntenia, Dobrogea and South Moldova) with arable land use mainly and in addition a great part of humid area of Danube Delta are included in "Arid, semi-arid and dry sub-humid land" having a ratio between rainfall and potential evapotranspiration less than 0.65.

According with the Aridity Index of Palfay (I.P. of 6…8) world-wide used today for defining the drought areas:

- drought areas has indexes greater than 6;
- moderate drought areas have Palfay Index in the range 6-8; here the frequency of drought years is 40-65 %.

A reduced frequency of drought years is in areas with Palfay Index less than 6, too. The area of Romania with Palfay index in the range 6-8 (see the map) covers 40 % of the agriculture land, mainly in the South, South East and East of Romania; the area with Palfay Index in the range 4-6 is about 20 % of the agriculture land area, mainly in South and South east, but with areas in West and central part of the country. After the evaluation of the Research Institute for Soil Science and Agrochemistry the drought affected area is of about 7.1 million ha (29.8 %).

The intensity of the drought is dependent on soil, relief and groundwater depth land characteristics, too. Therefore, the well developed soils with medium texture, absence of skeleton, high water retention capacity and available water for cops are less vulnerable to drought than extreme sand, clay or skeleton soils with short soil profile depth, having salinisation problems and low soil water capacity. The slope relief increases the vulnerability of the land to drought induced processes due to water losses by runoff. This vulnerability of slope areas is reduced if the groundwater depth

is in the range 1-3 m. Considering these aspects in the drought affected area of Romania most of the soils have a small or moderate vulnerability to drought (favorable available soil water and other agrophysical properties, flat area, some areas with shallow groundwater table). Therefore, on these areas the dry farming agriculture is suitable.

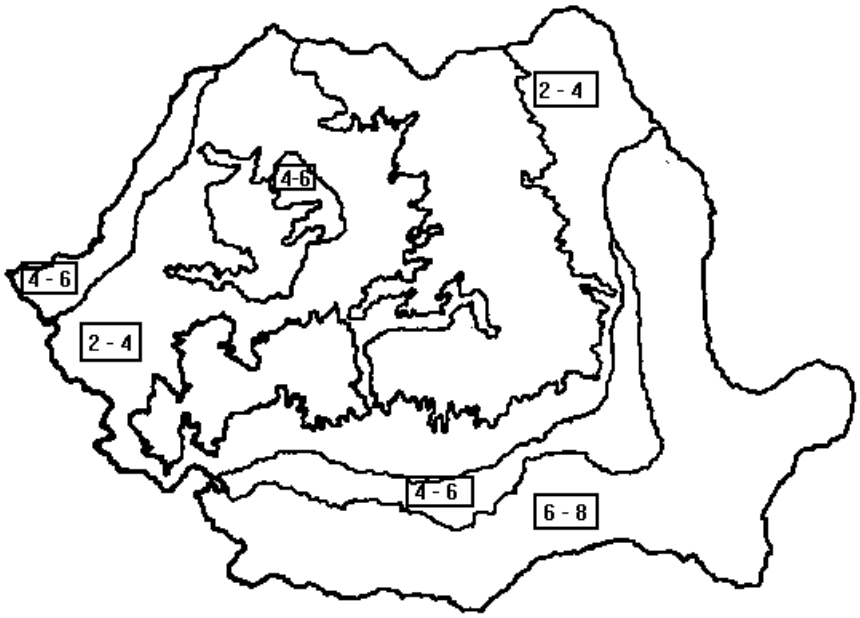

Figure 3.1. The map with Palfay Aridity Index

Land with high vulnerability to drought (mainly sandy soils with very low available water capacity placed in South Romania) is suitable only for irrigated agriculture. These areas are less than 3 % of the drought-affected areas.

Droughts, without a very distinctive periodicity, are repeated for 12-15 years interval. In this interval are some extreme drought years and 1-3 years breaks with years with enough rainfall. In the last 100 years periods with extreme drought were recorded in the following intervals:

- 1894 – 1905, with the extreme drought year in 1897
- 1942 – 1953, with the extreme drought year in 1946/1947
- 1982 – 1996 with the extreme drought years 1988 and 1991; in this interval the drought affected area were higher than for the previous drought periods.

