



**European Council
for the Conservation
of Fungi**

Chairman

Beatrice Senn-Irlet
Swiss Federal Research Institute WSL
Zürcherstr. 111
8903 Birmensdorf, Switzerland
Fax (41) 01 739 22 15
Tel. (41) 01 739 22 43
E-mail: <beatrice.senn@wsl.ch >

Secretary

Vera Havoyva
M.G. Kholodny Institute of Botany
2 Tereshchenkivska Street
Kiev UA- 01601 Ukraine
Tel +380 44 239 67 87
e-mail: <vera.havoyva@i.ua>

Executive Committee:

Shelley Evans, United Kingdom
Alexander Kovalenko, Russia
Claudia Perini, Italy
Peter Otto, Germany (European Mapping Group)
Heikki Kotiranta, Finland (IUCN Criteria Group)

Newsletter 15 – Summer 2010



Bovista paludosa, endangered in many parts of Europe

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New contacts, changed addresses, phones, emails & so on

Introduction

by *Beatrice Senn-Irlet*

We are very proud to present a new edition of the ECCF newsletter, number 15. This newsletter demonstrates an ongoing interest across Europe in conservation of fungi. Even if some suffer from failed efforts to protect some specific species or sites as a whole the picture across Europe remains clear: fungi are now part of national biodiversity action plans, are integrated in Red data books and often even specific threats can be named. Fungi are more and more treated as an independent systematic group of organisms with its own characteristics and needs in conservation.

The base of this newsletter is a questionnaire, designed by David Minter for the meeting in Whitby (see Report by Vera Hayova). It served to describe the baseline of fungal conservation on a global scale. Mycologists from all continents met at Whitby and agreed to continue developing fungal conservation activities on national and continental level and to go further – to establish a Global Federation of fungal conservation groups. During the next International Mycological Congress, IMC9 in Edinburgh, we will have the opportunity to discuss the constitution and the goals of this new Global Federation. Global threats demand global actions!

Within the next years our efforts will have to focus on at least three directions: First we need good scientific tools to demonstrate changes in populations sizes in our fungi, from sound study designs to quantitative analyses with modelling. Second we have to focus on a broad education in mycology and to train stakeholders in nature conservation about fungi. We have to rise the knowledge about fungi on a broad and popular level. Otherwise all the perfect biodiversity action plans will remain paperwork. And third we have to develop a base in restoration ecology of fungi. What can be done to facilitate the establishment of a recently disappeared species? What are specific measurements for the conservation of fungi that top simple conservation of habitats? In which cases is it not enough for a longterm survival of a population to have it present in National Parks? Enough topics to discuss at the next Congress of European Mycologists in Greece!

The XVI Congress of European Mycologists will take place in Porto Carras, Sithonia peninsula, Greece from 19 to 23 September 2011.

More information is presented on the EMA's web-site: <http://www.euromould.org/events.htm>

Part 1 – Information about Fungal Conservation meeting in Whitby

Vera Hayova

A special international meeting “Fungal Conservation: Science, Infrastructure and Politics” was held in Whitby, North Yorkshire, UK, on October 26-30, 2009 <www.cybertruffle.org.uk/whitbymycosynod> where representatives from 23 countries and from every continent have gathered to discuss how to develop future activities on fungal conservation.

The meeting was organized by the European Mycological Association for the International Union for Conservation of Nature, IUCN, with support from the UK Darwin Initiative (DEFRA). This was the first IUCN-supported meeting devoted specifically and entirely to fungal conservation. Chairs of all recently recognized five IUCN Fungal Specialist Groups (Non-Lichen-forming Ascomycetes; Lichens; Basidiomycetes (mushrooms & puffballs); Rusts and Smuts; Mildews, Moulds and Myxomycetes) www.iucn.org/about/work/programmes/species/about_ssc/specialist_groups/directory_specialist_groups/fungi/ and representatives of the fungal conservation groups of Africa, Australasia, Europe, North America and South America attended the meeting. This made it the first conference on fungus conservation on the global level.

The meeting began with welcoming words by David Minter, Chairman of the Organizing Committee, and opening remarks by Simon Stuart, Chair of the Species Survival Commission, SSC of the IUCN, followed by introducing the five IUCN Specialist Groups for fungal conservation. The leader of each Specialist Group (David Minter, Christoph Scheidegger, Greg Mueller, Cvetomir Denchev, Mayra Camino) spoke about the group, its activities and plans. Within the meeting the leaders of the five groups and the IUCN representatives had a separate workshop on their future activities.

Scientific background for fungal conservation was discussed at the special section: fungal endemism, population structure and distribution, assessing fungi under the IUCN Red List criteria, Red-listing of European macrofungi, threat status of smut fungi, endangered desert truffle species, culture collection role, etc. were among the topics of the presentations. Some political aspects were also addressed at the meeting: how to promote fungal conservation through public relations, by means of media and press, improving legislation, etc.

A special workshop in two parts was held to apply the IUCN criteria & categories for the assessment and to address problems in adapting red-listing procedures to conservation of fungi. The workshop was led by Craig Hilton-Taylor and Julie Griffin, IUCN/SSC. The discussion was useful both for mycologists and for the IUCN representatives.

The unique opportunity of the meeting attended by representatives from the most of continental level mycological societies of the whole world was used to discuss the future infrastructure of fungal conservation at the global level. It was agreed to continue developing fungal conservation activities on national and continental level and to go further – to establish a Global Federation of fungal conservation groups. From representatives of different continents a Steering Committee was appointed to prepare a draft constitution for this Global Federation, for future discussion.

Traditionally for the ECCF meetings, one of sections was devoted to country reports on recent events/activities in fungal conservation on national level. General picture of fungal conservation in Europe and future steps in its development were presented by Beatrice Senn-Irlet, ECCF President. The following ECCF members participated in the meeting: Anders Dahlberg, Sweden; Cvetomir Denchev, Bulgaria; Stephanos Diamandis, Greece; Shelley Evans, UK; Reda Irsenaite, Lithuania; Heikki Kotiranta, Finland; Claudia Perini, Italy; Beatrice Senn-Irlet, Switzerland and Vera Hayova, Ukraine. Unfortunately many ECCF members were not able to come. For example, Alexandr Kovalenko and Tatyana Svetasheva, a new ECCF member from Russia have not come but their colleague Nadezhda Psurtseva presented the country. Other mycologists from Europe participated in the meeting were Paul Canon, Stephen Helfer, UK; Miguel Torrejon, Spain; Boris Assyov, Bulgaria.

The meeting was hosted by the Whitby town museum full of exciting fossil & rock exhibits. One of afternoons all participants enjoyed a lovely field excursion walking along the North Yorkshire moors, observing mushrooms and other fungi in local habitats, coming back on a steam train.



Photos by Alison Pouliot

Red Book of Plants and Fungi in Armenia

Siranush G. Nanagulyan

Armenian Mycological Society "Ecofung", Yerevan State University, ARMENIA
E-mail: snanagulyan@ysu.am

Armenia supports a surprisingly high diversity of plants and animals, including many endemic, relict and rare species. Also Armenia is mycological diverse and involves the opulence and originality of fungal biota. In the Republic it has been revealed about 4200 species of macro- and micromycetes, referring to the divisions *Myxomycota* and *Eumycota* (Nanagulyan et al., 1999; Nanagulyan, 2003).

Until recently, we had no Red Book for Fungi in Armenia. No one fungus species was included in the first edition of the Red Book, which was published about twenty years ago (Red Data Book of Armenia, 1990). The protection of fungi has a number of peculiarities in comparison with the conservation of higher plants.

Nowadays the experts from Armenian Mycological Society and department of Botany of Yerevan State University have been given the mandate by the Armenian government and Ministry of Nature Protection to propose inclusion of a number of macromycetes species into the second edition of Red Book of Armenia. It will help legitimize conservation of fungal diversity in our republic. The Ministry of Nature Protection of Armenia decided to create new edition of Red List of Plants, Fungi and Animals (1st volume dedicated to Plants and Fungi, 2nd - to Animals). The work is now finished and will be published in Armenian and English languages before the end of the 2009. Only some groups of macrofungi were taken into account. Five from the total of 33 species, which are candidates for listing in Appendix 1 of the Bern Convention, have been found in Armenia. These species are included in the Red Book of Plants and Fungi in Armenia.

More than 1200 species of macromycetes have been reported from the territory of Armenia. In consideration of research work of this area, IUCN category system has been applied (IUCN, 2001, 2003). It includes: the species of international importance (the species that have been proposed by ECCF for Bern's convention and mapping, as the species from European Red Lists), specially rare or rare species in Armenia, and the species bound to types of endangered habitats, the species which populations are decreased due to excessive exploration.

We propose that a total number of 40 macroscopic fungi species be included in the Red Book. These are:

- | | |
|--|---------------------------------------|
| 1. <i>Agaricus tabularis</i> | 22. <i>Macrolepiota puellaris</i> |
| 2. <i>Agaricus xanthodermus</i> | 23. <i>Macrolepiota rhacodes</i> |
| 3. <i>Amanita gemmata</i> | 24. <i>Meripilus giganteus</i> |
| 4. <i>Amanita muscaria</i> | 25. <i>Montagnea arenaria</i> |
| 5. <i>Amanita phalloides</i> | 26. <i>Mutinus caninus</i> |
| 6. <i>Asterophora lycoperdoides</i> | 27. <i>M. ravenelii</i> |
| 7. <i>Astraeus hygrometricus</i> | 28. <i>Myriostoma coliforme</i> |
| 8. <i>Battarrea phalloides</i> | 29. <i>Phallus impudicus</i> |
| 9. <i>Boletopsis leucomelaena</i> | 30. <i>Phyllotopsis nidulans</i> |
| 10. <i>Boletus edulis</i> | 31. <i>Pleurotus eryngii</i> |
| 11. <i>Boletus satanas</i> | 32. <i>Podaxis pistillaris</i> |
| 12. <i>Clavariadelphus pistillaris</i> | 33. <i>Rhodotus palmatus</i> |
| 13. <i>Collybia cookei</i> | 34. <i>Sarcosoma globosum</i> |
| 14. <i>Cystoderma amianthina</i> | 35. <i>Strobilomyces strobilaceus</i> |
| 15. <i>Dictyophora duplicata</i> | 36. <i>Suillus grevillei</i> |
| 16. <i>Hapalopilus croceus</i> | 37. <i>S. punctipes</i> |
| 17. <i>Haploporus odoratus</i> | 38. <i>Tuber aestivum</i> |
| 18. <i>Helvella atra</i> | 39. <i>Verpa conica</i> |
| 19. <i>Hericium coralloides</i> | 40. <i>Volvariella bombycina</i> |
| 20. <i>Hericium erinaceum</i> | |
| 21. <i>Leucoagaricus macrorrhizus</i> | |

According to IUCN categories, 1 species is regarded as extinct, 2 – near threatened, 4 – data deficient, 6 – critically endangered, 12 – vulnerable, 15 – endangered. For each species a short description and drawing are given, with some information about distribution, map, ecotops, bibliographic references etc.

The proposed list was prepared on the basis of longstanding mycological investigations and European Red Lists, Red Data Books of various regions or countries. Data are from literature, from specimens in herbariums of Yerevan State University (ERHM) and the Institute of Botany of Armenian National Academy of Sciences (ERE), from field records and private data collections (Nanagulyan, Osipyan, 1999; Nanagulyan, 2008).

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Red Data Book of Armenia. Rare and endangered species of Plants, Eds. E. Gabrielyan et al. – Yerevan : Ayastan. – 1990. - 270 p. .

General Situation in Fungal Conservation in Belgium

André Fraiture

National Botanic Garden of Belgium, Domaine de Bouchout, B -1860 Meise, BELGIUM

e-mail: andre.fraiture@br.fgov.be

Does your country have any policy on biodiversity conservation?

Yes. However, in Belgium, nature protection is no longer in the hands of the national (= federal) government but is now ruled by the three administrative Regions of the country: Flemish Region (northern part of the country), Walloon Region (southern part of the country) and Brussels Region (centre of the country).

If yes, has a biodiversity action plan been produced? Yes.

If yes, are fungi mentioned in the plan? Yes.

If yes, are fungi treated independently? What fungal groups are mentioned? How are fungi regarded - as organisms themselves worth protecting, or as a threat to other endangered organisms?

No, fungi are not treated independently but in common with other natural productions as berries and flowers.

They are treated as organisms deserving protection (thinking mainly to edible species which are susceptible to be collected by people).

Do fungi have legal protection?

Collecting mushrooms is now totally prohibited in dominical forests of the Flemish Region ("Bosdecreet") and, since 2009, of the Brussels Region. In the dominical forests of the Walloon Region, there is an interdiction of circulating outside of the roads and paths and a restriction of the amounts of mushrooms collected. The decision concerning mushroom picking in the private forests is left to the owner of the forest.

If yes, is that protection implicit (i.e. that all organisms are protected in principal) or explicit (fungi explicitly named as being protected)? Usually, when fungi are explicitly cited, it is almost always together with other organisms.

Are there any mycologists in the country? Yes, many.

If yes, do they any work in fungal conservation?

They don't work actively in fungal protection but are in favour of nature protection. They occasionally do inventories of the mycoflora in natural reserves.

Is there any mycological society?

Yes. Up to about 10 years ago, there were a lot of small local societies in Belgium. Since then, a clear tendency to fusion of these societies developed. There is now only one society in the Flemish region and the movement started also to develop in the southern part of the country.

Do any checklists exist for fungi of the country?

Belgium has no national checklist for fungi. A first critical checklist of macrofungi of northern Belgium has been published recently (Walley & Vandeven 2006). A national checklist of Uredinales is also in the process of publication (Vanderweyen & Fraiture 2007, 2008, 2010).

If yes, please supply bibliographic details.

VANDERWEYEN A. & FRAITURE A. (2007) Catalogue des Uredinales de Belgique, 1^{re} partie : Chaconiaceae, Coleosporiaceae, Cronartiaceae, Melampsoraceae, Phragmidiaceae, Pucciniaceae, Raveneliaceae et Uropyxidaceae. *Lejeunia* 183: 1-36.

VANDERWEYEN A. & FRAITURE A. (2008) Catalogue des Uredinales de Belgique, 2^{ème} partie : Pucciniaceae (sauf *Puccinia*). *Lejeunia* 185: 1-31.

VANDERWEYEN A. & FRAITURE A. (2010) Catalogue des Uredinales de Belgique, 3^{ème} partie : Pucciniaceae (genre *Puccinia*). *Lejeunia* [to be published].

WALLEYN R. & VANDEVEN E. (red.) (2006) Standaardlijst van Basidiomycota en Myxomycota van Vlaanderen en het Brussels Gewest. Rapport INBO.R.2006.27. Instituut voor Natuur- en Bosonderzoek, Brussel, 144 p.

If no, please supply bibliographic details of key works (if any) on fungi of the country

Is there any activity in respect of fungal conservation? Yes but not much.

If yes, what is that activity?

Also, in northern Belgium, a network of (rather small) forest reserves has been created in 1995 and consisted, in 2004, of about 1500 ha strict (= unmanaged) reserves, which is favourable for wood inhabiting fungi.

Has any red list been made for fungi?

A regional red list has been published by the Flemish Region :

WALLEYN R. & VERBEKEN A. (2000) Een gedocumenteerde Rode Lijst van enkele groepen paddestoelen (macrofungi) van Vlaanderen. *Meded. Inst. Natuurbehoud* 7: i-x, 1-84.

If yes, what groups?

Only some groups of macrofungi have been taken into account in that check-list. They belong to the Ascomycetes (Geoglossaceae s.l., *Poronia* and many fleshy Pezizales) and Basidiomycetes (Amanitaceae, Hygrophoraceae, *Tricholoma*, *Collybia* s.l., *Marasmius* s.l., Russulaceae, Boletales, Pleurotaceae, Cantharellaceae, hydroid fungi and epigeous Gasteromycetes).

What are the perceived threats for fungi in the country?

Pollution (but it seems that the situation is slowly improving), climatic changes (drought, modification of the mycoflora due to invasive species, ...)

Have any protected areas been established for fungi?

Mushrooms are of course protected in natural reserves, together with all other organisms, but we have only one natural reserve created especially for the protection of fungi. It is the richest waxcap grassland of the country with about 30 *Hygrocybe* / *Hygrophorus* species and 12 clavarioid species.

Conservation of fungi in Bulgaria, 2006–2009

Cvetomir M. Denchev & Melaniya M. Gyosheva

Institute of Botany, Bulgarian Academy of Sciences, 23 Acad. G. Bonchev St., 1113 Sofia, BULGARIA
e-mails: cmdenchev@yahoo.co.uk; gyosheva@bio.bas.bg

Red List of fungi

The first red list of macrofungi in Bulgaria was published in 2000 (Gyosheva et al., 2000), including 19 ascomycetes and 106 basidiomycetes. In that, preliminary list five threat categories were applied – extinct, endangered, vulnerable, rare, and indeterminate. A contemporary Red List of fungi in Bulgaria was prepared and published in 2006 (Gyosheva et al., 2006). It is an official red list for the country. The list includes 215 species of ascomycetes and basidiomycetes, as follows: 37 Critically Endangered (CR), 105 Endangered (EN), 40 Vulnerable (VU), 14 Near Threatened (NT), and 19 Data Deficient (DD). In that list, IUCN Red Data Book Categories (IUCN 2001, 2003a, b) were put into practice for the fungi. Thirteen from the total of 33 species, which are candidates for listing in Appendix 1 of the Bern Convention, have been found in Bulgaria. Eleven species of them included in the Red list of fungi in Bulgaria.

