**Program on the Monitoring of Forests and Environmental Interactions
in the Cyprus Forests**

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**1. Introduction **

A serious decline in the forests of Europe has been observed since the beginning of 1980. This decline is characterized by a die-back of trees, excessive loss of foliage, insect attacks, reduction of vitality and productivity of forests and, in certain cases loss of ecological stability.

The decline of forests was attributed mainly to the atmospheric pollution, and for these reasons, research and continuous observation have been decided.

The international dimension of the problem leads to a world program for the monitoring of effects of atmospheric pollution on the forests (*International Co-operative Program on the Assessment and Monitoring of Air Pollution Effects on Forests, ICP-FORESTS*) has been developed by UN in 1985. Further information for the program is available in www.icp-forests.org. Nowadays more than 39 countries participate in the program.

Cyprus has joined the ICP – Forests program in 2001. The adoption of the program was the result of the increasing necessity for a better monitoring and understanding of forest ecosystems in Cyprus.

The Department of Forests, of the Ministry of Agriculture, Natural Resources and Environment, has been nominated as the National Focal Centre of the ICP-Program in Cyprus, being responsible for the collection, validation, evaluation, storage and management of the monitoring data.

For the period 01/01/2009 – 31/06/2011, a large part of program’s activities were included and co – funded under the LIFE+ project, «Further Development and Implementation of an EU – level forests Monitoring System (FutMon) ».

**2. The Objectives of the Program **

In addition to the national character, the program has a pan-European and global dimension with the following objectives:

· to provide a periodic overview on the spatial and temporal variation in forest condition in relation to anthropogenic (in particular air pollution) and natural stress factors (insects, diseases, drought, frost, flood etc),
· to contribute to a better understanding of the relationships between the condition of forest ecosystems and anthropogenic (in particular air pollution) / natural stress factors,
· to contribute to the calculation of critical levels / loads of various chemical substances which are accumulated in forest ecosystems, as a result of atmospheric pollution, and to the development and improvement of cooperation with other agents dealing with environmental monitoring programs,
· to contribute to a better understanding on forest ecosystem process and the interaction between its variouscomponents through the available data and observations of the program,· to contribute by means of the monitoring activities to other aspects of relevance to forest policy at national, pan-European and global level, such as climate changes on forests, sustainable forest management and biodiversity in forests,
· to provide policy-makers and the general public with relevant information.

**3. Research Activities of the Program **

The following research activities have been developed for the achievement of the objectives of the program:

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| Visual assessment of the forest crown condition, |
| Sampling and analysis of forest soil, |
| Sampling and analysis of forest soil solution, |
| Sampling and analysis of needles and leaves of forest trees, |
| Estimation of growth and yield of forest stands, |
| Sampling and chemical analysis of deposition (precipitation, snow, hail), |
| Meteorological observations, |
| Assessment of forest ground vegetation, |
| Monitoring of air quality and assessment of ozone injury on forests. |

A systematic network of 19 permanent plots has been established in Cyprus State forests aiming at the collection of the necessary data, relevant to the above activities. These plots are divided in two categories according to the type of observations to be done and data to be collected:

***“Systematic large scale monitoring plots”***

Fifteen plots, covering an area of 0,1 ha each, have been established for monitoring Calabrian pine (*Pinus brutia*), Black pine (*Pinus nigra*), and Cyprus cedar (*Cedrus brevifolia*) ecosystems. In these plots, annual observations of crown conditions and periodic sampling and analysis of soil and needles are carried out.

***“Intensive monitoring plots”***

Four plots, covering an area of 1ha each, have been established for monitoring Calabrian pine (*Pinus brutia*) and Black pine (*Pinus nigra*) ecosystems. In two of these plots, all research activities, mentioned above, are carried out. These plots are furnished with appropriate instruments and equipment for the collection of samples, data and information. The other two plots are partially equipped and only some research activities are carried out.

**4. Cooperation and Submission of Data and Results **

There is a close cooperation of the Cyprus Department of Forests and the “Program Coordinating Centre” (PCC) in Hamburg. There is also cooperation with Expert Panels which are responsible for the scientific work of the program.

For the implementation of the program, collaboration has been developed among Department of Forests and other governmental departments such as the Department of Agriculture, Department of Labor Inspection and Meteorological Service. The laboratory part of the program (chemical analysis of water, soil solution, needles and soil) has been undertaken by the Department of Agriculture, while there is exchange of information between the National Focal Centre and the Department of Labor Inspection, which runs the program “Network on Assessing Atmospheric Air-Quality in Cyprus”. The Meteorological Service contributes to the program with the provision of relevant meteorological data.

Processing and submission of the relevant data is under the responsibility of the Cyprus Department of Forests. The data and information are submitted by the end of each year to the Coordinating Center in Germany for further processing in combination with the data submitted by the other participating countries. Every year, the Program Coordinating Center prepares two technical reports, the “Forest Condition in Europe” and the “Intensive Monitoring of Forest Ecosystems in Europe” where it presents all results of the activities of the program.

Source: Department of Forests, Ministry of Agriculture, Rural Development and Environment.

**5. Climate Change and Forests**

According to the United Nation Framework Convention on Climate Change (UNFCCC),the term of climate change means «a change of climate which is attributed directly or indirectly to human activity» differentiating the term by climate variability due to natural causes. Cyprus Forests unfortunately could not remain uninfluenced by Climate Change and other Changes. In particular, the period 2005 – 2008 was affected by prolonged droughts, resulting on Cyprus forests ecosystems been intensively stress due to lack of soil moisture.

The Department of Forests adopts and applies mostly repeated actions which are designed to adapt on forest stands (natural and artificial) to climate change. Also the object of these actions is the reduction of emissions and increase the absorption of greenhouse gases. These actions can be grouped into three main areas as listed in the Statement of Forest Policy:

* Protecting forests against forest fires
* Adaptation of forests to climate change and enhancing the contribution of forests in addressing climate change and improvement of main forests and forested areas
* Improvement and expansion of forests.

Such **measures** are:

* Protection of forests from illegal logging: With the implementation of Law 139 (I) / 2013 is controlled most the available firewood locally and criminal penalties for any illegal or uncontrolled logging and / or disposal of the local timber market without authorization
* Reforestation of Amiantos asbestos Mine as well as restoration of abandoned mines in cooperation with the Competent Authorities (the Department of Geological Survey and the Mines Service)
* Protection of forests and enhancement of their structure and resistance to climate change through the Rural Development Program 2014 – 2020.

In particular, on the Rural Development Program, a number of activities and actions have been integrated under Measure 8 (Investments in forest area development and improvement of the viability of forests). The Action 8.5.3 includes thinning operations in thick stands created by afforestation / reforestation, with the purpose of:

Improving the structure of forests created by afforestation or/and reforestation operations. Furthermore, they will help in the adaptation of forest stands in climate change as well as contribute to the adaptation of forest stands to climate change, the reduction of emissions and increase the absorption of greenhouse gases.

The implementation of targeted thinning is expected to improve stability and resilience to other disturbances, such as drought, increase in average temperatures and prolonged heat waves (as a result of climate change).