From a hydrological point of view the drought periods with low river flows are more frequently and shorter than the meteorological drought. Therefore, such periods were recorded in 1894-1900 and 1961-1965 in Transilvania, and 1943-1952, 1958-1964 and 1982-1993 in Oltenia, Muntenia and Moldova regions.

The drought effects on crop development and yields could be derived from statistical records. Therefore, in the last 10 years the country winter wheat yield varied in the range 4 – 7 million tones.

Figures 3.2 – 3.4 show the output of a recent study using mathematical simulation models included in decision support systems linked with soil and climate data from Geographical Information Systems estimating the potential yield and annual economic profit in normal, wet and dry years, for an area of 972,656 ha placed in South Romania in Dolj and Mehedinti counties (43° 40' 00" - 44° 40' 00" latitude, 22° 00' 00" - 24° 00' 00" longitude).

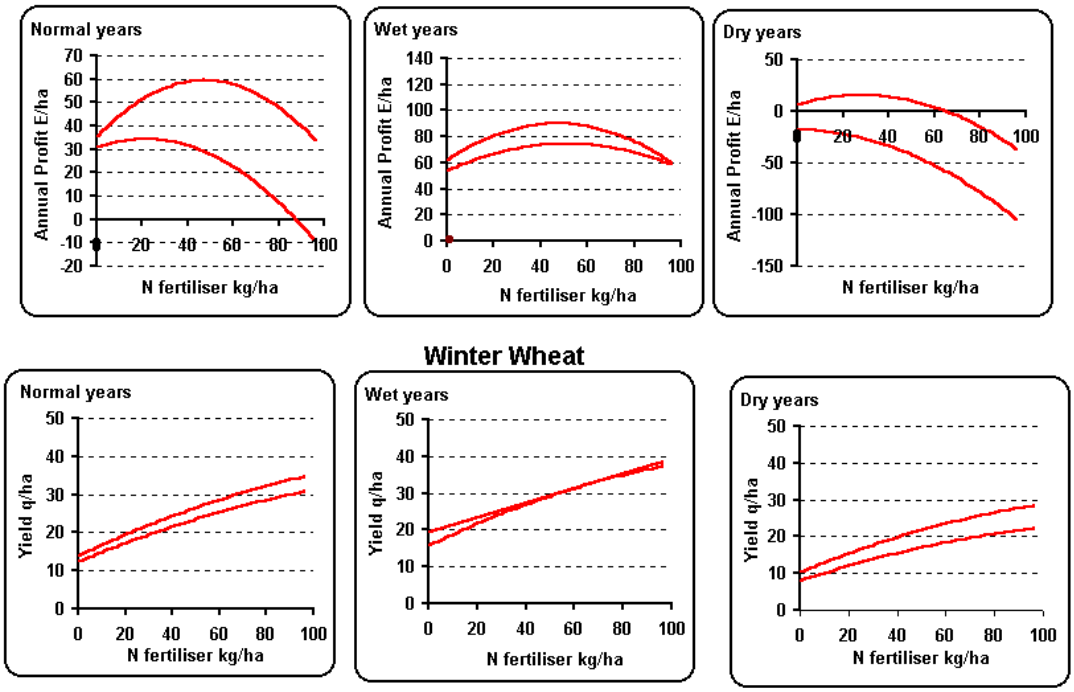

Figure 3.2. The Winter Wheat Yield and Annual Economic Profit depending on the climatic characteristics of the years and management system (Romania, Dolj and Mehedinti counties, 1960-1990)