Red Data Book

A project for preparation of a three-volume Red Data Book of Republic of Bulgaria (2004–2010) was assigned by the Ministry of Environment and Water of Republic of Bulgaria. Within the framework of that project and especially, for the purpose of its first volume, dealing with threatened plants and fungi, the necessary information about 146 larger fungi was prepared and accepted for publication. The following groups of threatened fungi are included: 37 Critically Endangered (CR), 105 Endangered (EN), and 4 Vulnerable (VU) species. Every single species has been appropriately illustrated with a distribution map and colour illustration. In the third volume, Natural habitats in Bulgaria, characteristics and threatened species of fungi are given for 108 habitats. The book is due to be published in 2010. The inclusion of fungi in the national Red Data Book is believed to benefit the fungal conservation in the country.

Legal protection of fungi

Unfortunately, Bulgaria lacks a specific document (law or decree) regulating the collection, purchase, sale, and export of wild fungi and those activities are regulated only by the means of the *Forestry Act*. Any person is permitted to collect up to 5 kg of fresh wild mushrooms free of charge and no special permit is required. Any larger quantity is assumed to be for trade and for this special permit is required from the Forestry Commission, obtainable after fee is paid. The fee is negligible, for the ceps it is approximately 20 Eurocents per kg. None of these regulations apply for private lands, where there are no limitations for collecting. The absence of a special document that would particularly focus on collecting of mushrooms remains a serious issue in this country. So far collecting of fungi in Bulgaria is absolutely free and uncontrolled, and has greatly escalated since 1990.

Fungi were for a long time neglected by the Nature Conservation officials and thus not even mentioned in the *Biodiversity Act* despite of the numerous critical notes and proposals submitted when the law was passed in 2002. In 2007 after continuous lobbying, amendments to the Act were proposed by members of the Bulgarian Mycological Society. All the amended texts were consequently approved by the Bulgarian Parliament. It is worthy to noting that in the *Biodiversity Act* the word ‘fungi’ was included, as an analogous term of ‘plants’ and ‘animals’, which in itself was an important step. However, the proposal to add fungal species to the Appendix 3 – *Species protected by the law*, was rejected. Instead of that 10 fungi were listed in Appendix 2a. Those must be protected by the means of protection of their habitat and localities, including the possibility of declaring of new protected territories. No fungi were added also on the list of species, whose collection and marketing is restricted.

Important Plant Areas

Within the framework of the project *Important Plant Areas* (2006–2009), the whole territory of the country has been covered for estimation of fungi. Threatened fungal species are present in 32 sites. One site is designated especially for protection of a fungus. Sites are designated for all the Bulgarian species on the ECCF proposal (Criterion Aii). The project will hopefully encourage the *in-situ* conservation of fungi and designation of protected areas for fungi.

Checklists of fungi

The inventory of fungus-like organisms and fungi lag seriously behind those of animals and plants.

A preliminary checklist of *Boletales* s. str. in Bulgaria was published by Assyov & Denchev (2004). A complete *Checklist of the larger basidiomycetes in Bulgaria* was just recently prepared (Denchev & Assyov, 2010). In the checklist, the total number of accepted names of species of larger basidiomycetes in Bulgaria is 1537. One hundred fifty-seven species were treated as doubtful, confused or erroneously recorded names or as illegitimate names and included in a list of excluded records, providing reasons for their exclusion. An index of synonyms based on literature records from Bulgaria is appended. It includes 1020 species and infraspecific taxa.

A checklist of Bulgarian *Pezizales* was published (Dimitrova & Gyosheva, 2009). It includes information about the distribution across the country, literature sources, and trophic affiliation of 191 species. Thirty-two species of them have conservation status at national level. A contribution to the knowledge of the hypogeous ascomycetes in Bulgaria was published by Dimitrova & Gyosheva (2008). The issue of a checklist of Bulgarian *Helotiales* is impending (Dimitrova & Gyosheva, 2010).

Surveys for macrofungi were carried out in some protected areas. In the article about the macromycetes in the Pirin Mts, a list of 350 known species, including 34 ascomycetes and 316 basidiomycetes, was given (Denchev *et al.*, 2007). Among them, 60 species were reported for the first time for the Pirin Mts. Twenty-five species are of conservation significance. Information about the known macromycetes in the Pirin National Park was separately given.

Gyosheva & Georgieva (2009) published data on the species diversity of macrofungi in the Parangalitsa Biosphere Reserve in the Rila Mts. A total of 307 taxa of larger ascomycetes and basidiomycetes were recorded. Fourteen species are of high conservation value. Eight species of wood rooting fungi, indicators for old and primeval spruce and beech forests, have been found in the reserve.

A paper by Denchev *et al.* (2006) presented available and unpublished data on the fungal diversity of the Rhodopes. The total number of currently known species is 1763, including 31 oomycetes, 246 non-lichenized ascomycetes, 484 lichenized and lichenicolous fungi, 5 fungi, traditionally included in the lichenological literature, 125 anamorphic fungi, 683 basidiomycetes proper, 27 smut fungi, and 162 rust fungi. Among these species, 267 species were recorded for the first time from the Rhodopes. Seventy-eight macroscopic fungi of conservation significance were also listed. Denchev & Petrova (2005) published a list of the currently known fungi in the Bulgarian part of Mt Strandzha. The total number of listed species is 333, including 15 oomycetes, 88 non-lichenized ascomycetes, 47 anamorphic fungi, 61 lichenized fungi, 87 basidiomycetes proper, 5 smut fungi, and 30 rust fungi.

Mayrhofer *et al.* (2005) published the first catalogue of the lichenized and lichenicolous fungi in Bulgaria, including 910 taxa (893 species with 6 subspecies, 10 varieties, and 1 form) of lichenized fungi, 9 species of lichenicolous fungi, and 14 non-lichenized fungi traditionally included in lichenological literature. An index of synonyms based on literature records from Bulgaria was appended. It includes 1625 infrageneric epithets.

Contemporary information about the composition and distribution of the macromycetes and microscopic fungi in the Bulgarian non-lotic wetlands is given in Gyosheva (2007) and Denchev (2007), respectively.

Mapping of macrofungi

One Bulgarian mycologist participates in a project of ECCF for *Mapping and monitoring of threatened fungi in Europe* (50 threatened fungal species, including all 33 species candidates for listing in Appendix 1 of the *Bern Convention*).

Development of a Fungal Biodiversity Monitoring System

As it has been already mentioned in our previous report (Denchev & Gyosheva, 2006), a *Framework for development of a National Biodiversity and Protected Areas Monitoring System in Bulgaria* was created and published (Gospodinov *et al.*, 2005). For the first time, fungi were included by the Bulgarian Ministry of Environment and Water in a monitoring system at national level. For that purpose, a set of methods were discussed and proposed by Denchev (2006). Because of financial difficulties, such kind of a monitoring system at national level has been not yet started practically.

Fungal monitoring started in the Rila National Park in 2009. An object of monitoring is five species of conservation significance and four species of economic importance (*Boletus edulis*, *B. pinophilus*, *B. reticulatus*, and *Cantharellus cibarius*).

Fungal NGO's

The single Bulgarian NGO, working in the area of the conservation of fungi, is the Bulgarian Mycological Society. The synergy between the professional and NGO mycologists is very good.

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Monitoring of fungal species protected with law in Estonia, 2009

Indrek Sell

Institute of Agricultural and Environmental Sciences, Estonian University of Life Sciences, 181 Riia Street, 51014 Tartu, ESTONIA
e-mail: indrek.sell@emu.ee

The initial objective of the monitoring project was the surveillance of the habitats of protected fungi in Estonia: 9 category 1 species, 8 category 2 species, 3 category 3 species and one species (*Ceriporia tarda*) not yet protected by law. The objective was met, furthermore, new habitats were found, several of which are intended to be taken into use as monitoring areas. Two very rare species of fungi were also monitored: *Polyporus umbellatus* and *Polyporus melanopus*.

The main results were the following:

1. Out of 23 species monitored, basidiocarps were not found in case of 6 species (*Amylocystis lapponica*, *Hapalopilus croceus*, *Leucopaxillus salmonifolius*, *Inonotopsis subiculosa*, *Boletus radicans*, *Bankera violascens*), in case of two species, *Tricholoma apium* and *Bankera fuligineoalba*, the basidiocarps were found in habitats that are not included in the current monitoring project. In as much as the basidiocarps occurred in nearly three quarters of the monitored protected species and other rare species, the year 2009 may be regarded as a significantly good year in relation to the finds of fungi.
2. It was an exceptionally good year for *Leucopaxillus compactus* in the Laheva monitoring area in Läänemaa County, the basidiocarps of this species were found especially numerously in the mentioned area.
3. The basidiocarps of *Sarcodon fuligineoviolaceus* were not found from its monitoring areas already for the second year. On the other hand, there have been finds of the basidiocarps of this species, already for the second year, in its new habitat in Kärla, in the Island of Saaremaa. In the future, it is purposeful to take the Kärla habitat into use as a monitoring area.
4. This year, there were no finds of the basidiocarps of *Hapalopilus croceus* in its habitats in Ungru, Lääne County and in Kuldre, Võru County. The Ungru habitat is probably perished whereas the reason for the non-occurrence of basidiocarps of the fungi in the Kuldre habitat could be the peculiarity of the rhythm of the occurrence of the basidiocarps of this species (the basidiocarps do not occur every year). The monitoring in Kuldre habitat should definitely be continued in the following years.
5. *Sarcosoma globosum* occurred in most monitoring areas this year, whereas substantially less so than last year: in several places, the numerousness amounted to downright one tenth of what it was in 2008. In addition, a new habitat of *Sarcosoma globosum* was discovered.
6. This year was positive in regards to the finds of *Grifola frondosa*, since basidiocarps appeared in all monitoring areas; in Rasina, Põlva County for example, noticeably earlier than usual. In Lääne-Viru County, two new habitats of this fungal species were found.

From the monitoring data of the year 2009 it can be concluded, that in case of several (rare) fungal species, it is not possible to assess their occurrence or non-occurrence in a habitat based only on one or a few years of monitoring. The lack of a species in a specific

habitat does not imply the extinct of this species in the given site. The reason for this is primarily that several protected fungal species are situated on the Southern or Northern limit of their habitat, and the annual fungal species do not produce basidiocarps every year.

Fungal conservation in Estonia

Irja Saar¹ and Indrek Sell²

¹ Institute of Ecology and Earth Sciences, University of Tartu, 14 Ravila St., 50411 Tartu, Estonia. E-mail: irja.saar@ut.ee

² Institute of Agricultural and Environmental Sciences, University of Life Sciences, 181 Riia St., 51014 Tartu, ESTONIA.
E-mail: indrek.sell@emu.ee

Does your country have any policy on biodiversity conservation? Yes.

If yes, has a biodiversity action plan been produced? Yes.

If yes, are fungi mentioned in the plan? Yes.

If yes, are fungi treated independently? What fungal groups are mentioned? How are fungi regarded - as organisms themselves worth protecting, or as a threat to other endangered organisms?

Yes, fungi are treated independently. The fungi protected by law and included in Estonian Red Data List are mentioned as objects of protection.

Do fungi have legal protection? Yes, we have 3 threat categories for fungi (categories I, II and III).

If yes, is that protection implicit (i.e. that all organisms are protected in principal) or explicit (fungi explicitly named as being protected)?

We have 46 fungal species protected with law. According to the Nature Conservation Act, all localities of the species of I category must be protected, not less than 50 % of the localities of the II category species, and not less than 10 % of the localities of the III category species. For this, in addition to the protection in numerous Protected Areas, many new special Species Protection Sites have been organized in 2004.

Are there any mycologists in the country?

Yes, we have about 20 persons working as mycologists, including PhD students.

If yes, do they any work in fungal conservation?

Yes, some mycologists make inventories of rare fungi. Environmental board has also ordered the monitoring of protected fungal species in their habitats – on each year since 2005.

Is there any mycological society?

Yes, we have Estonian Mycological Society, which is a section of the Estonian Naturalists' Society. There are about 70 fellows who participate in society's activities.

Do any checklists exist for fungi of the country? Yes.

If yes, please supply bibliographic details.

Recent information about the distribution of fungal species in Estonia is available at homepage of Estonian Species Registry (<http://elurikkus.ut.ee/>). Published check-lists are:

Järva L, Parmasto E. 1980. Eesti seente koondnimestik. List of Estonian Fungi. Scripta Mycologica 7. Tartu.

Järva L, Parmasto I, Vaasma M. 1998. Eesti seente koondnimestik peremeestaimede nimestiku ja bibliograafiaga. 1. täiendusköide (1975 - 1990). List of Estonian fungi with host index and bibliography. Supplement 1 (1975–1990). Scripta Mycologica 12. Tartu.

If no, please supply bibliographic details of key works (if any) on fungi of the country

Is there any activity in respect of fungal conservation? Yes.

If yes, what is that activity? Monitoring of protected species and inventories (especially in nature reserves).

Has any red list been made for fungi? Yes.

If yes, what groups? Ascomycetes and Basidiomycetes (mainly agarics and polypores).

What are the perceived threats for fungi in the country?

Forest management (mainly), also influence of human activity (in general).

Have any protected areas been established for fungi?

Yes, one nature reserve area is established especially for protecting fungal species.

Any news or recent events in fungal conservation in your country?

It is time to introduce Legislation for Conservation of Macromycetes in Greece

Stephanos Diamandis

NAGREF-Forest Research Institute
570 06 Vassilika, Thessaloniki, GREECE
e-mail: diamandi@fri.gr

Key words: mycoflora, conservation, legislation

Abstract

Although Greece is located at the southernmost end of Europe in the Eastern Mediterranean and in a climatic zone characterized by long periods of drought, its mycoflora is quite rich and unique. In recent years, Greek and also foreign companies have been picking enormous quantities of edible mushrooms on a commercial level. There is no legislation as yet to monitor this new activity or to validate the mushrooms that are consumed by the public. A technical committee which worked on the subject submitted a proposal in 2007 to introduce legislation in order to protect the public from possible mushroom poisoning and also to manage and regulate mushroom picking in an effort to conserve fungal biodiversity. Sadly, the proposal has not been forwarded accordingly, the reason being that it was opposed by commercial interests. It is concluded that in addition to having an integrated, scientific proposal on fungal conservation, it is necessary to also have a strong political will.

Introduction

Although Greece is located at the southernmost end of Europe in the Eastern Mediterranean, in a climatic zone characterized by long periods of drought, its mycoflora appears to be quite rich and unique. A great variety of ecosystems, from the coastline to the high mountains, create habitats which host a remarkable number of fungal species. Over 3,000 species of macromycetes have been recorded up to now. The number of recorded micromycetes, however, is still rather limited.

People in the countryside have always picked edible mushrooms for their own consumption. Greece has five mycological societies that have a few hundred members each. These societies contribute significantly to the study of the macromycetes and to the promotion of mushroom loving but not as much to the conservation of mushrooms. What is worse is the fact that in recent years Greek and also foreign companies have started to pick enormous quantities of mushrooms on a commercial level. The Forest Service, as the natural authority responsible for the management of this natural resource, stands unable to monitor this new activity because of a lack of legislation. Wild mushrooms are sold in shops and served in restaurants in certain parts of the country without any prior validation.

Protection of habitats, and especially hedgerows, is another important issue in conservation. In certain agricultural areas of the country, farming procedures such as burning of straw or corn in order to clear the fields before ploughing has resulted in the disappearance of hedgerows which function as important oasis of biodiversity. Burning of vast agricultural areas is surely a waste of biomass which could be exploited in more useful ways and also contributes to CO₂ emissions in the environment. None of the involved Ministries, including the Ministry of Environment and the Ministry of Rural Development, seem to be bothered by this.

Under the gloomy conditions mentioned above, it seems that it is time to finally introduce legislation in order to protect the public from possible mushroom poisoning and also to conserve fungal biodiversity before any major disturbance in species and populations occurs. Any such proposal should be based on scientific data generated locally and also on international experience. Along those lines, a committee was nominated in 2007 to work on a basic proposal and submit it to the Ministry of Environment for further processing before sending it to the Greek parliament for a final vote. Unfortunately, although the study-proposal was submitted before the end of 2007, it still has not been forwarded accordingly, the reason being "it was opposed by commercial interests".

The content of the proposal

The State Forest Service is proposed as the authority to manage mushrooms as a natural resource for the simple reason that approximately 80% of the mushrooms grow on forest land and are part of the forest ecosystem.

