

## FEW THOUGHTS ABOUT THE CONSERVATION OF CRYPTOGAMIC PLANTS WORLDWIDE AND IN ROMANIA (a review)

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**Abstract:** A short account on the history of cryptogamic plant conservation in Romania and worldwide is given. Four points of its importance are enumerated, as indicators of air pollution, their role in the composition of plant communities, their part in the biodiversity and in the monitoring of climate changes (global warming). 11 tusk for cryptogamic conservation are proposed.

**Key words:** biodiversity, bryophytes, conservation, lichens, pollution.

### The beginning of cryptogamic conservation in Romania and in Europe

The first attempts were to save cryptogamic habitats during the XX<sup>th</sup> century, by creations of protected areas and national parks. In this respect, Romania was among the firsts countries in south-east Europe (Retezat National Park, 1928). The intensive work to explore the cryptogamic floras, checklists (Péterfi 1908 [11], Papp 1970 [10], Dihoru 1994 [1], Mohan 1998 [9], Plămadă 1998 [13], Ștefănuț 2002 [16]), preparation of vegetational monographs, all helped to reach this goal and others in important periodicals, as "*Ocotirea Naturii*" (= "*Nature and Conservation*"), the "*Buletinul Științific*", both edited by the Romanian Academy of Sciences, the "*Contribuții Botanice*" of the Botanic Garden of "Babeș-Bolyai" University in Cluj-Napoca or the "*Scripta Botanica Musei Transilvanici*". There were many books published on the vegetation of national parks or protected areas, some of the aiming direct to the description of cryptogamic vegetation, like the study of Pop 1960 [15], Ștefureac 1969 [18], on some moss communities (summary by Goia [7]). In addition, the numerous works describing cryptogamic floras of protected areas, yielded important basis to establish their protection in Romania (e.g. Goia & Schumacker 2006 [6]), as well as in other countries of Europe.

The first legal step to protect bryophytes in Europe was their inclusion among the protected plants. The "*Bern Convention*" in 1979 [2] enumerated only 22 bryophytes, as officially protected. The European Community later edited the "*Habitats Directive*", then the Uppsala Symposium (1990) established an European Committee for the Conservation of Bryophytes. Its principles were applied in Romania by the Law 13/1993. The Conference on the Conservation of Bryophytes in Europe, Zürich (1994) decided the edition of a "*Red Data Book of European Bryophytes*" (1995), which enlisted already 469 threatened and 5 extinct bryophytes. This was followed in many countries by the publication of red lists at national level.

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### **Cryptogamic conservation at a global scale**

The International Union of Natural Conservation (IUCN) established a Global Committee for the Conservation of Bryophytes in (1990). Koponen called the attention to the global threat of extinction even in the field of bryophytes (Koponen 1992). A Status Survey and Conservation Action Plan was initiated (Hallingbäck & Hodgetts 2000 [8]) and as a result, an IUCN World Red List of Bryophytes (2000) was created, which at that time includes only 92 species of bryophytes protected at worldwide level.

#### **Why is the protection of cryptogams and their communities so important?**

Nowadays, several authors dealt with this question (Koponen 1992, Ștefănuț 2004 [16]). There are more than one reason:

- Cryptogams are much more sensitive indicators for environmental changes, especially for air pollution, than higher plants, absorbing moisture and air carried pollutants during the whole surface of their body. This is, why popularly they are used for the indication of pollutants (SO<sub>2</sub>, heavy metals, cement dust, etc.). There are hundreds of publications in this topic. I wish just to mention for example Aceto et al. (2003), Gombert et al. (2003), Nash (1976), Plămadă (1986) [12], and so on.
- Due to the increasing habitat destruction, lichens and mosses, important components of communities, being sensitive for environmental changes, disappear earlier than many other phanerogams.
- Our knowledge is still very incomplete on the cryptogamic floras of the tropics. The alarming level of forest destruction, overgrazing and bush fires there cause serious damage in cryptogam diversity. Many species become extinct before we even know them.
- Cryptogams are good indicators also of climatic changes. Due to the global warming the distribution areas of cryptogams more rapidly change than that of the phanerogams, due to their easier dispersal by spores. For example, in Europe, during the last five decades a number of bryophytes moved already a few hundred kilometers northwards, especially in open habitats, following the movements of isothermes (Frahm 2003 [4], 2005 [5], Frahm & Klaus 2001 [3], Pócs 2005 [14]). At the same time, due to the increasing climatic extremes in southeast Europe and due to the desiccation of some tropical countries, bryophytes of humid or wet habitats are decimated.

#### **How to continue the protection of cryptogams, what to do?**

- It is essential to prepare cryptogamic floras with good keys and illustrations, especially in the less known areas.
- Habitat monitoring and making species inventories in national parks and protected areas is very important, enabling us to follow up changes in biodiversity.
- Taxonomic revisions of critical groups, based on modern methodology.
- Mapping the distribution of protected or endangered species.
- Study the distributional history of taxa (phylogeography).
- To establish hot spots with high diversity, at national, continent and world level.
- The conservation of hot spots by establishing complex reserves and national parks.

- To take care of the legal process for the sake of effective protection.
- International cooperation in conservation research.
- Alert and strengthen public awareness.
- To popularize the cryptogamic plants and their protection at all levels of education.

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