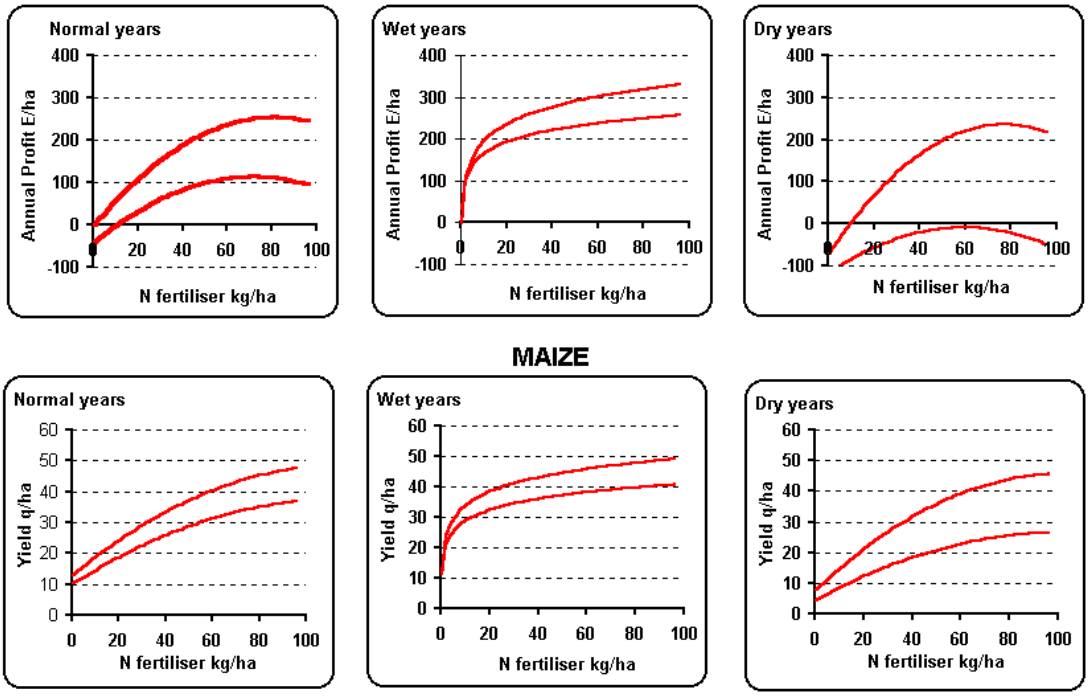

Figure 3.3. The Maize Yield and Annual Economic Profit depending on the climatic characteristics of the years and management system (Romania, Dolj and Mehedinti counties, 1960-1990)