A short course of training is proposed for those wishing to be professional inspectors of edible mushroom. This training will consist of a short, approximately 100-hour, program which will include basic knowledge on Mycology, Botany, Soil science, Meteorology and also field training to familiarize the students with carpophores of edible macromycetes. After successful examinations, the students will be awarded a certificate qualifying them as mushroom inspectors. The number of candidates per district will depend upon the quantities of edible mushroom picked in each of them.

In their districts, the inspectors will be invited by the local governments to organize short, 6-hour evening seminars in each municipality on mushroom picking which is open to the local public. The seminars will emphasize the importance of fungi in the ecosystem, the need for conservation and will teach identification of edible and poisonous mushrooms, and the correct way to pick them. The seminars will also include 2 field trips for practical training. All those attending will be given a certificate of a mushroom picker. Mushroom pickers who intend to collect mushrooms for their own consumption will be issued an annual license by paying a small symbolic fee to the Forest Service whereas professional pickers will be issued their license at a little higher cost. Such training is expected to minimize the risk of mushroom poisoning which is not uncommon in Greece.

Private companies which intend to pick mushrooms in a certain area will have to submit an application form to the local Forest Service office. The file will also include the geographical boundaries of the area, the species of fungi to be picked, the quantity, the time period and the names of the professional pickers. The authority will approve the quantity according to the existing data on the capacity of the area and the operation will be monitored by forest rangers. Companies which have picked a certain quantity of edible mushrooms will contact the local mushroom inspectors to inspect and validate the produce. Inspectors will be paid individually by the companies. The

validated produce, accompanied by the appropriate documents and safe for the public, will be channelled to the market. This whole process will be supported scientifically by the Universities and Research Institutes dealing with the study of the Greek mycoflora. Amateur mushroom pickers will be allowed to pick a total of 3 kg of mushroom per day.

The study-proposal is accompanied by a list of edible species which have been recorded in Greece and are of commercial interest. A detailed description and photographs are given for each species.

Unfortunately, the restrictions imposed by the study-proposal were in conflict with private interests and, as a result, the proposal has been halted somewhere in the administration canals.

Private interests look only to the present and fail to see future consequences of their actions. The state authorities with their scientists have the duty to see further into the future and to propose measures for conservation. If governments cannot enact appropriate legislation, then biodiversity and sustainability are under threat.

Greece has neither a Red Data Book on fungi nor on lichens as of yet. Although the matter has been discussed among the several authorities and the scientists who keep databases on fungi, there has not been any progress. I hope that the XVI CEM which will be held in N. Greece in 2011 will be a milestone for the first Red Data Book to be compiled and published.

Conclusion

Commercial picking of edible mushrooms in Greece raises the necessity for sustainable management of this natural resource. It is time to introduce legislation towards conserving the mycoflora. It appears, however, that in addition to having an integrated, scientific proposal on fungal conservation, it is necessary to also have a strong political will.

Responses to the questionnaire

Does your country have any policy on biodiversity conservation?

Yes, Greece has a policy on biodiversity conservation which is restricted to birds, higher plants, mammals (including sea mammals such as seals, dolphins, whales etc.) and reptiles.

If yes, has a biodiversity action plan been produced?

As far as I know a plan has been implemented.

If yes, are fungi mentioned in the plan?

Fungi are not included in the plan. Even worse Greece does not have a Red List for Fungi.

Do fungi have legal protection?

There is no legislation for the conservation of fungi. In 2007 I participated in a technical committee which submitted to the government a proposal on the management of fungi as a natural resource. The proposal was not further forwarded and that is what I would like to present in Whitby on Friday morning.

Are there any mycologists in the country?

There are a few mycologists but non works systematically on fungal conservation.

Is there any mycological society?

There are 5 mycological societies numbering a few hundred members in total.

Do any checklists exist for fungi of the country?

There are 2 published checklists.

Pantidou, M. 1973: Fungus-Host Index for Greece. Benaki Phytopathological Institute, Athens, pp. 382.

Zervakis, G., Dimou, D. & Balis, C., 1998: A check-list of the Greek macrofungi including hosts and biogeographic distribution: I. Basidiomycotina. Mycotaxon LXVI: 273-336.

Is there any activity in respect of fungal conservation?

There is not any activity on fungal conservation as far as I know.

Has any red list been made for fungi? If yes, what groups?

When there will be a Red List on fungi I guess it will include only macromycetes.

What are the perceived threats for fungi in the country?

The emerging threat comes from heavy commercial picking of edible species in restricted geographical areas. Forest fires and mainly loss of hedgerows threaten precious habitats of fungi.

Have any protected areas been established for fungi?

There are 11 National Parks and a Reserve Area where strict protection is enforced by the Forest Service.

Any news or recent events in fungal conservation in your country ?

No news about fungal conservation unless something happens with the conservation proposal that I mentioned above.

Fungal Conservation in the Republic of Ireland

Hubert Fuller

Botany Dept., University College Dublin, Dublin 4, IRELAND

Responses to Questionnaire

1. **Does your country have any policy on biodiversity conservation?** Yes.
2. **If yes, has a biodiversity action plan been produced?** Yes – national and local.
3. **If yes, are fungi mentioned in the plan?** Yes.
4. **If yes, are fungi treated independently?** Generally No.
5. **What fungal groups are mentioned? How are fungi regarded - as organisms themselves worth protecting, or as a threat to other endangered organisms?** In a very few cases (e.g. The Curragh, Co. Kildare and Ballyprior, Co. Laois) fungi (wax cap group) are specifically mentioned in relation to protection of those sites. More typically fungi would be protected as a consequence of the habitat being protected.
6. **Do fungi have legal protection?** Yes.
If yes, is that protection implicit (i.e. that all organisms are protected in principal) or explicit (fungi explicitly named as being protected)? Generally all organisms in a particular habitat/site are protected.
7. **Are there any mycologists in the country?** Yes, but very few! Four in full time employment in Universities, a few more individuals who are essentially molecular biologists but working on fungi and a few plant pathologists. Also a few 'retired' mycologists (like me!) and some 'amateurs' mainly interested in collecting edible fungi at this time of year!
8. **If yes, do they any work in fungal conservation?** No! Even though I'm a lab-based experimental mycologist, and not working in the area of conservation and certainly no expert, out of a sense of responsibility and because no one else was doing it, I've been responding to questionnaires from the ECCF, occasionally attending meetings e.g. whenever possible I attend meetings of the UK Fungal Conservation Forum, as an observer.
9. **Is there any mycological society?** Not in the Republic of Ireland. Anyone with an interest in fungi here would join the British Mycological Society and/or the Northern Ireland Fungal Group. There is a Society of Irish Plant Pathologists which would also cater for mycological interests.
10. **Do any checklists exist for fungi of the country?** Yes.
If yes, please supply bibliographic details. Checklist of the British and Irish Basidiomycota (2006) by Legon *et al.*, published by RBG Kew and also 'live' on line (I served on the Steering Committee); Muskett & Malone series of papers (Census Catalogue of Irish Fungi) in the Proceedings of the Royal Irish Academy (1950's -60's); Series of papers by O'Connor on the Irish mycobiota, published largely in Proceedings of the Royal Dublin Society; Additionally, there are thousands of Irish fungal records in the Fungal Records Database of Britain & Ireland (FRDBBI) managed by the British Mycological Society. In this regard there is a serious error in a document prepared by Beatrice Senn-Irlet *et al.* – Guidance for Conservation of Macrofungi in Europe (October 2007) – prepared for the EU. Fig. 3 shows Ireland as a grey area – no records of macrofungi!!
11. **If no, please supply bibliographic details of key works (if any) on fungi of the country**
12. **Is there any activity in respect of fungal conservation?**
Yes, activities relating to fungal conservation.
If yes, what is that activity? For the past 4 years the Irish Heritage Council have funded fieldwork on surveys of waxcap fungi in a number of vice-counties on the western seaboard of Ireland. The work has been conducted over 2 weeks each autumn by David Mitchel (now living in Wales) - this year he will be surveying sites in County Donegal. The waxcap data will feed into conservation plans for these areas. Additionally, Dr John Feehan, Environmental Scientist & Conservationist, at University College Dublin, is very much involved with biodiversity conservation plans in the Irish Midlands, especially Co Offaly, and is very conscious of the importance of waxcap fungi in low-nutrient input grasslands, and their value as indicator organisms. He was responsible for getting fungi mentioned specifically at the Curragh and Ballyprior sites.
13. **Has any red list been made for fungi?** No.
14. **What are the perceived threats for fungi in the country?**
As listed in previous reports to ECCF.
15. **Have any protected areas been established for fungi?** See answer to Q. 5.
16. **Any news or recent events in fungal conservation in your country ?** See answer to Q. 12.

The state of Conservation of fungi in Iceland 2009

Guðríður Gyða Eyjólfsdóttir

Icelandic Institute of Natural History, Akureyri Division, Borgir við Norðurslóð, P.O. Box 180, IS-602 Akureyri, Iceland,
e-mail: gge@ni.is

Iceland does not have a red list for fungi and no fungi are protected by law but important habitats for fungi have been protected as National parks or Nature reserves based on the need to conserve habitats for birds, lichens and plants.

In 2003 The Environment Agency of Iceland published a draft of a Nature Conservation Plan for Iceland. With this plan a net of 75 protected areas would secure the protection of geological and biological diversity by selecting areas important for birds, plants, rivers and

geological formations (Anonymous 2003). For the first five year period the Ministry for the Environment selected 14 areas to be protected before the year 2009. This was confirmed by The Icelandic Parliament Althingi in 2004 and the Environment Agency has since been working towards protection of these areas. Two of the existing national parks, Skaftafell National Park and Jökulsárgljúfur Canyon National Park were joined and Vatnajökull ice cap and areas near the glaciers were included when the new Vatnajökull National Park (12,000 km²) was established in June 2008 (for maps and details see the homepage of the VNP). Several small native birch woods near the Vatnajökull ice cap have thus been protected. Vatnshornsskógur wood, a native birch wood, in Western Iceland became a nature reserve in January 2009. Presently the Parliament is processing a proposal from the Ministry for the Environment for protection of 13 areas before the year 2014, thereof are at least four which are not only important habitats for lichens and plants but also for fungi. Furthermore, 24 species of vascular plants, 45 species of mosses, and 90 species of lichens which are critically endangered, endangered, or vulnerable are proposed to be protected by law.

The Nature Conservation Plan from 2003 has been used as a base for the protection of biodiversity in Iceland. The Icelandic Institute of Natural History works with the Environment Agency of Iceland on the scientific base on which the conservation for the coming years is planned. We are planning to propose at least one site to be protected because of its funga.

In 2004 the checklist of Icelandic microfungi was published (Hallgrímsson & Eyjólfsdóttir 2004) and it is now available free of charge in pdf-format. The latter part, checklist of the basidiomycetes (Agaricomycotina) in Iceland (Hallgrímsson & Eyjólfsdóttir, manuscript) is still unpublished but it was used in *Funga Nordica* (Knudsen & Vesterholt 2008) and species from the subarctic/subalpine or arctic/alpine zone marked IS in the text are known from Iceland. When the checklist is ready a red list of Icelandic macrofungi will be prepared.

Information on the known distribution of fungi in Iceland, still primarily based on herbarium specimens in AMNH, is available on the internet using Plöntuvefsjá Náttúrufræðistofnunar selecting Sveppir (Fungi) from Plöntuhópar (Groups of plants) and the Latin name (latnesku nafni) of a species (or select a grid number (Reitanúmer) in the 10x10 km grid, e.g. 5542 for a list of species in Vaglaskógur wood) in the Leita eftir (search by) category then click on Byrja (begin) <http://vefsja.ni.is/website/plontuvefsja/>. Detailed information on fungal specimens in AMNH is available through the GBIF website.

In Iceland there are three mycologists, two plant pathologists and two biologists who work on ectomycorrhizal fungi. There is no mycological society in Iceland.

There is a growing interest in fungi as information in Icelandic becomes available. This summer a book on edible fungi was published and next year Helgi Hallgrímsson's book on the Icelandic funga is expected.

Invasive alien plant species are threats to fungi as well as to native plants, clearing of native birch woodlands for summer cottages, clearing dead wood from woodlands and planting of conifers into native birch woodlands.

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Report from Italy

Claudia Perini

Department of Environmental Sciences “G. Sarfatti”, via Mattioli 4, 53100 SIENA – ITALY
e-mail: perini@unisi.it

Keywords: macromycetes, multidisciplinary networks, Red-list, Key-areas,

In this past years initiatives and actions concerning Italian biodiversity have been developed and various studies and research projects have been completed. Most available in the volume “Biodiversity in Italy - Contribution to the National Biodiversity Strategy” realized by the Ministry for the Environment and Land and Sea with the coordination of the Italian Botanical Society and over 100 researcher (Blasi et al., 2007).

After the publication of the Checklist of Italian Basidiomycetes (Onofri et al., 2005), thanks to the changing minds and thanks surely also to the 2 European Strategies developed by Planta Europa and the European Council and to the participation at various “not fungal” meetings and the pressing of some mycologists, finally fungi are present in some national multidisciplinary networks for the conservation of biodiversity.

In this framework Italian mycologists participated with their knowledge in the network of the Italian Botanical Society for assessing the conservation status of selected target species of the Italian native flora, including lower and higher plants. This action aimed to promote a new Italian Red List applying properly the 2001 published IUCN criteria and categories and the 2006 IUCN guidelines and first results have been recently published. The case studies of *Boletus dupainii* Boudier, one of the 33 species proposed by the European Council

for the Conservation of Fungi (ECCF) for the Bern Convention Appendix 1 and *Psathyrella ammophila* (Durieu et Lév.) P.D. Orton, a common and/or threatened species, was analyzed (Rossi et al., 2008).

Another aspect is the project Important Plant Areas in Italy involving a range of taxonomic groups such as vascular plants, bryophytes, freshwater algae, lichens and fungi. In Tuscany very first attempts to apply the IPA criteria to the Regnum *Fungi* dates back to the beginning of the new millennium, but it must be underlined that the participation at the national IPA project has been fundamental, much more variables have been analyzed and the results are of bigger importance (Blasi et al., 2009). An additional experience at regional level with the use of the recently published Tuscan Red List of macromycetes (Antonini D. & M., 2006) was tried, too.

Also other projects of the Ministry such as monitoring of old growth forests or the Kyoto protocol, that involves the presence of various Italian Universities and various aspects and organisms, sow the participation of some mycologists.

In conclusion positive aspects and difficulties of the multidisciplinary networking such as the lack of homogeneity of knowledge or the short timing of researches will be discussed from a mycological point of view.

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Responses to the Questionnaire:

Does your country have any policy on biodiversity conservation?

no

If yes, has a biodiversity action plan been produced?

If yes, are fungi mentioned in the plan?

If yes, are fungi treated independently? What fungal groups are mentioned? How are fungi regarded - as organisms themselves worth protecting, or as a threat to other endangered organisms?

Do fungi have legal protection?

Yes, a national one only for a list of edible mushrooms and extra for truffles; then single regions have a regional one.

If yes, is that protection implicit (i.e. that all organisms are protected in principal) or explicit (fungi explicitly named as being protected)?

explicit

Are there any mycologists in the country?

Few at the Universities, rarely working only with fungi as mycologists

If yes, do they any work in fungal conservation?

Very very few, indirectly

Is there any mycological society?

Yes, the mycological working group inside the Botanical Society (SBI), the Unione micologica italiana (UMI), the Associazione micologica Bresadola (AMB), and various others more or less amatorial ones...

Do any checklists exist for fungi of the country?

yes

If yes, please supply bibliographic details.

Onofri S., Bernicchia A., Filipello Marchisio V., Padovan F., Perini C., Ripa C., Salerni E., Savino E., Venturella G., Vizzini A., Zotti M., Zucconi L., 2005 - Checklist dei funghi italiani Checklist of Italian fungi *Basidiomycetes Basidiomycota*. Carlo Delfino Editore.

If no, please supply bibliographic details of key works (if any) on fungi of the country

Is there any activity in respect of fungal conservation?

Very few first steps toward it

If yes, what is that activity?

Attempts for redlisting and identifying key-areas in order to have something that demonstrate the importance and eventual threat of fungi and to start protection activities

Has any red list been made for fungi?

At national level only attempts/small preliminary ones; at regional level in Tuscany published in 2006.

If yes, what groups?

Socalled Macromycetes (asco and basidiomycetes)

What are the perceived threats for fungi in the country?

Change of habitat, of land management,

Have any protected areas been established for fungi?

no

Any news or recent events in fungal conservation in your country ?

Participation in multidisciplinary projects of the ministry

Fungal conservation in Latvia. Responses to the Questionnaire

Inita Daniele

Latvian Museum of Natural History, Barona str. 4, LV- Riga 1050, LATVIA

Does your country have any policy on biodiversity conservation? Yes.

If yes, has a biodiversity action plan been produced? We have action plans for “Natura 2000” territories

If yes, are fungi mentioned in the plan? Only in a few territories.

If yes, are fungi treated independently? What fungal groups are mentioned? How are fungi regarded - as organisms themselves worth protecting, or as a threat to other endangered organisms?

