# HUNGARY

## Desertification and drought

Government focal point: Zita Geller, UNCCD National Focal Point, Department of Strategy, Ministry of Environment and Water, Tel: +36-1-457-3578, E-mail: geller@mail.kvvm.hu

Decision-Making: Coordinating Bodies

The government agency responsible primarily for coordinating desertification and drought related government policies in Hungary is the MoEW in close cooperation with the MoARD. .

Decision-Making: Legislation and Regulations

The UN Convention to Combat Desertification in countries experiencing drought and/or desertification particularly in Africa (UNCCD) was signed by Hungary in 1999 and promulgated in 2003. The country has also joined the United Nations Framework Convention on Climate Change (FCCC) and its Kyoto Protocol, which objectives are closely related to the objective and some key provisions of the UNCCD.

Status of the country

The country is located in a climate zone predisposed to drought, and dry periods have always occurred. Large parts of the country are semi-arid or dry sub-humid. According to the worldwide used aridity index, the ratio of annual precipitation to potential evapotranspiration (P/PET), Hungary can be identified as an “affected country” under the terms of the UNCCD. In fact, drought is a considerable and increasing risk factor, especially on the Great Hungarian Plain and other parts of the country, and the signs of desertification can also be found. The problem of droughts is compounded in some areas by soil erosion.

As far as future tendencies are concerned, based on the analyses of climatic data on long term observations and taking into account the recent investigations on the effects of climatic changes in Hungary, it can be stated that an increase in temperature and a significant decrease in precipitation as well as in average soil moisture content is anticipated, and therefore the interest in the fight against drought and desertification is a priority in the country. Severe or moderate

droughts occur in Hungary nearly every year. Drought frequency has unfortunately increased, primarily in the last decades.

It is expected that one of the possible consequences of anticipated global climate change will be an average decrease of precipitation levels in the Hungarian region by approximately 50-100 mm/C annually. This could cause severe water supply problems in semiarid areas and dry lands.

Status of the National Action Programme (NAP)/ Drought Strategy

The National Drought Strategy was elaborated in 2006. It deals with the strategic planning framework for the protection and sustainable management of ecosystems in drought-prone areas.

Combating desertification and drought is of high importance in Hungary. The **National Drought Strategy** aimed at prevention and control of droughts . The key elements of the strategy are promotion of water-saving farming methods (for example, tillage systems, application of organic manure, use of certain types of agricultural machines); plant protection and weed control; amelioration and irrigation; afforestation and plant breeding; and improvement of observation systems.

Policies and practices to arrest land degradation and to restore land and soil productivity

The necessity and rationality of the reclamation of soils with limited fertility depends on economic (cost-benefit) analysis and ecological considerations. The radical amelioration of salt-affected soil, sandy soils or peat-lands requires expensive complex measures. Saline lakes and soils, wetlands and sand regions are – in many cases – protected ecosystems, habitats of protected plants and/or animals, and they are preserved for that reasons. Rehabilitation of degraded soils were estimated at and laid down in the National Agri-environmental Programme (2000-2004), and especially in the frame of the Environmentally Sensitive Areas (ESA) network that is still functioning.

National strategies and contingency arrangements for drought preparedness to deal with drought related food and water deficiencies

There is a national research and development project dealing partly with water management and water scarcity problems in agriculture, entitled Agroecology, under the leadership of the Research Institute of Soil Science and Agro-chemistry (RISSAC) of the Hungarian Academy of Sciences, and with participation of several academic and scientific institutions of Hungary. The project is going to

give a comprehensive outlook on the different problems of agro-ecological systems, and making proposals for a better and environmentally safe operation of these kinds of systems, with special regard to the most effective use of the national water resources and water retention possibilities under different climatic and ecological conditions.
Another project is about National Drought Strategy that was initiated and financed by the Ministry of Agriculture and Rural Development between 2001-2003, in which the experts of several research institutions and universities were involved. The final study of this project became an important document and starting point for the formulation of the present Strategy.

Afforestation and reforestation programmes using drought-resistant, fast-growing species

Afforestation programme supports the planting of the drought-resistant, fast-growing species on the sites threatened the most by the climate change, and there non-native tree species also can be applied excluding aggressively expanding species. In case of forest association consisting of native tree species, the regeneration after the final felling is required to apply native tree species, but not only the same species as the former stand's. In this case there is another possibility to regenerate the same forest stand with a lower canopy closure.

Use of climate and weather information, forecasts, monitoring and early warning to mitigate the effects of drought

One of the most important general preventive actions is forecasting. An early warning system should be established and operated as a basis of further and necessary decisions in due time before severe drought situation develops, especially in those areas where drought is occurring frequently. For this, the drought sensitive regions should be designated.