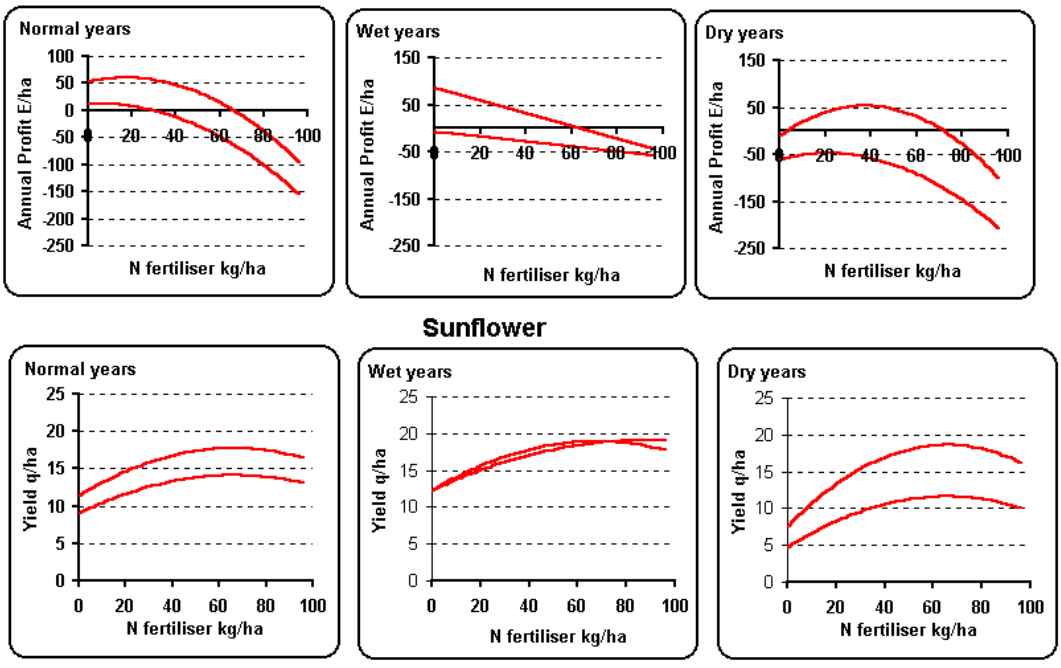

Figure 3.4. The Sunflower and Annual Economic Profit depending on the climatic characteristics of the years and management system (Romania, Dolj and Mehedinti counties, 1960-1990)

The drought has a negative impact on forest areas changing the areal of various tree species, moving the limits of vegetation zones (moving North and West of the silvo-steppe) and penetrating in the South area of Romania of some Saharian species.

Very sensitive considering the existence, conservation and evolution of forest vegetation and landscape with negative influences on socio-economic human activities are the hill and plain areas where the synergic negative effect of severe climatic fluctuations (with extreme drought periods), fragility of the litology and small areas covered with forest is increased. In this respect the most affected counties are placed in South and East Romania (Dolj, Olt, Galati, Braila, Ialomita). In this area the phenomenon of tree drying up is significant affecting the forest ecosystems: mainly with sessile trees in the plain area and willow and poplar trees in the inside-river meadows. The dramatic decreasing of the forest areas in the South and East Romania affects not only the socio-economic sector but induces the decreasing of a very important live-barrier in the way of penetrating to the Central part of Europe of Euro-Asiatic steppe.

Besides the effects on agriculture and forest ecosystems the drought has a negative impact on animal stocks by decreasing food and water supplies. In the same time, in drought periods are affected surface and groundwater reserves with negative consequences on hydropower plants and fluvial navigation. Reducing the river water flows could induce the increase of pollutant concentration. Direct negative effects on human health were also reported in the drought periods.

The drought has a significant effect on socio-economic sector. The income of farmers is significantly reduced and the production costs are not recovered. Considering that in the last years the drought affected large and compacted areas almost all the population involved in agriculture or agriculture-related economic activities is affected. The insurance system is not able to cover the damages of drought due to the fact that in these years the damages are very high and generalized over large areas.

The land desertification could be recorded in areas with a relative favorable rainfall regime (greater than 500 mm/year) as was the case in Vrancea Depression and in hill region close to Carpathian Mountains where the land was degraded by erosion due to deforestation and the wrong agriculture management practices on

slope areas. In these conditions, in some decade years the soil was complete eroded on large areas – in only a half century on a large area of the region the land looks like a semi-desert.

In conclusion, the soil degradation processes and drought affect large areas in the South of the country with very negative economic consequences. In the case, not very few, when these processes have a maximum intensity the lands where affected by desertification, or semi-desertification processes. Limiting the area of forests, ecological non-equilibrium and destructuration are the causes for the amplification in the last times of flooding, landslide and other land degradation processes (in the first place water and wind soil erosion). In addition, in Romania the negative consequences of natural hazards and of the climate changes have an increasing effect.

3.2. Size and effects of the land degradation

Land degradation processes affect more than half of the land area of the country (Table 1); lands with severe erosion problems (shallow and depth erosion, landslides, wind erosion) have a significant area: 7.262 million ha (30.6 %).

The regions with the highest ratio of eroded lands are in Moldova Plateau, hill area near Carpathian Mountains (mainly between Trotus and Olt rivers), Getic and Transilvania Plateaus – that means in East, South, and Central/North-West parts of Romania.

The wind erosion is significant in North-West (Carei Plain), West (Banat Plain), South (Oltenia and Baragan Plains), South-East (Black See shore, Danube Delta) and East (Tecuci Plain).

The agriculture land with aridisation problems are in South-East Romania in the same areas where wind erosion is significant, too (Dolj, Olt, Ialomita, Braila and Galati counties).