We have checklists of fungi in some protected areas (Agaricales s.l. Gasteromycetes and Polyporales s.l. are included) Gauja National Park, Kemeru National Park. In this territories fungi are regarded as independent organisms.

Do fungi have legal protection? Yes, but really it doesn't work.

If yes, is that protection implicit (i.e. that all organisms are protected in principal) or explicit (fungi explicitly named as being protected)?

Yes, Regulations of Government No 396 (14/10/2000) Lists of Specially Protected and Limitedly Exploitable Specially Protected Species. A special list for fungi.

Are there any mycologists in the country?

Inita Daniele, Fungal Diversity and Conservation of Agaricoid Fungi, Latvian Museum of Natural History;
Diana Meiere, Fungal Diversity and Conservation, Ecology; Polypores, Latvian Museum of Natural History;
Edgars Vimba, Fungal Diversity and Conservation, Biology, Ecology, University of Latvia, Faculty of Biology

If yes, do they any work in fungal conservation? Yes, mostly educational work.

Is there any mycological society? The Latvian Mycological Society, miko.ltm.gov.lv/

Do any checklists exist for fungi of the country? Yes

If yes, please supply bibliographic details.

Dānīele I., Krastiņa I. 2002. Latvijas cepurīšu sēņu (*Agaricales* s.l.) konspēkts. *Latvijas veģētācija*, 5, 43-174.

Meiere D. 2002. Latvijas piepju konspēkts. *Latvijas veģētācija*, 5, 7-41

Museum collections on internet: www.imuzejs.lv

If no, please supply bibliographic details of key works (if any) on fungi of the country

Is there any activity in respect of fungal conservation? If yes, what is that activity?

Education of population: information in newspapers, TV, Radio, exhibitions of fungi.

Has any red list been made for fungi?

Official Red List: Andrušaitis G. (red.) 1996. Latvijas Sarkanā grāmata. Retās un izzūdošās augu un dzīvnieku sugas, 1. sējums. – Red Data Book of Latvia. Rare and endangered species of plants and animals, Vol.1, Rīga.

If yes, what groups? Only macro fungi.

What are the perceived threats for fungi in the country?

Have any protected areas been established for fungi? No.

Any news or recent events in fungal conservation in your country? We are preparing a new red list according to IUNC criteria.

Conservation of fungi in Lithuania

Reda Iršėnaitė

Institute of Botany, Žaliojių ežerų 49, LT-08604, Vilnius, LITHUANIA

Introduction

The fungi were started to record in Lithuania already in XVIII century by botanists of Vilnius University in their forays. More intensive and broader studies of fungi by specialists, such as mycologists and plant pathologists, started in XX century. Field researches were done in whole Lithuanian territory and monographs were published by mycologists of Vilnius University and Institute of Botany. The main investigation task during Soviet period was to inventory fungi diversity and to study economically important pathogenic species. Most reports and herbarium collections of fungi are from the last 60 years. The first measure for protection of fungi was taken in 1992 with inclusion of 81 species of fungi and lichens into Red Data Book of Lithuania. Knowledge on occurrence and ecology of many fungi in the country is rapidly increasing, but conservation issue needs more attention at present.

This paper aims to review current status of fungal diversity and conservation in Lithuania, to highlight some problems and to plan further actions for conservation.

Checklists of fungi

About 6500 species of fungi is known to occur in Lithuania. In the past 15 years a total of 1000 new taxa for Lithuania have been found, giving an average rate of about 60 new taxa per year. At this rate of recording of new species, the list of Lithuanian fungi is provisional. The first most complete information about fungi appears in multivolume edition "Mycota Lithuaniae". The first book of the series has been published in 1991. Up till 2008 total of 15 books were produced covering macromycetes (part of aphylophoroid fungi, agaricoid fungi, *Pezizales*, macrolichens), micromycetes (*Erysiphales*, *Melanconiales*, *Peronosporales*, *Spheropsidales*, *Ustilaginales*, *Uredinales*) and myxomycetes (GRICIUS, MATELIS, 1996, GRIGALIŪNAITĖ, 1997, IGNATAVIČIŪTĖ, 2001, IGNATAVIČIŪTĖ, TREIGIENĖ, 1998, KUTORGA, 2000, MARKEVIČIUS, TREIGIENĖ, 2003, MAZELAITIS, STANEVIČIENĖ, 1995, MINKEVIČIUS, IGNATAVIČIŪTĖ, 1991, 1993, MOTIEJŪNAITĖ, 2002, ŪRBNAS, 1997a, 1997b, 1999, 2001, 2005). The checklist of corticioid fungi is being currently prepared (IRŠENAITĖ 2009, in press). In addition to recently published information on Lithuania's fungi, mycologists would greatly benefit from the online available checklists, which can be updated regularly. Our knowledge about distribution and abundance of the recorded species is still rather poor. Distributional data have not yet been compiled and distribution maps are not available for most of species. For species which occur in a reasonable number of collections it seems that many fungi tend to have a wider distribution within the country, than is recorded now.

Conservation policy for fungal biodiversity

After the restoration of independence in 1991 Lithuania has joined or ratified six conventions and one international agreement regarding protection of nature and biodiversity. With the ratification of the Convention on Biological Diversity (Rio de Janeiro, 1992), Lithuania started to compile national strategy and action plans to conserve biological diversity. Most of these plans focus exclusively on protection of flora and fauna, especially birds, fish species, and bats. Unfortunately, fungi were not mentioned in any of the habitat conservation projects. The only important use of fungi as indicators to determine the value of old-growth forests was implemented in the program on Woodland Key Habitats (WKH) in Lithuania (2002-2005). Due to this project 6 fungi species, rare and endangered in many European countries, but not previously recorded in Lithuania were found. Also many new records of rare and protected fungi species were reported (ANDERSSON et al., 2005). As mapping of WKH is required by forest certification scheme, it provides a tool for conserving a large share of forest biodiversity, especially wood-inhabiting fungi, in cost-effective way (HASSELINK et al., 2004).

Legal fungi protection

The *Law on Protected Animal, Plant and Fungi Species and Communities (1997)* set up the protection of rare and endangered species, including fungi and their communities. According to this national legislation, actions leading to the deterioration or destruction of species and habitats of the populations of these species are prohibited. In reality this law is rather difficult to apply for conservation of fungi, due to lack of information on occurrence of the rare species. Private land owners claim that they don't know about the presence of rare species in their forests and therefore are not obliged to take any measures. The *Law on Protected Animal, ... (1997)* had scheduled creation of state register of protected species. It was later proposed to create a database of protected species, but the real work has not started yet. Protocols should be created regarding data entry, identification quality assurance and question of depositions of voucher specimens is also important. Some information about rare species came from private initiative of biologists and ecologists working in State Protected Areas and was randomly published in edition "Raudoni lapai (Red Lists)" starting in 1993.

Another problem in legal protection of fungi is associated with fines for law breaking. They are not adequate and it is not clear how they were set. There is a set of penalties applicable only in case of destruction of fungus species, but not their habitat. To my knowledge there were no cases of punishment for destruction of protected fungus. It seems that today protection of fungi in Lithuania is more formal than real.

The Red Data Book serves as a legal document on which the protection of species is based. The Red Data Book in Lithuania is managed by the Red Data Book Commission under the Ministry of Environment. Total of 68 species of fungi have been included into the Red Data Book published in 1992. In 2003 the list has been extended to cover 134 fungi, from agaricoid, aphylophoroid, gasteromycetes and pezizales groups. Species were included basing on their abundance and deterioration of their ecological conditions. Unfortunately, the new edition of Red Data Book (2007) followed the same criteria and species were not evaluated according to strict IUCN criteria. Total of 112 fungi species were included in 2007 edition of Red Data Book and every year commission revises information about allocation of species to the correct categories. Without evaluation of all macromycetes found in Lithuania according to IUCN criteria some definitely rare species of clavarioid fungi or *Cortinariales* remained not included into the recent Red Data Book edition.

Mycologists in Lithuania

In Lithuania at present there are eight full time mycologists working on fungi as well as lichen taxonomy, ecology, and conservation. There are few amateurs and other researchers interested in fungi, but primarily working in related areas such as plant pathology and non government organizations. Four mycologists provide recommendations and consultations on fungi conservation upon request. Lithuanian Mycological Society has been established in 1998; however the activity of the society has low impact on conservation of fungi. Private people also provide information about rare fungi. This information has to be confirmed by specialists basing on specimen examination or at least photograph, otherwise it can easily lead to misidentification of species. There are no truly knowledgeable amateur mycologists in Lithuania.

Fungal conservation activities

The main activity carried out by Lithuanian scientists in respect to fungal conservation is carrying out fungal inventories in protected areas. Currently, the network of protected areas consist of one Biosphere Nature Reserve, 4 Strict Nature Reserves, 5 National and 30 Regional Parks, 26 Biosphere Polygons, 261 State Nature Reserves and 112 Municipal Reserve. Full inventories of fungi for several protected areas, covering ca. 5 % of all protected areas, have been completed and this work has to be extended to cover all remaining ecologically important areas. With so few professional mycologists in the country and very scarce staff with fungi expertise in administrations of Protected Areas in Lithuania this inventory can take very long time. Mycological training for ecologists working in protected areas has to be developed to ensure that they can respond to conservation needs for fungi.

Sadly, no area has been reserved specifically for the conservation of fungi. Only once the Municipal Reserve have been proposed on the basis of presence of fungi as well as plant, insect and bird species. It is known that some unprotected areas deserve conservation due to detected considerable number of threatened fungi and lichens species. First of all, it is not rational to create new protected areas without data about diversity of rare fungi in network of Natura 2000 areas or WKH. In addition, Lithuania currently has no project directly related to fungi conservation. Some research has been done on habitat requirements for rare and threatened species *Hapalopilus croceus* but more in-depth studies should be planned (IRŠENAITE, STONČIUS, 2007). Assessing of the impact of different land management practice on fungal diversity is very important. Such research on wood-inhabiting fungi has been done in oak wood of Lithuania (IRŠENAITE, KUTORGA, 2006, 2007). Fungi diversity in spruce forest of different age and management practice were investigated, but the results have not been published yet. Little is known of the threat posed by non-native fungi to native plants and diversity of native fungi. Project on alien species may detect important facts of distribution of some rare fungi species. Urgently needed research for fungi conservation is monitoring of changing status of threatened species population or habitat monitoring.

Threats for fungi

As in other countries, fungi in Lithuania are threatened mainly by anthropogenic factors, i.e. intensive utilization of forest resources. These activities destroy fungal habitats and also change humidity and light regime within the forests. In turn, extremely vulnerable species which are dependent on long habitat continuity are being threatened. The proportion of old growth forests especially decreased in the last decade. Traditional managing of seminatural grasslands changes their ecological conditions due to agricultural activity (fertilizations, cultivation) or its reduction (land abandonment) and remains serious threat to fungi. Negative impact on sand-inhabiting fungi is mostly caused by the overgrowth of open sand areas, afforestation or intensive recreation. Exploitation of wetlands as well as development activities creates habitat fragmentation, which also threatens fungi. We still lack information on how fungi are affected by pollution as well as climate change.

Conclusions

Fungal studies have to be actively and seriously used in nature protection and management plans. This especially depends on closer cooperation between mycologists, botanists and environmental authorities leading to reinforcement of currently existing and creation of more functional laws. With increasing knowledge on ecology and species occurrence, Lithuanian fungi should be revised according to new IUCN criteria. There is an urgent need to create a database of protected species, extend red listing, emphasize conservation problems, continue monitoring fungal status, thus deepening scientific knowledge and educating the public about fungal variety, ecological importance and benefits rendered.

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The situation with fungal conservation in Luxembourg

Marie Garnier-Delcourt

e-mail: cgarnier@pt.lu

Legal protection of Fungi

In the Grand Duchy of Luxembourg, mushrooms (i.e. Fungi, lichens included) are protected since roughly twenty years, under the 19th August 1989 National Law on the “integral and partial protection of certain plant species of the wild flora”.

“Mushrooms”, considered in this legal frame as part of the flora, are partially protected.

Collecting mushrooms for non-commercial purposes is allowed for around fifty species which are listed in an annex of the Law, of which 1 kg (fresh weight) per person and per day can be collected, whereas collection for commercial use is subjected to prior authorization from the Environment Ministry. Only three specimens of all other species (i.e. those not listed in the annex) can be collected.

Lichens growing on the sandstone rocks in Luxembourg, as well as those of the genera *Bryonia*, *Cladina*, *Cladonia* and *Usnea* are integrally protected. The 1989 national Law has been updated in 2008 in congruence with the 19th January 2004 modified Law on the protection of nature and natural resources, and with the 2007 National Plan for Nature Protection (“Biodiversity” plan). This update was realised with the collaboration of the Luxembourg’s mycologists but this new version has not yet been ratified.

If in the title of the new national Law, the words “mushrooms” or “Fungi” still do not appear; the text itself however explicitly mentions the groups of species which are integrally and partially protected (plants, red algae, mushrooms, lichens and lichenicolous mushrooms). In the text, it will be mentioned that all lichens growing on sandstone rocky environments are integrally protected, as well as 118 lichens and lichenicolous mushrooms listed on an annex. All other mushrooms (Fungi) will be partially protected, because an integral protection would have implied that, for each specimen sampled for studying/identification purposes, a ministerial authorization need to be obtained.

In this new text the collection of these partially protected mushrooms would thus remain limited to 3 specimens per person, except for the edible species listed in the annex, as was the case in the previous version. Collecting the mushrooms listed on the annex by hand, for non-commercial use, would remain limited to 1 kg per person and per day (that weight referring to all species collected taken together). Group collecting would be restricted to 3 kg. Organised collecting for commercial use would be forbidden. The list of mushrooms for which collection would be regulated has been updated so as to prevent, as much as possible, the excessive collection of the species most susceptible of being collected for their edibility or for other purposes. However, control over collecting would remain difficult.

As a reminder, “integral” protection means that “plants” (including Fungi in this legal context), cannot be collected, destroyed or transported. “Partial” protection applies, among other things, to certain parts of “plants” or to the way they are used. The species which are protected under international conventions are subjected to the conditions expressed in these conventions. Finally, any unjustified destruction of unprotected “wild plants” is also forbidden.

Biodiversity Plan

The Luxembourg’s government adopted a nature protection plan in 2007 (PNPN 2007-2011) which was produced by the Environment Ministry. This plan consists in a political action programme which aims to stop diversity loss by 2010 and to preserve and restore the different ecosystem services at the landscape and national scales. In it are integrated the different engagements taken by the government in the past. These engagements include:

- *at the worldwide level*: ratification of the 1992 Rio Convention on Biological Diversity (CBD), and participation in the 2002 Johannesburg Summit;
- *at the European level*: translation of the European Bird and Habitat Directives into National Laws, and approval of the European Landscape Convention (Florence, 2000);
- *at the national level*: General Declaration of Intention (DIG) in 1981 on the protection of certain parts of the country, and the National Plan for Sustainable Development in 1999. Luxembourg also signed the Bern Convention and officially adhered to the 2010 Countdown Initiative.

Among other things, the plan involves:

- finalisation of the territorial delimitation of the “Natura 2000” network (45 260 ha or 17.5% of the national territory), two thirds of which consist of integral forest areas;
- constitution of a network of protected areas of national interest (diverse humid areas, nutrient-poor meadows, calcareous grasslands, etc.);
- creation of integral forest reserves representing 5% of the forest areas subjected to forestry management, of which 800 ha are already official nature reserves. In Luxembourg, forests spread on 35% of the land (2586 Km²). Public forests (44.8% of all forest coverage, or 40 000 ha), are managed by the Administration of Nature and Forests (ANF), in accordance with the Helsinki Resolution (H1) principles of sustainable management;
- preservation and restoration of the ecological continuity of large landscape units;
- restoration of humid areas and renaturation of streams and rivers;
- management of some agricultural areas under “biodiversity contracts”, which will amount to 5 000 ha in 2011;

- integration of nature protection principles to other fields such as the building/construction sector, for example;
- creation of databases, monitoring and scientific follow-up work evaluating the state of biodiversity, and promotion of scientific research in this area (by institutions such as the National Natural History Museum (NNHM), the ANF and the Gabriel Lippmann Public Research Centre);
- strengthening of the environmental education and information of the general public about nature protection and sustainable development, through infrastructures such as educational paths, information centres, etc.;
- set up of the Natural Environment Observatory, which evaluates and ensures the follow-up of the environmental management measures and coordinates the different stakeholders;
- adaptation of the legal framework to modify the lists of species which are to be protected partially or integrally (see above).

Fungi in the Biodiversity Action Plan

In addition to the species listed in Habitats and Species Directive, even though mushrooms (Fungi) are not explicitly mentioned in the law or in the National Nature Protection Plan (NNPP), a list of fungi and lichens appears in an annex of the NNPP as priority species, which benefit of the same protection status as do the country's rare and threatened animals and plants. This list includes roughly fifty species of rare Ascomycetes and Basidiomycetes which depend on rare and regressing habitats (dry grasslands, nutrient-poor meadows or ravine forests, for example), as well as twenty-four lichen species. This species list, which is amenable to change over time, includes indicator species of management schemes used for the conservation of habitats of national or regional interests.