Although a separate drought early warning system has not yet been established in Hungary, early warning activities are based on different indices. With the objective of providing a more comprehensive framework for improving early warning and drought monitoring and mitigation techniques, the creation of a regional drought preparedness network for countries with similar geographical characteristics and drought patterns has begun under the coordination of the Drought Management Centre for Southeastern Europe (DMCSEE) based in Slovenia.

There are several indices used for drought estimation and forecasting in Hungary.

At the Hungarian Meteorological Service (HMS) an operational statistical (analogue) technique for long-range forecasting was developed and has been used for 20 years. The application of the dynamical seasonal forecasts started in 1998, in the frame of which forecasts of precipitation, surface air temperature and mean sea level pressure are given both as ensemble mean anomalies and as probability plots. Programmes are under development for the automatic data-reading from the forecasted fields, for the automatic data processing and verification. To consider drought severity the well-known Palmer Drought Severity Index (PDSI) is used. On a country-wide scale both the index values and their spatial extent are important.

In some cases Standardised Precipitation Index (SPI) series of 3-, 6-, 9-, and 18-month time scales are calculated. SPI's of shorter time scales can characterise water supply changes in short time periods in the year. One advantage of using SPI is its explicit time scale in contrast to the PDSI which is reported to respond to moisture anomalies on the 6-12-months scale.

Hydrologists and Water Authorities prefer to use the Palfai Aridity Index (PAI) for drought prediction and evaluation. The main aim of this method is to calculate the possible situation until the end of the year in case of the given spring conditions.

Agro-Hydro Potential (AHP) is used mainly by agronomists. This index gives the water demand satisfying ability of a certain area for a concrete plant stand existing there by the ratio of the effective water consumption and the water demand.

The above mentioned indicators constitute the basis of a nation-wide monitoring system for drought analysis and forecasting, which is under construction. Based on the use of the Palfai Aridity Index, a partial drought monitoring system is operating in water management and gives information first of all to the experts of the local water authorities interested in drought mitigation. According to our plans this system will be extended and together with the National Meteorological Service we would like to establish a general drought monitoring and forecasting system as well as to create a special data-base for drought analysis.

Using and evaluating the existing calculation methods and indices by which the occurrence and the expectable degree of dryness can be continuously calculated and forecast can be made, it is possible to determine the main drought prone areas and to draw a map with the differently sensitive territories of the country or even a greater region. If the method of the calculations and the mapping are the same or harmonised, it is possible to draw the drought sensitivity map of the country.

Research and dissemination on ways of reducing water loss from soils, on increasing the water absorption capacities of soils and on water harvesting technologies in desertification affected areas

The Hungarian Academy of Sciences coordinated a multidisciplinary research project addressing the problems of droughts. This project is continuing as a programme called Agro-21 which provides a scientific basis for the further development of Hungarian agriculture taking into consideration the variability and probable changes in natural conditions (especially the climate).

Intensive research work has been carried out in the following main topics:

- evaluation of the effects of drought events;
- determination of the reasons and circumstances in which drought occur;
- finding out the effects of drought on plant production and animal husbandry;
- developing methods for reduction of harmful impacts of drought.

The results of research works have been discussed, and the experts evaluated the situation within the framework of consultations and symposia. The special group of the Hungarian Academy of Sciences made one of the most important evaluations of the experience of the drought of 1983 during the next ten years, in which the experts have made:

- mathematical evaluation of climatic data series and climate-yield correlation,
- analysis of plant production on the basis of data gathered on several cultivated plots and plants,
- correspondence analysis of different factors on yield,
- historical evaluation of drought events and and response policies, and
- summary on the future tasks and possibilities.

The necessity of the establishment of monitoring systems and the use of the methods of informatics have been emphasised as well as the well organised complex research work on different impacts of drought. The Hungarian Academy of Sciences established a special temporary commission for the coordination of these kinds of research activities. The conclusion is clear that prevention is the most important and preparedness should be increased including the help of a better forecast service for drought mitigation. Also more effective international cooperation has been urged. Very important part of the fight against drought damages is plant breeding: to develop drought tolerant varieties of the cultivated crop species. Especially in the very drought sensitive areas the farmers can use these types of crops and avoid the complete destruction of yield. Hungarian plant breeders are doing continuous research and development work for having a wider offer from more drought tolerant crops. A new and comprehensive information system should be established including mapping of drought prone areas, specific

database of relevant meteorological, hydrological, agrotechnical, social and other data, with the help of which a better forecast can be given on drought occurrence as well as on estimation of drought impacts.