From the desertification point of view, degradation processes and limitations for agriculture ensuing from such processes are of high interest. There is a large specter of such limitations, including water and wind erosion, waterlogging, compaction, low humus, nitrogen and phosphorus content, pollution with various industrial and mining residues etc. Some of these degradation processes result from natural causes,. but some already are a consequence of inadequate farming and/or of other economic activities. An increase in many of these man-made degradation processes represent a major risk for the droughty area of Romania as a consequence of more intense industrial, mining, urban , traffic and even agricultural development. Erosion, salinity, pollution are among the main risks to be taken into consideration.

Table 1. Types of land degradation in Romania

Nr.	Type of degradation	Affected Area		
		x 1000 ha.	%	%*
1	Chemical pollution due to socio-economic activities	900	5.7	3.8
2	Oil and salt water pollution	50	0,3	0,2
3	Water erosion	6300	40.2	26.5
4	Landslides	702	4.5	2.9
5	Alluvial deposits	950	6,2	4.0
6	Wind erosion	378	2.4	1.6
7	Very low content of humus and nutritive elements	7304	46.6	30.6
8	Soil compaction due to inadecquate tillage practices	6500	41.5	27.3
9	Soil crust formation	2300	14.6	9.6
10	Frequent drought	7100	45.3	29.8
11	Aridisation	362	2.3	1.5
12	Lands without vegetation cover	141	0.9	0.6

% on total land area (23.8 million ha.).

Agricultural land capability classification (without land reclamation works)

Land Capability Class		Percent of villages	
Class	Limitations	Whole country	Droughty area
I	No or very minor limitations	8.3	16.3
II	Minor limitations	20.6	33.0
III	Moderate limitations	31.3	34.5
IV	Severe limitations	25.9	14.8
V	Very severe limitations	13.9	1.4

The direct effects of the land degradation processes in the areas affected by desertification are significant.

Besides the decreasing down to vanishing the production capacity of the soils, the land degradation induces negative changes of the flow regime of surface and ground waters, of the local climate, and the deterioration of the landscape. The cumulative negative effects induced by land degradation produce high water streams and flooding with very high damages on economic and social downstream objectives (transport, human settlements, agriculture, etc.).

The damages due to water streams, flooding and landslides were estimated in 1999 at 55 million $. The worse is the losing of human lives.

A very negative consequence of the land degradation processes is the altering of the physical and biological soil functions and the decreasing of soil productivity with 20 – 100 % on an area of about 2 million ha, and with up to 20 % on a slope land area of 3.7 million ha with agriculture land use. In the same time, the degraded lands have a 20 – 90 % decreased water storing capacity with very negative consequences during the drought periods.

Soils of the droughty area of Romania and their vulnerability to drought

Soils	Area (% of cropland in the droughty zone)	Soil vulnerab-ility to drought	Easily available water capacity (mm)
Soils with good available water capacity			
• *on flat land* (moderately vulnerable to drought)			
Kastanozems	1.0	III	65 -100
Chernozems	17.0	II	55 - 95
Phaeozems	16.4	II	50 - 80
Mollic Luvisols	12.5	II	40 - 70
Greyzems	1.0	II	40 - 70
Chromic Luvisols	4.2	II	30 - 50
• *on sloping land* (more vulnerable to drought)			
Kastanozems	1.3	I	60 - 90
Chernozems	5.0	I	50 - 90
Phaeozems	3.0	I-II	45 - 75
Greyzems	2.4	I	35 - 65
Soils with lower available water capacity (more vulnerable to drought)			
Lithic Kastanozems	0.1	I	20 - 35
Squeletic Phaeozems	1.0	I	20 - 35
Solontez soils	1.2	I	40 - 50
Vertisols	2.1	I-II	15 - 30
Lithosols	0.2	I	10 - 20
Arenosols	2.4	I	20 - 40
Lamelar Arenosols	0.4	I	15 - 30
Fluvisols of coarse particle-size	1.8	II	20 - 40
Soils with shallow ground-water table (less vulnerable to drought)			
Groundwater Chernozems	2.0	III	60 -100
Gleysols	0.4	II-III	20 - 60
Humic Gleysols	2.7	II-III	40 - 90
Fluvisols of medium particle-size	8.5	III	70 -120
Fluvisols of fine particle-size	5.8	II-III	40 - 90
Other soils	4.8		