In terms of evaluating the ecological and specific diversity of Fungi, a number of projects have been undertaken in addition to the national survey which started several decades ago. For example, Tholl *et al.*'s work contributed to the survey of the Luxemburg's "small Switzerland" area (Tholl *et al.* 2007). Schultheis' survey of an integrally protected forest and Garnier-Delcourt's data compilation about a site destined to become a Natura 2000 zone, also add to the already existing national data (Schultheis 2008, unpublished; Garnier-Delcourt 2008, unpublished). All of these were essentially surveys of Ascomycetes and Basidiomycetes (including Aphylophoromycetes taken here in the non-systematic sense) which develop visible sporophores. In this area, the most complete data for Luxembourg are the ones which exist for lichen specific diversity and distribution (Diederich *et al.* 2009).

Some uncertainties still remain however about the feasibility of the short and long term monitoring of Fungi because of the human and financial resources these imply.

Conservation measures only make sense if the general public is made aware of their existence. To better meet the growing public interest for nature in general and for wild mushrooms especially, as well as to inform the public on the themes of biodiversity and the regulation in application, a brochure on mushrooms in general (and the edible and toxic ones in particular), has been produced by mycologists from the Mycological Research Group. Financed by the ANF, this brochure will be published soon and will be freely available.

Mycologists and Mycological society

The practice of naturalist mycology started in Luxembourg in the first quarter of the 19th Century, with the publication of Louis Marchand's (1807-1843) studies on cryptogams of the Grand Duchy (Massard 1990). Now the country counts a dozen of non-professional naturalist mycologists, gathered since 1983 in an autonomous working group within the Luxemburg's Naturalist Society (SNL), called Groupe de Recherche Mycologique (GRMSNL). A substantial part of its activities, led individually or collectively, is devoted to the inventory of the country's mycoflora, but also to the information of the general public about the diversity, the ecological importance of mushrooms (excursions, conferences), and their edibility or toxicity (information sessions in autumn). Some of the members are cooperating as volunteer scientific collaborators with the National Natural History Museum's research centre to collect data on the natural heritage, to help in the activities destined to inform the general public, and to put the biodiversity plan into action.

Data, red list, checklists

There is no "red list" as such for mushrooms in Luxembourg, unless one considers the list annexed to the NNPP as an equivalent. Specific habitat preservation however remains a priority.

Collaborations with colleagues from the bordering countries concerning the occurrence and distribution of certain species exist, for example with Belgium (Fraiture 2006), France (Courtecuisse 1994) and Germany (Kriegelsteiner 1991), as well as in the frame of establishing the species list of the Bern Convention's first appendix (Dahlberg & Croneborg 2006).

The recording and informatised data management of the data concerning the occurrence of species present on the national territory is ongoing since 2002, via the Recorder application (www.recordersoftware.org). Mycologists therefore have the ability to transfer their observations onto the National Natural History Museum's database through a well defined data exchange protocol. It is the NNHM that centralises biodiversity informations in the Grand Duchy of Luxembourg, and which publishes species occurrence data, with their geographical attributes (which, when transferred on international portals such as the Biological Collections Service for Europe (www.biocase.org) or the Global Biodiversity Information facility (www.gbif.org), is rendered less precise to avoid the specimens from being easily found again). The NNHM can provide detailed data for educative, scientific or nature conservation projects (Walisch 2007). At the moment there are roughly 6000 recorded entries for mushrooms, a number which should increase in the coming years with the ongoing training of more mycologists.

Activity reports and species lists have been partly published in the SNL Bulletins. These are freely available via the the SNL website at <http://snl.lu>.

Protected areas, perceived threats and conclusions

To the exception of the sandstone rocky region mentioned before, where all lichens (but also mosses, liverworts and ferns) are integrally protected, there exists no site devoted in priority to mushroom protection. Nevertheless, all the existing measures and the future ones which aim at preserving particular habitats or ecosystems contribute to guarantee mushroom diversity.

When the threats which could affect the specific and functional diversity of Fungi are mentioned, one often thinks first of the excessive collecting of wild edible mushrooms. As we do not have quantitative nor qualitative data in this matter, the precaution principle applies. A national Law exists since 1989, even though control is difficult to ensure. The creation of the integral forest reserves' network however helps to control this problem, as all collecting is forbidden in them (as well as in all nature reserves), and the public is informed of the rules in application via educational paths and panels, for example.

One must admit that, until recently, mushrooms (Fungi) were ignored or at least considered less important than the fauna (birds, insects) and flora in the context of nature protection and management, in Luxembourg as well as in other countries. Let us hope that in the future, through the efforts of political representatives and of different stakeholders in the environmental sector, mushrooms will be more and more considered to be an essential node of biodiversity.

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Russia for ECCF

Tatyana Svetasheva

Tula State University e-mail: foxtail_svevt@mail.ru

and

Alexander Kovalenko, V.L. Komarov Botanical Institute, 2 Prof. Popov St., RUS- 197376 - St. Petersburg.

RUSSIA, e-mail: alkov@binran.ru

Does your country have any policy on biodiversity conservation?

Nature conservation is the important component in the national politics of Russia.

This supposes several main work directions: research of the biodiversity and definition of threatened species and ecosystems, creation of Red Data Books on national and regional levels, foundation of protected by law natural areas, improvement of national environmental legislation (on the animal world, the forests, water code, etc.), implementation of international environmental legal instruments and agreements (e.g. CITES).

If yes, has a biodiversity action plan been produced?

Yes, biodiversity action plan has been produced and is constantly under adjusting. This is the main aim of the Institute of Nature Protection. For scientific content of the problem there is the Basic Research Program of the Presidium of Russian Academy of Sciences "Biodiversity".

If yes, are fungi mentioned in the plan?

Fungi are mentioned in the biodiversity action plan.

If yes, are fungi treated independently? What fungal groups are mentioned? How are fungi regarded - as organisms themselves worth protecting, or as a threat to other endangered organisms?

Fungi are treated independently as organism themselves worth protecting.

Usually next fungal groups are mentioned:

basidiomycetes (agarics, polypores, clavarioid fungi, gasteroid fungi);
ascomycetes (discomycetes).

Also there are some fungal parasites of plants (in the Red Book of Leningrad region) and myxomycetes (several regional Red Books).

Do fungi have legal protection?

Yes, if the Red Data Book was prepared with observance of the established by law rules.

If yes, is that protection implicit (i.e. that all organisms are protected in principal) or explicit (fungi explicitly named as being protected)?

This protection often is implicit if we say of protected areas, where all organisms are protected. And this protection is explicit in the legislative documents such as Red Books or approved red lists.

Are there any mycologists in the country? If yes, do they any work in fungal conservation?

There are more than one thousand mycologists in Russia (specialists of all fields of mycology, including medicine, phytopathology, etc.), but perhaps only about two hundred mycologists deal with fungal diversity and conservation.

Is there any mycological society?

There are two mycological branches within Russian Botanical Society (under auspices of Russian Academy of Sciences): Section of Mycology and Commission on Macromycetes.

Also, a few years ago in Russia was organized the National Academy of Mycology – as public organization uniting mycologists of all specialties

Do any checklists exist for fungi of the country?

There is no general checklist for Russia. Checklists of separate regions and some federal districts exist.

If yes, please supply bibliographic details.

If no, please supply bibliographic details of key works (if any) on fungi of the country

The list of key publications will be mailed some later (please, take our apologies).

Is there any activity in respect of fungal conservation? If yes, what is that activity?

Russian Committee for Conservation of Fungi was established some years ago with participation of representatives from all 7 Russian Federative provinces, but unfortunately it does not work in reality.

Special workshops and scientific symposia on nature conservation problems (including fungi) took place in number regions of Russia with participation of scientists, ecologists and political figures. Some of these activities were of international level. Main themes of such meetings: problems of definition rare species, using IUCN criteria for fungi, interaction between scientists and politicians, cooperation of all mycologists worked with fungal conservation and etc.

The most of Russian mycological conferences include the section devoted fungal conservation. The last one – 5 International Conference “Study of Fungi in Biogeocoenoses”, Perm, September 2009.

The participation of mycologists in the national and regional commissions on “Holding of Red Data Book”

Research of mycobiota in various vegetative zones and landscape districts of Russia, different Russian regions, nature reserves and other nature protected areas.

Conservation and research fungi *ex situ*.

Publication of checklists and papers concerning fungal diversity and conservation.

Attraction of amateurs to research on fungal diversity, distribution and conservation.

Has any red list been made for fungi?

At present time Russia has renewed national Red Data Book devoted animals (2001), plants and fungi (2008) as well as the most of Russian regions (about 70 from 89) have own Red Data Books. The most of these editions are official legislative documents contained the data on threatened species as well as rules for conservation and recovery. The most of the Red Data Books and approved lists for conservation consist fungi, but their quantity is very different in various regions and usually are not extensive (in average 20-30 species) in comparison with plants and animals.

If yes, what groups?

Basidiomycetes (agarics, polypores, clavarioid fungi, gasteroid fungi);
ascomycetes (discomycetes).

Also there are some fungal parasites of plants (in the Red Book of Leningrad region) and myxomycetes (several regional Red Books).

What are the perceived threats for fungi in the country?

Disafforestation, road-building through the valuable fungal territories, grass fires caused by humans, ploughing up of meadows, spreading of picnic tourism and many other.

Have any protected areas been established for fungi?

The most special protected areas of Russia have been established for the all groups of organisms as a whole. Some territories – only for certain plants, or for certain animals. Today there are no protected areas, established specially for fungi, but last time some steps in this direction are undertaken by regional mycologists.

Any news or recent events in fungal conservation in your country?

Several new regional Red Data Books containing fungi are preparing for publication.

One of the key points of the Perm Conference resolution (5 International Conference “Study of Fungi in Biogeocoenoses”, Perm, September 2009) is: to make a petition for Russian Commission on rare and threatened species of animal, plants and fungi with request to revise Red Book categories and criteria, to correlate its with the same ones of IUCN (last version) as well as to propose the special amendments to criteria for fungi.

ECCF questionnaire for Serbia. December 2009

Boris Ivancevic

Natural History Museum, Njegoseva 51, Belgrade, SERBIA

Does your country have any policy on biodiversity conservation?	Yes
If yes, has a biodiversity action plan been produced?	The national biodiversity action plan has been in process of development for several years, but it is not finished yet.
If yes, are fungi mentioned in the plan?	Fungi will be included in the plan once it is finished.
If yes, are fungi treated independently? What fungal groups are mentioned? How are fungi regarded - as organisms themselves worth protecting, or as a threat to other endangered organisms?	It is expected that the plan will include macromycetes as a group of living organisms that needs to be included in measurements of protection and conservation of biodiversity.
Do fungi have legal protection?	Yes.
If yes, is that protection implicit (i.e. that all organisms are protected in principal) or explicit (fungi explicitly named as being protected)?	Implicit and explicit. The present official Law on Nature Conservation, which became accepted and formally valid in 2009, includes fungi (including lichens) as a general group of organisms. The presently ongoing process of preparing additional sub-law regulations and rulebook will result in a precise list of species that will be treated and protected as explicit taxa. These regulations will include 38 strictly protected species and 26 protected species of macromycetes (total of 64 species), as well as 37 strictly protected lichen species and 3 species and 1 genus of protected lichens. These lists have already been accepted by the appropriate Ministry, while the regulations will become formally valid in 2010. The status of "Strictly protected species" is given to threatened species included in the Red List of Fungi of Serbia, with prescribed special measures of conservation and protection. The status of "Protected species" includes species with commercial importance, and the law regulates the proper way of harvesting and quantities that may be harvested, further trade, transport etc.
Are there any mycologists in the country?	There are a few professional mycologists, who are mostly studying micromycetes and rarely macromycetes. There are also a certain number of amateur mycologists.
If yes, do they any work in fungal conservation?	Yes, they are promoting importance and need for conservation of fungi in various ways, participate in expert and scientific projects pertaining to fungi conservation; various publications are published; species are inventoried and mapped on territory of Serbia etc.
Is there any mycological society?	Mycological Society of Serbia and several local amateur mycological societies.
Do any checklists exist for fungi of the country?	Yes, but only an old one. The new checklist is in process of being prepared, and publishing is expected in 2010 or early 2011.
If yes, please supply bibliographic details.	Ivančević, B. (2002): Species of macromycetes recorded in Serbia and Montenegro until 1993.- <i>World of Mushrooms</i> , 14: 7-11. [<i>In Serbian</i>]
If no, please supply bibliographic details of key works (if any) on fungi of the country	
Is there any activity in respect of fungal conservation?	Yes
If yes, what is that activity?	Lobbying at the appropriate Ministry to formally protect fungi with legislatives in an adequate way, and to include them in plans and measures of conservation as a special group of organisms, separately from plants. Inventory of species, estimate of threatened status. The proposal of the project for preparing the Red Book of Fungi of Serbia was prepared even in 2007, but it is still waiting for the Ministry to approve the means for realization.
Has any red list been made for fungi?	Yes. Ivancevic, B. 1998. A preliminary Red List of the macromycetes of Yugoslavia. – In: Perini, C. [ed.]. Conservation of fungi in Europe, pp. 57-61. Università degli Studi, Siena. (+Add. Rev. March 2004)
If yes, what groups?	Macromycetes

What are the perceived threats for fungi in the country?	Destruction and loss of natural habitats, primarily including old forest complexes or rare habitats such as peat bogs; various uncontrolled activities on a huge scale that include extremely intensive harvesting of commercially important mushrooms (damage to the habitat, deposition of waste etc.)
Have any protected areas been established for fungi?	One area was officially nominated a protected area because it is a habitat of species <i>Myriostoma coliforme</i> and certain other rare species of fungi, as well as the great diversity of species.
Any news or recent events in fungal conservation in your country?	The new Law on Nature Conservation was accepted in 2009. It includes fungi as a separate group. There are also prepared sub-law legislations that include the accepted list of about 100 individually protected species of fungi and lichens. It is expected that these legislations will become implemented in 2010.

Responses to the Questionnaire from Slovenia

Tine Grebenc & Dusan Jurc

Slovenian Forestry Institute, Vecna pot 2, SI-1000 Ljubljana, SLOVENIA
e-mail: Tine.Grebenc@gozdis.si

1. Does your country have any policy on biodiversity conservation? Yes

2. If yes, has a biodiversity action plan been produced?

ANKO, Botjan, KRAIGHER, Hojka, JURC, Dusan, URBANI, Mihej, SIMONI, Primo, BATI, Franc, HLAD, Branka (ur.), SKOBERNE, Peter (ur.). Biological and landscape diversity in Slovenia : an overview. Ljubljana: Ministry of the Environment and Spatial Planning, Environmental Agency of the Republic of Slovenia, 2001. 242 str., ilustr. ISBN 961-6324-17-9.

3. If yes, are fungi mentioned in the plan? Yes

4. If yes, are fungi treated independently?

Yes - the updated list of fungi will also be included into the "Regulation of placement of endangered plants and animals into the RED list" (Pravilniku o uvrstitvi ogroenih rastlinskih inivalskih vrst v rdeci seznam (Ur.l. RS, t. 82/2002)) which will ensure the upgrade of the current "Act on protection of naturally occurring fungi" (Uredbe o zavarovanju samoniklih gliv Ur.l. RS, t. 38/1994 (44/1995, 30/1996, 57/1998))

5. What fungal groups are mentioned? Macromycetes, micromycetes

6. How are fungi regarded - as organisms themselves worth protecting, or as a threat to other endangered organisms?

Fungi are treated as organisms themselves worth protecting

7. Do fungi have legal protection?

Yes - see above ("Act on protection of naturally occurring fungi" - Uredbe o zavarovanju samoniklih gliv Ur.l. RS, t. 38/1994 (44/1995, 30/1996, 57/1998))

8. If yes, is that protection implicit (i.e. that all organisms are protected in principal) or explicit (fungi explicitly named as being protected)?

Yes, explicit for most of species while for selected genera all species within the genus are protected.

9. Are there any mycologists in the country?

Yes, several; Prof. Nina Gunde Cimerman and Dr. Polona Zalar (Uni. Of Ljubljana; mycology combined with microbiology), In addition there are few persons dealing with fungi at molecular level (mainly phylogenetics and systematics): Dr. Cene Gostinar (Uni. Of Ljubljana), Dr. Tine Grebenc (Slovenian Forestry Institute). In addition we have several groups dealing with phytopathology, fungal biochemistry,.. all at the professional level. If names of these people are of interest as well, please let me know to update the form. In addition to professional mycologists (above mentioned, who spend at least a part of their research work in the field of mycology), there is an array of amateur mycologists, whose prime occupations are different but dedicate an amount of time to work in the area of mycology as well, mainly mapping, identifications, holding private collections, etc. they are (most of them) associated with Mycological Society of Slovenia (MSS) or with one of the MSS's subordinate local or regional mycological/mushroom picking society.

10. If yes, do they any work in fungal conservation?

Directly no. Some indirect scientific works raising also the question of conservation has been done mainly in describing certain threats and invasive species (see Dusan Jurc et al., several publications) or simply molecular biodiversity studies (Nina Gunde Cimerman and Polona Zalar's publications, or Grebenc et al. 2009)

11. **Is there any mycological society?** Yes (see above - question 9)

12. **Do any checklists exist for fungi of the country?** Yes

13. **If yes, please supply bibliographic details.**

JURC, Dusan, PILTAVER, Andrej, OGRIS, Nikica. Glive Slovenije : vrste in razirjenost = Fungi of Slovenia : species and distribution, (Studia forestalia Slovenica, 124). Ljubljana: Gozdarski intitut Slovenije, Silva Slovenica, 2005. VI, 497 pp., ilustr. ISBN 961-6425-24-2.

14. **If no, please supply bibliographic details of key works (if any) on fungi of the country**

15. **Is there any activity in respect of fungal conservation?** Yes - see question 4.

16. **If yes, what is that activity?**

Preparation of new legislation for fungal protection including an updated list of RED species (a common work of Mycological Society of Slovenia, Institute for Systematics of Higher Fungi and Slovenian Forestry Institute - who contributed to the preparation of list or to subsequent comments)

17. **Has any red list been made for fungi?** Yes

18. **If yes, what groups?** macromycetes (Basydiomycota, Ascomycota)

19. **What are the perceived threats for fungi in the country?**

See reference : ANKO, Botjan, KRAIGHER, Hojka, JURC, Dusan, URBANI, Mihej, SIMONI, Primo, BATI, Franc, HLAD, Branka (ur.), SKOBERNE, Peter (ur.). Biological and landscape diversity in Slovenia : an overview. Ljubljana: Ministry of the Environment and Spatial Planning, Environmental Agency of the Republic of Slovenia, 2001. 242 str., ilustr. ISBN 961-6324-17-9.

20. **Have any protected areas been established for fungi?** No

21. **Any news or recent events in fungal conservation in your country?**

No - except the new legislation.

The state of conservation of fungi in Switzerland 2009 - from the Red list to species and site protection

Beatrice Senn-Irlet

Swiss Federal Research Institute WSL, FE Biodiversity and conservation biology, Zürcherstr. 111, CH- 8903 Birmensdorf, Switzerland

E-mail: Beatrice.senn@wsl.ch

Switzerland has published a Red List for macrofungi and 12 species are protected by law. During the last years great efforts have been conducted to find a coherent conservation strategy and to find efficient ways for the conservation of a maximum of threatened species.

The Red list

The Red List of threatened macrofungi of Switzerland published in 2007 lists all ascomycetes and basidiomycetes, classified as macrofungi and known to occur in the country, together with their categories of threat according to the IUCN criteria. Of the 2956 evaluated species of the Swiss macromycetes flora, 937 (32 %) are threatened. 1 of these is at present extinct in Switzerland (RE), 81 (2,7 %) are considered as critically endangered (CR), 360 (12,1 %) as endangered (EN) and 495 (16,7 %) as vulnerable (VU). An additional 143 (4,8 %) species are listed as nearly threatened (NT) and 1876 species (63,5 %) are not threatened (LC). Due to missing data a total of 2004 species (40,4 %) could not be classified (DD).

The highest percentages of Red List species are found in dry grassland and bogs and mires. The alpine zone has several threatened species due to overall small populations in small areas. In woodlands the percentage of threatened species is comparably small. However nutrient input from the air threatens the habitat quality especially for mycorrhizal species, especially so in the Swiss plateau. Numerous threatened species are wood-inhabiting species. The increase of woody debris as a consequence of wind throw events and changing forestry managements in the last years has not yet positively influenced the presence of rare, highly specialized wood saprotrophs.

This official Red List is seen as an important facility for government agencies to implement general strategies for the conservation of fungi as well as species specific conservation measurements.

The strategy for implementation

The Federal Office for the Environment has adopted a strategy that treats all threatened organisms with the same priority, i.e. fungi should have the same weight as birds.

As Red Lists are worked out and published for many groups or organisms (phanerogams, mosses, lichens, birds, molluscs, insects etc), a certain degree of prioritization of these thousands of threatened species is needed. It is now agreed that the criteria to ascertain the priorities are the same for all group of organisms. As any conservation measurements (e.g. opening forests, grazing regimes, facilitating specific host trees) will influence not only the target organisms but also other species of this site, we should know which other species will profit, that is it seems desirable to define bundles of threatened organisms with similar habitat needs and similar threats.

i) Setting priorities

The criteria for this process of prioritization include national responsibility (endemic species have top priority), state of knowledge about precise ecology and distribution ("we can only conserve what we know"), number of specialists for advise in specific cases

("conservation is more than a paper"), methods known and applied elsewhere for conservation and acceptance of a given species (e.g. flagship species) in a wider public.

ii). Define habitats, threats and measurements for each Red-listed species

In order to define bundles of species with similar threats and habitats, each species has to be allocated to one or several habitats following the same classification. This classification is based on vegetation units (Delarze & Gonthier 2008). Along the line of unified lists for habitats also the threats have to be named with a classification in common. A list of all possible threats is currently being worked out.

The instruments

i) Data sheets

A Red data book is not planned for any group of organism. However, data sheets as a surrogate are in preparation. End of 2009 data sheets for 24 endangered macrofungi should be published electronically. These data sheets inform local authorities about specific ecological demands, threats and possible measurements for the conservation and facilitation of a given species.

ii) Coordination with coordinators of other mapping projects

As the conservation of the national biodiversity has become approved and the technical bases such as the mapping centres are all funded by the same board a closer collaboration of all coordinators of mapping projects has been initiated. This helps greatly to make fungi and their specific characteristics better known to a wide range of conservationists.

References

Delarze, R. & Y. Gonthier. 2008. Lebensräume der Schweiz/Guide des milieux naturels de Suisse. Ott Verlag. ISBN 978-3-7225-0069-0
Senn-Irlet, B.; Bieri, G. & S. Egli. 2007. Rote Liste der gefährdeten Grosspilze der Schweiz. Umwelt—Vollzug Nr 0718., Hrsg. Bundesamt für Umwelt, Bern, und WSL, Birmensdorf.

Fungal conservation in Ukraine, 2009

Vera Hayova

Kholodny Institute of Botany, National Academy of Sciences of Ukraine, 2 Tereshchenkivska str. 01601 Kiev UKRAINE

e-mail: vera.hayova@i.ua

Fungal diversity studies

Since the previous report some research on fungal diversity went on, with rare species recorded, particularly on protected areas, Biosphere and Nature Reserves, National Nature Parks, regional parks, small reserves of local importance, etc. At present number of the reserves and parks in the country is constantly growing and although none of them was established due to rare fungal species yet, making fungal inventories for each one is very important. Recently, observations were made and all available up to now data on fungi and fungi-like organisms were compiled for two Biosphere Reserves, three Nature Reserves and 6 National Nature Parks located in the east of Ukraine (Dudka et al., 2009).

Recording and Mapping

With support of the UK Darwin Initiative fund and other supporting organizations, tens of thousand of fungal records from Ukraine (from the Herbarium of the Kholodny Institute of Botany (KW) and some bibliographic sources) with their exact locations on the map are currently accessible on the internet through the Cybertruffle's Robigalia website:

<http://www.cybertruffle.org.uk/robigalia/eng/index.htm>

Red Data Book

Preparing and publishing of the Red Data Book of Ukraine is administered by the Ministry of the environmental protection. An updated edition the Red Data Book according to the law has to be published once in about 10 year period. At the end of 2009 the third edition of the Red Data Book of Ukraine was published. The structure and the layout of the Red Data Book corresponds with its second edition (published in 1996) in accordance with the legislation adopted specially for this subject. Plants, algae, fungi and lichens are published in one volume. All included species are protected by law, destruction of their habitats is prohibited. The list of species in the third edition has extended to include 57 species of non-lichenized fungi (Ascomycota – 6 and Basidiomycota – 51) and 51 species of lichenized fungi. Among non-lichenized fungi 23 species are listed as rare, 11 – vulnerable, 20 – endangered and 1 – extinct. Attempts of using IUCN categories were made, however, the species were not strictly evaluated against the IUCN criteria yet and still many species are classified as rare due to their abundance in observations. Each species in the Red Data Book has a Latin and vernacular names, short description, photograph (or drawing), taxonomic position, distribution, habitat(s), population characteristics, threats, distribution map, bibliographic references, etc. In the third edition, like in the previous ones, only macrofungi are included.

Since the book is published in Ukrainian and information about its fungal component is not widely known outside the country, below are the 57 species of non-lichenized fungi from the Red Data Book of Ukraine:

Discinaceae	<i>Gyromitra slonevskii</i> Heluta	Rare
Helvellaceae	<i>Helvella monachella</i> (Scop.) Fr.	Rare
Morchellaceae	<i>Morchella crassipes</i> (Vent.) Pers.	Rare
Morchellaceae	<i>Morchella steppicola</i> Zerova	Rare
Sarcosomataceae	<i>Sarcosoma globosum</i> (Schmidel) Rehm	Rare
Tuberaceae	<i>Tuber aestivum</i> Vitt.	Endangered
Agaricaceae	<i>Agaricus amanitaeformis</i> Wasser	Endangered
Agaricaceae	<i>Agaricus romagnesii</i> Wasser	Endangered
Agaricaceae	<i>Agaricus tabularis</i> Peck	Endangered
Agaricaceae	<i>Leucoagaricus macrorhizus</i> Locq. ex Horak	Endangered
Agaricaceae	<i>Leucoagaricus moseri</i> (Wasser) Wasser	Rare
Agaricaceae	<i>Leucoagaricus nymphaeum</i> (Kalchbr.) Bon (<i>Macrolepiota puellaris</i> (Fr.) M.M. Moser)	Rare
Agaricaceae	<i>Leucocoprinus bohusi</i> Wasser	Endangered
Amanitaceae	<i>Amanita caesarea</i> (Scop.) Pers.	Endangered
Amanitaceae	<i>Amanita solitaria</i> (Bull.) Fr.	Endangered
Amanitaceae	<i>Limacella steppicola</i> Zerova & S. Wasser	Rare
Bolbitiaceae	<i>Galeropsis desertorum</i> Velen. & Dvor.	Endangered
Boletaceae	<i>Boletus aereus</i> Bull.	Vulnerable
Boletaceae	<i>Boletus parasiticus</i> Fr.	Rare
Boletaceae	<i>Boletus regius</i> Krombh.	Endangered
Boletaceae	<i>Phylloporus pelletieri</i> (Lév. apud Crouan) Quéf. <i>Strobilomyces strobilaceus</i> (Scop.) Berk.	Endangered
Boletaceae	(<i>S. floccopus</i> (Vahl) P. Karst.)	Endangered
Catathelasmataceae	<i>Catathelasma imperiale</i> (Fr.) Sing.	Rare
Clathraceae	<i>Clathrus ruber</i> Pers.	Rare
Clathraceae	<i>Anthurus archeri</i> (Berk.) Fischer	Endangered
Clathraceae	<i>Pseudocolus fusiformis</i> (E.Fischer) Lloyd	Rare
Clavariaceae	<i>Clavariadelphus pistillaris</i> (Fr.) Donk	Rare
Cortinariaceae	<i>Crepidotus macedonicus</i> Pilát <i>Leucocortinarius bulbiger</i> (Alb. & Schwein.) Singer	Vulnerable
Cortinariaceae	<i>Entoloma nidorosum</i> (Fr.) Quel.	Rare
Fomitopsidaceae	<i>Laricifomes officinalis</i> (Vill.) Kotl. & Pouzar	Extinct
Geastraceae	<i>Myriostoma coliforme</i> (Dicks.) Corda	Rare
Gomphaceae	<i>Gomphus clavatus</i> (Pers.) Gray	Endangered
Hericiaceae	<i>Hericium coralloides</i> (Fr.) Gray <i>Hygrocybe calyptriformis</i> (Berk. et Broome)	Vulnerable
Hygrophoraceae	Fayod	Rare
Lycoperdaceae	<i>Bovista paludosa</i> Lev.	Endangered
Lycoperdaceae	<i>Lycoperdon mammaeforme</i> Pers.	Vulnerable
Meripilaceae	<i>Grifola frondosa</i> (Dicks.) Gray	Vulnerable
Paxillaceae	<i>Paxillus zerovae</i> Wasser	Endangered
Phallaceae	<i>Mutinus caninus</i> (Huds.) Fr.	Rare
Phallaceae	<i>Mutinus ravenelii</i> (Berk. & M.A. Curtis) E. Fish. <i>Phallus duplicatus</i> Bosc	Rare
Phallaceae	(<i>Dictyophora duplicata</i> (Bosc) E. Fisch.)	Endangered
Phelloriniaceae	<i>Phellorinia herculeana</i> (Pers.) Kreisel	Rare
Pisolithaceae	<i>Pisolithus arhizus</i> (Scop.) S. Rauschert	Rare

Polyporaceae	<i>Polyporus rhizophilus</i> (Pat.) Sacc.	Rare
Polyporaceae	<i>Polyporus umbellatus</i> (Pers.) Fr. (<i>Grifola umbellata</i> (Pers.) Pilát)	Rare
Russulaceae	<i>Lactarius chrysorrheus</i> Fr.	Vulnerable
Russulaceae	<i>Lactarius sanguifluus</i> (Paulet) Fr.	Vulnerable
Russulaceae	<i>Lactarius lignyotus</i> Fr.	Rare
Russulaceae	<i>Russula turci</i> Bres.	Vulnerable
Sclerodermataceae	<i>Scleroderma geaster</i> Fr.	Rare
Sparassidaceae	<i>Sparassis crispa</i> (Wulfen) Fr.	Endangered
Tricholomataceae	<i>Floccularia rickenii</i> (Bohus) Wasser	Vulnerable
Tricholomataceae	<i>Lyophyllum favrei</i> R. Haller Aar. & R. Haller Suhr	Endangered
Tricholomataceae	<i>Phaeolepiota aurea</i> (Matt.) Maire	Vulnerable
Tricholomataceae	<i>Tricholoma colossus</i> (Fr.) Quel.	Rare
Tricholomataceae	<i>Tricholoma focale</i> (Fr.) Ricken	Vulnerable

Fungal conservation activities and tasks

Fungi are mentioned in the National Report of Ukraine on Conservation of Biodiversity adopted by the Government in 1997, and in the updated National Strategy on Biodiversity Conservation approved in 2004. However, some other developments in legislation for fungal protection are needed. At present, none of the reserve of local or national level can be designated for an endangered species of fungi, like it is possible for plant and/or animal species. This is necessary to approve in order to emphasize *in-situ* conservation of fungi, along with other groups of living organisms. Ukraine has no official law or regulations for collecting, sale or purchase of wild growing edible mushrooms. There is however other sort of restrictions, sadly famous Chernobyl accident and radioactive pollution preventing consumption of mushrooms in many regions of the country for the last more than 20 years. Nevertheless picking mushrooms has many centuries of tradition in this part of the world and remains very popular nowadays. At the same time number of competent amateurs is limited. Mycological education is also necessary for ecologists involved in conservation activities.

Further mycological diversity studies, inventories of fungal records on protected areas and monitoring of threatened species have to continue and develop. The problem is that fungi due to their biological characteristics often need long-term monitoring for species assessment which is difficult to realize with restricted mycological resources and lack of knowledge among non-mycologists. An education and easily accessible data on fungi must be available for those working for or interested in environmental protection. Additional research must be undertaken and observations made in order to extend the list of fungal species in the future editions of the Red Data Book and to include some microfungi species. With more information on species ecology and knowledge on the IUCN approach to evaluation, it is necessary to apply the IUCN criteria and categories for the species assessment. Ideally, in the future editions the Red Data Book of Fungi should be published as a separate volume.

With more data on new records on non-native microfungi, particularly biotrophic species, special attention must be paid in future to their observation and monitoring.

As an example of *ex-situ* conservation of fungi, some rare species including listed in the Red Data Book of Ukraine were introduced and are preserved in the culture collection of fungi at the Kholodny Institute of Botany, Kiev.

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Responses to the Questionnaire - Ukraine

Vera Hayova

Kholodny Institute of Botany, National Academy of Sciences of Ukraine 2 Tereschenkivska str. 01601 Kiev UKRAINE
e-mail: vera.hayova@i.ua

Does your country have any policy on biodiversity conservation?

Yes. There is a National Report of Ukraine on Conservation of Biodiversity adopted in 1997.
In 2004 the updated National Strategy on Biodiversity Conservation was approved by the Government

If yes, has a biodiversity action plan been produced?

The draft NSCB (National Strategy for Conservation of Biodiversity) Action Plan has been prepared, disseminated for inter-ministerial consideration and distributed among other organizations concerned, before being submitted to Parliament.

If yes, are fungi mentioned in the plan? Yes, they are.

If yes, are fungi treated independently? What fungal groups are mentioned?

Fungi are mentioned along with other groups of living organisms. Basidiomycetes and ascomycetes, so called macrofungi.