Considering the forecast of the land degradation processes in Romania, inclusive in the dry sub-humid areas, which are the aim of CCD, there are elements to sustain the amplification of these phenomena. Considering the water erosion the forecast is that an amount of 126 millions tones of soil will be lost per year over all the country. Using the mineral fertilizers at 20-50 % of the needs induce the depletion of crop available nutritive elements from soils. The limited number of tractors and tillage implements have the effect of working the soil (especially plowing) out of the optimum time with consequences in increasing soil compaction and crust formation. Processes of soil pollution with chemical toxic substances from industry, husbandry, urban sites are increasing – even in the case of a low decrease in the last years due to social and economic problems of transition.

The direct effects of land degradation processes in areas subject to desertification are significant. The soil erosion induces a lost of cereal yield of about 60 kg/ha for each cm of eroded soil. Experiments on soil compaction show that even for an increase of soil bulk density with 0.01 g/cm^3 in the arable soil layer the decrease of the maize yield is about 130 kg/ha.

Annex 4.

Average size and structure of households

Before 1989, 95 percent of the agricultural land was organised in state and collective farms. Following the land reform of 1991, most of the land of the collective farms was returned to the original owners or the their inheritants, but no more than 10 ha per original owner, and some land was given to people working in agriculture but not being original land owners. Some of those getting back their land organised various kinds of "associations", either "family" (several land owners farming together) or "juridical" (managers farming land rented from its owners). The former state farms were reorganised as "trade societies", most of the land still being state-owned. The land where individual farming is practised is managed in extremely small farms. The land reforms initiated in 1981 are not yet accomplished, and at present discussion are going on in the Parliament for continuing this reform.

Item	Average area (ha/house-hold)	Agricultural area			
		(thous. ha)	(%)	(thous. ha)	(%)
		of the whole country area		of the droughty area	
Individual peasant farms	2.24	8,897	59.2	2414	43.8
"Family" associations	105	1,000	6.7	757	13.7
"Juridical" private agricultural societies	466	1,752	11.7	1169	21.2
Agricultural "commercial societies" and autonomous agencies (mostly state owned)	1,638	1,711	11.4	1176	18.1

Annex 5

ECOLOGICAL RECONSTRUCTION PROGRAMMES BY SILVICULTURAL MEANS OF DEGRADED LANDS LOCATED IN AGRICULTURAL FUND FOR THE PERIOD 2001 – 2050

Period of time	Afforestation programme for whole period - ha -	Afforestation annual average area - ha -	Limits of afforestation annual area - ha -
2001 – 2005	50.000	10.000	5.000 – 15.000
2006 – 2010	100.000	20.000	15.000 – 25.000
2011 – 2015	150.000	30.000	25.000 – 35.000
2016 – 2020	200.000	40.000	35.000 – 45.000
2021 – 2050	1.500.000	50.000	45.000 – 55.000
TOTAL 2001 – 2050	2.000.000	40.000	5.000 – 55.000

PROGRAMMES FOR CREATION OF SHELTER FOREST BELTS FOR THE PERIOD 2001 – 2050

Period of time	Programme for creation of shelter forest belts for whole period - ha -	Programme for annual average shelter forest belts area - ha -	Limits for creation of annual shelter forest belts area - ha -
2001 – 2005	5.000	1.000	500 – 2.000
2006 – 2010	15.000	3.000	2.000 – 4.000
2011 – 2015	20.000	4.000	3.000 – 5.000
2016 – 2020	30.000	6.000	5.000 – 6.000
2021 – 2050	210.000	7.000	6.000 – 8.000
TOTAL 2001 – 2050	280.000	5.600	500 – 8.000