How are fungi regarded - as organisms themselves worth protecting, or as a threat to other endangered organisms?

Fungi are regarded worth protecting as well as other living organisms.

Do fungi have legal protection?

Yes. 57 species of fungi are protected by law on national level, according to the Red Data Book of Ukraine (2009).

If yes, is that protection implicit (i.e. that all organisms are protected in principal) or explicit (fungi explicitly named as being protected)?

Fungi are named implicitly when habitat protection is concerned, and explicitly when separate species are mentioned. In the Red Data Book they are mentioned as explicitly protected.

Are there any mycologists in the country?

There are less than professional 10 mycologists studying fungal diversity in the country, macro- and microfungi including fungi-like organisms/slime molds; few other PhDs in mycology are teaching in the universities and are not really included in any research.

If yes, do they any work in fungal conservation?

None is working specifically for fungal conservation, except for some mycologists are occasionally involved in projects related to conservation, for example in Red-list preparation organized by the Ministry of environmental protection.

Is there any mycological society?

No, there is no separate mycological society; only mycological section within the Ukrainian botanical society.

Do any checklists exist for fungi of the country? Yes.

If yes, please supply bibliographic details.

Fungi of Ukraine: A Preliminary Checklist. Minter D. W., Dudka I. O. (eds.). – Egham, Surrey, UK: CAB International, 1996. – 361 p.
The Checklist provides current nomenclature and synonymy.
Many records of fungal species and their distribution in Ukraine are available on Cybertruffle's Robigalia website:
<http://www.cybertruffle.org.uk/cybernome/eng/index.htm>

If no, please supply bibliographic details of key works (if any) on fungi of the country

Is there any activity in respect of fungal conservation? Yes.

If yes, what is that activity?

Fungi are listed in the Red Data Book of Ukraine. Other activities: fungal diversity studies by professional mycologists, producing and publishing fungal inventories for protected areas (Biosphere and Nature Reserves, National Nature Parks, protected areas of regional importance, etc.), with particular attention to rare records, red-listed at present and future potential red-listed fungi; workshops for mycologists, students and others interested in fungal conservation; publications about rare/red-listed species, both scientific and popular for general public.

Has any red list been made for fungi?

Yes, officially approved list of fungal species published in the the Red Data Book of Ukraine (2009). This is the third edition, it comprises 57 species of fungi. Although, according to the law, fungi are publishes in the same volume with plants.

If yes, what groups?

Up to now only macrofungi are included in the Red Data Book: ascomycetes (operculate discomycetes) and basidiomycetes (agaricoid, clavarioid, gasteroid and polyporoid fungi).

What are the perceived threats for fungi in the country?

Uncontrolled destruction of habitats due to over-exploitation of natural resources, afforestation, increasing pollution, illegal waste disposals, public ignorance, climate change, etc.

Have any protected areas been established for fungi? No.

Any news or recent events in fungal conservation in your country ?

An updated fungal list in the Red Data Book of Ukraine (2009).

Compilation of the responses to the Questionnaire sent by Belgium, Estonia, Greece, Ireland, Italy, Latvia, Russia, Serbia, Slovenia, and Ukraine

1. Does your country have any policy on biodiversity conservation?

Belgium: Yes. However, in Belgium, nature protection is no longer in the hands of the national (= federal) government but is now ruled by the three administrative Regions of the country: Flemish Region (northern part of the country), Walloon Region (southern part of the country) and Brussels Region (centre of the country).

Estonia: Yes.

Greece: Yes, Greece has a policy on biodiversity conservation which is restricted to birds, higher plants, mammals (including sea mammals such as seals, dolphins, whales etc.) and reptiles.

Ireland: Yes.

Italy: No.

Latvia: Yes.

Russia: Nature conservation is important component in the national politics of Russia.

This supposes several main work directions: research of the biodiversity and definition of threatened species and ecosystems, creation of Red Data Books on national and regional levels, foundation of protected by law natural areas, improvement of national environmental legislation (on the animal world, the forests, water code, etc.), implementation of international environmental legal instruments and agreements (e.g. CITES).

Serbia: Yes.

Slovenia: Yes.

Ukraine: Yes. The National Concept (Strategy) for Conservation of Biodiversity was adopted in 1997. In 2004 the updated National Strategy on Biodiversity Conservation was approved by the Government

2. If yes, has a biodiversity action plan been produced?

Belgium: Yes.

Estonia: Yes.

Greece: As far as I know a plan has been implemented.

Ireland: Yes – national and local.

Italy: No

Latvia: We have action plans for “Natura 2000” territories.

Russia: Yes, biodiversity action plan has been produced and is constantly under adjusting. This is the main aim of the Institute of Nature Protection. For scientific content of the problem there is the Basic Research Program of the Presidium of Russian Academy of Sciences “Biodiversity”.

Serbia: The national biodiversity action plan has been in process of development for several years, but it is not finished yet.

Slovenia: ANKO, B., KRAIGHER, H., JURC, D., URBANI, M., SIMONI, P., BATI, F., HLAD, B. (ur.), SKOBERNE, P. (ur.). Biological and landscape diversity in Slovenia : an overview. Ljubljana: Ministry of the Environment and Spatial Planning, Environmental Agency of the Republic of Slovenia, 2001. 242 str., illustr. ISBN 961-6324-17-9.

Ukraine: The draft NSAP (National Strategy for Conservation of Biodiversity Action Plan) has been prepared, disseminated for inter-ministerial consideration and distributed among other organizations concerned, before being submitted to Parliament.

3. If yes, are fungi mentioned in the plan?

Belgium: Yes.

Estonia: Yes.

Greece: Fungi are not included in the plan. Even worse, Greece does not have a Red List for Fungi.

Ireland: Yes.

Italy: -

Latvia: Only in a few territories.

Russia: Fungi are mentioned in the biodiversity action plan.

Serbia: Fungi will be included in the plan once it is finished.

Slovenia: Yes.

Ukraine: Yes, they are.

4. If yes, are fungi treated independently? What fungal groups are mentioned?

Belgium: No, fungi are not treated independently but in common with other natural productions as berries and flowers. They are treated as organisms deserving protection (thinking mainly of edible species which are susceptible to be collected by people).

Estonia: Yes, fungi are treated independently.

Ireland: Generally No.

Italy: -

Latvia: We have checklists of fungi in some protected areas (Agaricales s.l. Gasteromycetes and Polyporales s.l. are included) Gauja National Park, Kemeru National Park. In this territories fungi are regarded as independent organisms.

Russia: Fungi are treated independently. Usually next fungal groups are mentioned: basidiomycetes (agarics, polypores, clavarioid fungi, gasteroid fungi); ascomycetes (discomycetes). Also there are some fungal parasites of plants (in the Red Book of Leningrad region) and myxomycetes (several regional Red Books).

Serbia: It is expected that the plan will include macromycetes as a group of living organisms that needs to be included in measurements of protection and conservation of biodiversity.

Slovenia: Yes - the updated list of fungi will also be included into the "Regulation of placement of endangered plants and animals into the RED list" (Pravilniku o uvrstitvi ogrojenih rastlinskih inivalskih vrst v rdeci seznam (Ur.l. RS, t. 82/2002)) which will ensure the upgrade of the current "Act on protection of naturally occurring fungi" (Uredbe o zavarovanju samoniklih gliv Ur.l. RS, t. 38/1994 (44/1995, 30/1996, 57/1998)). Macromycetes, micromycetes

Ukraine: Fungi are mentioned along with other groups of living organisms. Basidiomycetes and ascomycetes, so called macrofungi.

5. How are fungi regarded - as organisms themselves worth protecting, or as a threat to other endangered organisms?

Belgium: They are treated as organisms deserving protection (thinking mainly to edible species which are susceptible to be collected by people).

Estonia: The fungi protected by law and included in Estonian Red Data List are mentioned as objects of protection.

Ireland: In a very few cases (e.g. The Curragh, Co. Kildare and Ballyprior, Co. Laois) fungi (wax cap group) are specifically mentioned in relation to protection of those sites. More typically fungi would be protected as a consequence of the habitat being protected.

Russia: Fungi are treated as organisms themselves worth protecting.

Serbia: Implicit and explicit. The present official Law on Nature Conservation, which became accepted and formally valid in 2009, includes fungi (including lichens) as a general group of organisms. The presently ongoing process of preparing additional sub-law regulations and rulebook will result in a precise list of species that will be treated and protected as explicit taxa. These regulations will include 38 strictly protected species and 26 protected species of macromycetes (total of 64 species), as well as 37 strictly protected lichen species and 3 species and 1 genus of protected lichens. These lists have already been accepted by the appropriate Ministry, while the regulations will become formally valid in 2010.

The status of "Strictly protected species" is given to threatened species included in the Red List of Fungi of Serbia, with prescribed special measures of conservation and protection. The status of "Protected species" includes species with commercial importance, and the law regulates the proper way of harvesting and quantities that may be harvested, further trade, transport etc.

Slovenia: Fungi are treated as organisms themselves worth protecting

Ukraine: Fungi are regarded worth protecting as well as other living organisms.

6. Do fungi have legal protection?

Belgium: Collecting mushrooms is now totally prohibited in domanial forests of the Flemish Region ("Bosdecreet") and, since 2009, of the Brussels Region. In the domanial forests of the Walloon Region, there is an interdiction of circulating outside of the roads and paths and a restriction of the amounts of mushrooms collected. The decision concerning mushroom picking in the private forests is left to the owner of the forest.

Estonia: Yes, we have 3 threat categories for fungi (categories I, II and III).

Greece: There is no legislation for the conservation of fungi. In 2007 I participated in a technical committee which submitted to the government a proposal on the management of fungi as a natural resource. The proposal was not further forwarded

Ireland: Yes.

Italy: Yes, a national one only for a list of edible mushrooms and extra for truffles; then single regions have a regional one.

Latvia: Yes, but really it doesn't work.

Russia: Yes, if the Red Data Book was prepared with observance of the established by law rules.

Serbia: Yes. - see above

Slovenia: Yes - see above ("Act on protection of naturally occurring fungi" - Uredbe o zavarovanju samoniklih gliv Ur.l. RS, t. 38/1994 (44/1995, 30/1996, 57/1998))

Ukraine: Yes. 57 species of fungi are protected by law on the national level, according to the Red Data Book of Ukraine (2009).

7. If yes, is that protection implicit (i.e. that all organisms are protected in principal) or explicit (fungi explicitly named as being protected)?

Belgium: Usually, when fungi are explicitly cited, it is almost always together with other organisms.

Estonia: We have 46 fungal species protected with law. According to the Nature Conservation Act, all localities of the species of I category must be protected, not less than 50 % of the localities of the II category species, and not less than 10 % of the localities of the III category species. For this, in addition to the protection in numerous Protected Areas, many new special Species Protection Sites have been organized in 2004.

Ireland: Generally all organisms in a particular habitat/site are protected.

Italy: explicit

Latvia: Yes, Regulations of Government No 396 (14/10/2000) Lists of Specially Protected and Limitedly Exploitable Specially Protected Species. A special list for fungi.

Russia: This protection often is implicit if we say of protected areas, where all organisms are protected. And this protection is explicit in the legislative documents such as Red Books or approved red lists.

Serbia: Implicit and explicit. The present official Law on Nature Conservation, which became accepted and formally valid in 2009, includes fungi (including lichens) as a general group of organisms. The presently ongoing process of preparing additional sub-law regulations and rulebook will result in a precise list of species that will be treated and protected as explicit taxa. These regulations will include 38 strictly protected species and 26 protected species of macromycetes (total of 64 species), as well as 37 strictly protected lichen species and 3 species

and 1 genus of protected lichens. These lists have already been accepted by the appropriate Ministry, while the regulations will become formally valid in 2010.

The status of "Strictly protected species" is given to threatened species included in the Red List of Fungi of Serbia, with prescribed special measures of conservation and protection. The status of "Protected species" includes species with commercial importance, and the law regulates the proper way of harvesting and quantities that may be harvested, further trade, transport etc.

Slovenia: Yes, explicit for most of species while for selected genera all species within the genus are protected.

Ukraine: Fungi are named implicitly when habitat protection is concerned, and explicitly when separate species are mentioned. In the Red Data Book they are mentioned as explicitly protected.

8. Are there any mycologists in the country?

Belgium: Yes, many.

Estonia: Yes, we have about 20 persons working as mycologists, including PhD students.

Greece: There are a few mycologists but non works systematically on fungal conservation.

Ireland: Yes, but very few! Four in full time employment in Universities, a few more individuals who are essentially molecular biologists but working on fungi and a few plant pathologists. Also a few 'retired' mycologists (like me!) and some 'amateurs' mainly interested in collecting edible fungi at this time of year!

Italy: Few at the Universities, rarely working only with fungi as mycologists

Latvia: Inita Daniele, Fungal Diversity and Conservation of Agaricoid Fungi, Latvian Museum

of Natural History; Diana Meiere, Fungal Diversity and Conservation, Ecology; Polypores, Latvian Museum of Natural History; Edgars Vimba, Fungal Diversity and Conservation, Biology, Ecology, University of Latvia, Faculty of Biology

Russia: There are more than one thousand mycologists in Russia (specialists of all fields of mycology, including medicine, phytopathology, etc.).

Serbia: There are a few professional mycologists, who are mostly studying micromycetes and rarely macromycetes. There are also a certain number of amateur mycologists.

Slovenia: Yes, several; Prof. Nina Gunde Cimerman and Dr. Polona Zalar (Uni. of Ljubljana; mycology combined with microbiology). In addition there are few persons dealing with fungi at molecular level (mainly phylogenetics and systematics): Dr. Cene Gostinar (Uni. Of Ljubljana), Dr. Tine Grebenc (Slovenian Forestry Institute). In addition we have several groups dealing with phytopathology, fungal biochemistry, all at the professional level. If names of these people are of interest as well, please let me know to update the form. In addition to professional mycologists (above mentioned, who spend at least a part of their research work in the field of mycology), there is an array of amateur mycologists, whose prime occupations are different but dedicate an amount of time to work in the area of mycology as well, mainly mapping, identifications, holding private collections, etc. they are (most of them) associated with Mycological Society of Slovenia (MSS) or with one of the MSS's subordinate local or regional mycological/mushroom picking society.

Ukraine: There are less than professional 10 mycologists studying fungal diversity in the country, macro- and microfungi including fungi-like organisms/slime molds; few other PhDs in mycology are teaching in the universities and are not really included in any research.

9. If yes, do they any work in fungal conservation?

Belgium: They don't work actively in fungal protection but are in favour of nature protection. They occasionally do inventories of the mycoflora in natural reserves.

Estonia: Yes, some mycologists make inventories of rare fungi. Environmental board has also ordered the monitoring of protected fungal species in their habitats – on each year since 2005.

Ireland: No! Even though I'm a lab-based experimental mycologist, and not working in the area of conservation and certainly no expert, out of a sense of responsibility and because no one else was doing it, I've been responding to questionnaires from the ECCF, occasionally attending meetings e.g. whenever possible I attend meetings of the UK Fungal Conservation Forum, as an observer.

Italy: Very very few, indirectly.

Latvia: Yes, mostly educational work.

Russia: Perhaps only about two hundred mycologists (out of one thousand) deal with fungal diversity and conservation.

Serbia: Yes, they are promoting importance and need for conservation of fungi in various ways, participate in expert and scientific projects pertaining to fungi conservation; various publications are published; species are inventoried and mapped on territory of Serbia etc.

Slovenia: Directly no. Some indirect scientific works raising also the question of conservation has been done mainly in describing certain threads and invasive species (see Dusan Jurc et al., several publications) or simply molecular biodiversity studies (Nina Gunde Cimerman and Polona Zalar's publications, or Grebenc et al. 2009)

Ukraine: None is working specifically for fungal conservation, except for some mycologists are occasionally involved in projects related to conservation, for example in Red-list preparation organized by the Ministry of environmental protection.

10. Is there any mycological society?

Belgium: Yes. Up to about 10 years ago, there was a lot of small local societies in Belgium. Since then, a clear tendency to fusion of these societies developed. There is now only one society in the Flemish region and the movement started also to develop in the southern part of the country.

Estonia: Yes, we have Estonian Mycological Society, which is a section of the Estonian Naturalists' Society. There are about 70 fellows who participate in society's activities.

Greece: There are 5 mycological societies numbering a few hundred members in total.

Ireland: Not in the Republic of Ireland. Anyone with an interest in fungi here would join the British Mycological Society and/or the Northern Ireland Fungal Group. There is a Society of Irish Plant Pathologists which would also cater for mycological interests.

Italy: Yes, the mycological working group inside the Botanical Society (SBI), the Unione micologica italiana (UMI), the Associazione micologica Bresadola (AMB), and various others more or less amateur ones...

Latvia: The Latvian Mycological Society, miko.ltm.gov.lv/

Russia: There are two mycological branches within Russian Botanical Society (under auspices of Russian Academy of Sciences): Section of Mycology and Commission on Macromycetes.

Also, a few years ago in Russia was organized the National Academy of Mycology – as public organization uniting mycologists of all specialties

Serbia: Mycological Society of Serbia and several local amateur mycological societies.

Slovenia: Yes (see above - question 8)

Ukraine: No, there is no separate mycological society; only mycological section within the Ukrainian botanical society.

11. Do any checklists exist for fungi of the country?

Belgium: Belgium has no national checklist for fungi. A first critical checklist of macrofungi of northern Belgium has been published recently (Walley & Vandeven 2006). A national checklist of Uredinales is also in the process of publication (Vanderweyen & Fraiture 2007, 2008, 2010).

Estonia: Yes.

Greece: There are 2 published checklists.

Ireland: Yes.

Italy: Yes.

Latvia: Yes.

Russia: There is no general checklist for Russia. Checklists of separate regions and some federal districts exist.

Serbia: Yes, but only an old one. The new checklist is in process of being prepared, and publishing is expected in 2010 or early 2011.

Slovenia: Yes.

Ukraine: Yes.

12. If yes, please supply bibliographic details.

Belgium: VANDERWEYEN A. & FRAITURE A. (2007) Catalogue des Uredinales de Belgique, 1^{re} partie : Chaconiaceae, Coleosporiaceae, Cronartiaceae, Melampsoraceae, Phragmidiaceae, Pucciniaceae, Raveneliaceae et Uropyxidaceae. *Lejeunia* **183**: 1-36.

VANDERWEYEN A. & FRAITURE A. (2008) Catalogue des Uredinales de Belgique, 2^{ème} partie : Pucciniaceae (sauf *Puccinia*). *Lejeunia* **185**: 1-31.

VANDERWEYEN A. & FRAITURE A. (2010) Catalogue des Uredinales de Belgique, 3^{ème} partie : Pucciniaceae (genre *Puccinia*). *Lejeunia* [to be published].

WALLEYN R. & VANDEVEN E. (red.) (2006) Standaardlijst van Basidiomycota en Myxomycota van Vlaanderen en het Brussels Gewest. Rapport INBO.R.2006.27. Instituut voor Natuur- en Bosonderzoek, Brussel, 144 p.

Estonia: Recent information about the distribution of fungal species in Estonia is available at homepage of Estonian Species Registry (<http://elurikkus.ut.ee/>). Published check-lists are:

Järva L, Parmasto E. 1980. Eesti seente koondnimestik. List of Estonian Fungi. Scripta Mycologica 7. Tartu.

Järva L, Parmasto I, Vaasma M. 1998. Eesti seente koondnimestik peremeestaimede nimestiku ja bibliograafiaga. 1. täiendusköide (1975–1990). List of Estonian fungi with host index and bibliography. Supplement 1 (1975–1990). Scripta Mycologica 12. Tartu.

Greece: There are 2 published checklists. 1. Pantidou, M. 1973: Fungus-Host Index for Greece. Benaki Phytopathological Institute, Athens, pp. 382. 2. Zervakis, G., Dimou, D. & Balis, C., 1998: A check-list of the Greek macrofungi including hosts and biogeographic distribution: I. Basidiomycotina. Mycotaxon LXVI: 273-336.

Ireland: Checklist of the British and Irish Basidiomycota (2006) by Legon *et al.*, published by RBG Kew and also 'live' on line (H. Fuller served on the Steering Committee);

Muskett & Malone series of papers (Census Catalogue of Irish Fungi) in the Proceedings of the Royal Irish Academy (1950's -60's);

Series of papers by O'Connor on the Irish mycobiota, published largely in Proceedings of the Royal Dublin Society.

Additionally, there are thousands of Irish fungal records in the Fungal Records Database of Britain & Ireland (FRDBBI) managed by the British Mycological Society. In this regard there is a serious error in a document prepared by Beatrice Senn-Irlet *et al.* – Guidance for Conservation of Macrofungi in Europe (October 2007) – prepared for the EU. Fig. 3 shows Ireland as a grey area – no records of macrofungi!!

Italy: Onofri S., Bernicchia A., Filipello Marchisio V., Padovan F., Perini C., Ripa C., Salerni E., Savino E., Venturella G., Vizzini A., Zotti M., Zucconi L., 2005 - Checklist dei funghi italiani Checklist of Italian fungi *Basidiomycetes Basidiomycota*. Carlo Delfino Editore.

Latvia: Dāniele I., Krastiņa I. 2002. Latvijas cepurīšu sēņu (*Agaricales* s.l.) konspekts. *Latvijas veģetācija*, 5, 43-174.

Meiere D. 2002. Latvijas piepju konspekts. *Latvijas veģetācija*, 5, 7-41

Museum collections on internet: www.imuzejs.lv

Russia: -

Serbia: Ivančević, B. (2002): Species of macromycetes recorded in Serbia and Montenegro until 1993. - World of Mushrooms, 14: 7-11. [*In Serbian*]

Slovenia: JURC, Dusan, PILTAVER, Andrej, OGRIS, Nikica. Glive Slovenije : vrste in razirjenost = Fungi of Slovenia : species and distribution, (Studia forestalia Slovenica, 124). Ljubljana: Gozdarski intitut Slovenije, Silva Slovenica, 2005. VI, 497 pp., ilustr. ISBN 961-6425-24-2.

Ukraine: Fungi of Ukraine: A Preliminary Checklist. Minter D. W., Dudka I. O. (eds.). – Egham, Surrey, UK: CAB International, 1996. – 361 p. The Checklist provides current nomenclature and synonymy.

Many records of fungal species and their distribution in Ukraine are available on Cybertruffle's Robigalia website: <http://www.cybertruffle.org.uk/cybernome/eng/index.htm>

13. If no, please supply bibliographic details of key works (if any) on fungi of the country

14. Is there any activity in respect of fungal conservation?

Belgium: Yes but not much.

Estonia: Yes.

Greece: There is not any activity on fungal conservation as far as I know.

Ireland: Yes, activities relating to fungal conservation.

Italy: Very few first steps toward it

Latvia: Yes.

Russia: Yes.

Serbia: Yes.

Slovenia: Yes - see question 4.

Ukraine: Yes.

15. If yes, what is that activity?

Belgium: Also, in northern Belgium, a network of (rather small) forest reserves has been created in 1995 and consisted, in 2004, of about 1500 ha strict (= unmanaged) reserves, which is favourable for wood inhabiting fungi.

Estonia: Monitoring of protected species and inventories (especially in nature reserves).

Ireland: For the past 4 years the Irish Heritage Council have funded fieldwork on surveys of waxcap fungi in a number of vice-counties on the western seaboard of Ireland. The work has been conducted over 2 weeks each autumn by David Mitchel (now living in Wales) - this year he will be surveying sites in County Donegal. The waxcap data will feed into conservation plans for these areas. Additionally, Dr John Feehan, Environmental Scientist & Conservationist, at University College Dublin, is very much involved with biodiversity conservation plans in the Irish Midlands, especially Co Offaly, and is very conscious of the importance of waxcap fungi in low-nutrient input grasslands, and their value as indicator organisms. He was responsible for getting fungi mentioned specifically at the Curragh and Ballyprior sites.

Italy: Attempts for redlisting and identifying key-areas in order to have something that demonstrate the importance and eventual threat of fungi and to start protection activities

Latvia: Education of population: information in newspapers, TV, Radio, exhibitions of fungi.

Russia: 1. Russian Committee for Conservation of Fungi was established some years ago with participation of representatives from all 7 Russian Federative provinces, but unfortunately it does not work in reality. 2. Special workshops and scientific symposia on nature conservation problems (including fungi) took place in number regions of Russia with participation of scientists, ecologists and political figures. Some of these activities were of international level. Main themes of such meetings: problems of definition rare species, using IUCN criteria for fungi, interaction between scientists and politicians, cooperation of all mycologists worked with fungal conservation and etc. 3. The most of Russian mycological conferences include the section devoted fungal conservation. The last one – 5 International Conference “Study of Fungi in Biogeocoenoses”, Perm, September 2009. 4. The participation of mycologists in the national and regional commissions on “Holding of Red Data Book”. 5. Research of mycobiota in various vegetative zones and landscape districts of Russia, different Russian regions, nature reserves and other nature protected areas. 6. Conservation and research fungi *ex situ*. 7. Publication of checklists and papers concerning fungal diversity and conservation. 8. Attraction of amateurs to research on fungal diversity, distribution and conservation.

Serbia: Lobbying at the appropriate Ministry to formally protect fungi with legislatives in an adequate way, and to include them in plans and measures of conservation as a special group of organisms, separately from plants. Inventory of species, estimate of threatened status. The proposal of the project for preparing the Red Book of Fungi of Serbia was prepared even in 2007, but it is still waiting for the Ministry to approve the means for realization.

Slovenia: Preparation of new legislation for fungal protection including an updated list of RED species (a common work of Mycological Society of Slovenia, Institute for Systematics of Higher Fungi and Slovenian Forestry Institute - who contributed to the preparation of list or to subsequent comments)

Ukraine: Fungi are listed in the Red Data Book of Ukraine. Other activities: fungal diversity studies by professional mycologists, producing and publishing fungal inventories for protected areas (Biosphere and Nature Reserves, National Nature Parks, protected areas of regional importance, etc.), with particular attention to rare records, red-listed at present and future potential red-listed fungi; workshops for mycologists, students and others interested in fungal conservation; publications about rare/red-listed species, both scientific and popular for general public.

16. Has any red list been made for fungi?

Belgium: A regional red list has been published by the Flemish Region :

WALLEYN R. & VERBEKEN A. (2000) Een gedocumenteerde Rode Lijst van enkele groepen paddestoelen (macrofungi) van Vlaanderen. *Meded. Inst. Natuurbehoud* 7: i-x, 1-84.

Estonia: Yes.

Greece: When there will be a Red List on fungi I guess it will include only macromycetes.

Ireland: No.

Italy: At national level only attempts/small preliminary ones; at regional level in Tuscany published in 2006.

Latvia: Official Red List: Andrušaitis G. (red.) 1996. Latvijas Sarkanā grāmata. Retās un izzūdošās augu un dzīvnieku sugas, 1. sējums. – Red Data Book of Latvia. Rare and endangered species of plantas and animals, Vol.1 , Riga.

Russia: At present time Russia has renewed national Red Data Book devoted animals (2001), plants and fungi (2008) as well as the most of Russian regions (about 70 from 89) have own Red Data Books. The most of these editions are official legislative documents contained the

data on threatened species as well as rules for conservation and recovery. The most of the Red Data Books and approved lists for conservation consist fungi, but their quantity is very different in various regions and usually are not extensive (in average 20-30 species) in comparison with plants and animals.

Serbia: Yes. Ivancevic, B. 1998. A preliminary Red List of the macromycetes of Yugoslavia. – In: Perini, C. [ed.]. Conservation of fungi in Europe, pp. 57-61. Università degli Studi, Siena. (+Add. Rev. March 2004)

Slovenia: Yes.

Ukraine: Yes, officially approved list of fungal species published in the the Red Data Book of Ukraine (2009). This is the third edition, it comprises 57 species of fungi. Although, according to the law, fungi are published in the same volume with plants.

17. If yes, what groups?

Belgium: Only some groups of macrofungi have been taken into account in that check-list. They belong to the Ascomycetes (Geoglossaceae s.l., *Poronia* and many fleshy Pezizales) and Basidiomycetes (Amanitaceae, Hygrophoraceae, *Tricholoma*, *Collybia* s.l., *Marasmius* s.l., Russulaceae, Boletales, Pleurotaceae, Cantharellaceae, hydroid fungi and epigeous Gasteromycetes).

Estonia: Ascomycetes and Basidiomycetes (mainly agarics and polypores).

Italy: So called Macromycetes (asco and basidiomycetes)

Latvia: Only macro fungi.

Russia: Basidiomycetes (agarics, polypores, clavarioid fungi, gasteroid fungi); ascomycetes (discomycetes). Also there are some fungal parasites of plants (in the Red Book of Leningrad region) and myxomycetes (several regional Red Books).

Serbia: macromycetes

Slovenia: macromycetes (Basidiomycota, Ascomycota)

Ukraine: Up to now only macrofungi are included in the Red Data Book: ascomycetes (operculate discomycetes) and basidiomycetes (agaricoid, clavarioid, gasteroid and polyporoid fungi).

18. What are the perceived threats for fungi in the country?

Belgium: Pollution (but it seems that the situation is slowly improving), climatic changes (drought, modification of the mycoflora due to invasive species, ...)

Estonia: Forest management (mainly), also influence of human activity (in general).

Greece: The emerging threat comes from heavy commercial picking of edible species in restricted geographical areas. Forest fires and mainly loss of hedgerows threaten precious habitats of fungi.

Ireland: As listed in previous reports to ECCF.

Italy: Change of habitat, of land management,

Russia: Disafforestation, road-building through the valuable fungal territories, grass fires caused by humans, ploughing up of meadows, spreading of picnic tourism and many other.

Serbia: Destruction and loss of natural habitats, primarily including old forest complexes or rare habitats such as peat bogs; various uncontrolled activities on a huge scale that include extremely intensive harvesting of commercially important mushrooms (damage to the habitat, deposition of waste etc.)

Slovenia: See reference : ANKO, B., KRAIGHNER, H., JURC, D., URBANI, M., SIMONI, P., BATI, F., HLAD, B. (ur.), SKOBERNE, P. (ur.). Biological and landscape diversity in Slovenia : an overview. Ljubljana: Ministry of the Environment and Spatial Planning, Environmental Agency of the Republic of Slovenia, 2001. 242 str., ilustr. ISBN 961-6324-17-9.

Ukraine: Uncontrolled destruction of habitats due to over-exploitation of natural resources, afforestation, increasing pollution, illegal waste disposals, public ignorance, climate change, etc.

19. Have any protected areas been established for fungi?

Belgium: Mushrooms are of course protected in natural reserves, together with all other organisms, but we have only one natural reserve created especially for the protection of fungi. It is the richest waxcap grassland of the country with about 30 *Hygrocybe* / *Hygrophorus* species and 12 clavarioid species.

Estonia: Yes, one nature reserve area is established especially for protecting fungal species.

Greece: There are 11 National Parks and a Reserve Area where strict protection is enforced by the Forest Service.

Ireland: See 5.

Italy: No

Latvia: No

Russia: The most special protected areas of Russia have been established for the all groups of organisms as a whole. Some territories – only for certain plants, or for certain animals. Today there are no protected areas, established specially for fungi, but last time some steps in this direction are undertaken by regional mycologists.

Serbia: One area was officially nominated a protected area because it is a habitat of species *Myriostoma coliforme* and certain other rare species of fungi, as well as the great diversity of species.

Slovenia: No

Ukraine: No.

20. Any news or recent events in fungal conservation in your country ?

Belgium: Nothing more than what is cited here above.

Estonia: New Red Data List of Estonian Fungi including 168 fungal species was compiled in 2008 and authorized by Minister of the Environment of the Estonian Republic (Minister's Decree no. 1048, 26 June 2009).

Greece: No news about fungal conservation unless something happens with the conservation proposal mentioned above.

Ireland: See 15.

Italy: Participation in multidisciplinary projects of the ministry

Latvia: We are preparing a new red list according to IUCN criteria.

Russia: 1. Several new regional Red Data Books containing fungi are preparing for publication. 2. One of the key points of the Perm Conference resolution (5 International Conference "Study of Fungi in Biogeocoenoses", Perm, September 2009) is: to make a petition for Russian Commission on rare and threatened species of animal, plants and fungi with request to revise Red Book categories and criteria, to correlate its with the same ones of IUCN (last version) as well as to propose the special amendments to criteria for fungi.

Serbia: The new Law on Nature Conservation was accepted in 2009. It includes fungi as a separate group. There are also prepared sub-law legislations that include the accepted list of about 100 individually protected species of fungi and lichens. It is expected that these legislations will become implemented in 2010.

Slovenia: No - except the new legislation.

Ukraine: An updated fungal list in the Red Data Book of Ukraine (2009).

  **New contacts, changed addresses, phones, e-mails & so on...**  

New ECCF members are welcomed – representatives from:

ESTONIA:

Miss Irja Saar, M.Sc.,

Tartu University

Institute of Ecology and Earth Sciences,

Chair of Mycology, Researcher. (Speciality: Gill fungi - Agaricales s.l.)

irja.saar@ut.ee

Mr Indrek Sell, M.Sc.,

Estonian University of Life Sciences, Institute of Agricultural and Environmental Sciences, Specialist.

(Speciality: polypores a. other wood-rotting fungi).

indrek.sell@emu.ee

RUSSIA:

Dr Tatyana Svetasheva

Tula State University

foxtail_svevt@mail.ru

Emails changed:

Jacob Heilman-Clausen, Denmark : JHeilmann-Clausen@bio.ku.dk

Boris Ivancevic, Serbia : i.boris@beotel.net

Daniele Inita, Latvia : inita.daniele@ldm.gov.lv

Francisco Calonge, Spain : calonge@rjb.csic.es

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Visit the ECCF homepage: www.eccf.info (continuously updated)

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**Beatrice Senn-Irlet, WSL;
Vera Hayova, Institute of Botany, Kiev
ECCF 5 July 2010**