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Review

Fungi (mushrooms and lichens) in Serbian legislation

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Summary. Protection and conservation of mushrooms and lichens is considered to be an extremely important aspect of environmental conservation as a whole; and numerous environmental, scientific, medical, economic, cultural and ethical reasons exist in support of their central significance. This paper presents an overview of official regulations on the protection of macrofungi and lichens in the Republic of Serbia: from the Protection act of 1991 until today. Both good and bad provisions of individual regulations are analyzed, together with the effects of adopted regulations on the protection of endangered species of fungi (macrofungi mushrooms) and lichens are discussed. In addition, the correlation between the chronological development of protective legislation and the natural population of fungi is addressed; and general measures to improve protection of mushrooms and lichens in the future are presented. Finally, the need for increased studies on mushrooms and lichens is proposed as a basis for effective protection based on scientific knowledge and expert experience.

Keywords: conservation, law regulations, lichens, mushrooms, protection, Serbia.

Introduction

What covers the term mushrooms?

Today, mushrooms are predominantly considered to be sporulating (fruiting) bodies of macrofungi (macromycets); including edible, medicinal and poisonous species (Karaman et al. 2012). However, originally, the word "mushroom" was used only for the edible members of macrofungi, and "toadstools" for poisonous members of the gilled macrofungi. However, scientifically, the term "toadstool" has no meaning, and it has been proposed that the term be dropped altogether in order to avoid confusion. Thus, the terms edible, medicinal and poisonous mushrooms are now in use (APCAEM A-7/F 2011).

According to Chang and Hayes (1978), and Chang and Miles (1992, 2004), there are over six different definitions of mushrooms. Atkinson (1961) defined mushrooms as belonging to the basidiomycets and used the term toadstool as a synonymous term, since there is strictly speaking, no distinction between a mushroom and a toadstool. Gray (1959, 1970) stated that mushrooms are a basidiomycetous or rarely, ascomycetous fungus. Snell and Dick (1970, 1971) stated that mushrooms may be edible, poisonous, unpalatable, tough, etc., but popular usage applies the term only to edible mushrooms, while all others are refered to as 'toadstools'. Chang and Hayes (1978) defined mushrooms as both epigeous and hypogeous fruiting bodies of macroscopic fungi. Pegler (1983) explained that the terms mushroom and toadstool are rather loosely applied to the fruiting bodies of fleshy gill-fungi, and are commonly used to denote edible and poisonous species, respectively. Webster's Ninth New Collegiate Dictionary defines mushrooms as an enlarged complex aerial fleshy fruiting body of a fungus (as of the class Basidiomycetes) that consists typically of the stem, bearing a flattened cap (Mish 1988). According to the American Heritage® Dictionary of the English Language (2009), – Mushrooms are forms

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deviating from the standard morphology, and usually have more specific names, such as "puffball", "stinkhorn", and "morel"; gilled mushrooms themselves are often called "agarics" in reference to their similarity to *Agaricus* or their place Agaricales. By extension, the term "mushroom" can also designate the entire fungus when in culture; the thallus (called a mycelium) of the species forming the fruiting bodies called mushrooms; or the species itself.

By the term "mushrooms", we generally mean the definition of Chang and Miles (1992): "A macrofungus with a distinctive fruiting body which can be either hypogeous or epigeous, large enough to be seen with the naked eye and to be picked by hand". From this definition, it becomes clear that mushrooms are found in both Ascomycetes as well as Basidiomycetes. Thus, they can be aerial, fleshy or non-edible.

Why lichens?

Currently, lichens are considered to be fungi that live in symbiosis with a photobiont, an autotrophic green alga (phycobiont) or cyanobacterium (cyanobiont) or, in some cases, both. The fungal partner (mycobiont) in most lichens (98%) belongs to ascomycets; while zygomycetes and rare basidiomycets make up the remainder. The symbiotic relationship is often characterized as mutualistic, that is, both partners benefit. However, recent evidence suggests that, while the fungus is dependent on its autotrophic partner, the photobiont is often fully content to live alone (Wedin et al. 2004).

Because fungi take the more dominant role and cultivate photosynthesizing algae for food and in return provide a shady, moist, vitamin-rich environment) scientists classify lichens based on their associated fungal species. Whether the fungi were harvesting algae or cyanobacteria, the symbiotic modus operandi of the lichens proved to be the same. Perhaps Trevor Goward, the lichen curator at the University of British Columbia Herbarium, describes them best: "Lichens are fungi that have discovered agriculture" (Grice 2010).

The significance of fungi

Although fungi comprise a very large (more than a million species) and important group of organisms (Haywood 1995), awareness of their unique position and ecological role in Serbia (as well as in general) has begun only relatively recently compared to plants and animals. In fact, it was not until the 1970s that it was finally accepted that fungi represent a separate group of organisms, taxonomically set aside in a separate Kingdom, and that they were substantially different from plants (where they were usually included) and animals. The ability of fungi to decompose dead organic matter, the large number of parasitic fungal species, and their ability to form symbiotic relations with most vascular plants, are dominant properties of fungi that enable them to survive and essentially participate in terrestrial ecosystems. Estimates indicate that at least 85% of species (Kirk et al. 2001) and as many as 95% (Brundrett 1991) of plant species form various types of mycorrhizae with fungi. In the process of matter recycling, fungi are the dominant group capable of decomposing lignin and cellulose from plant residues, allowing recycling of plant material for reuse in biocenosis. Without fungi, fallen leaves and woody debris would bury trees in a relatively short time, and life in forest ecosystems would become impossible.

Apart from the other reasons for protection and conservation of fungi, we could mention that mushrooms, together with lichens, comprise a vast and yet largely untapped source of potentially powerful new pharmaceutical products. In particular, and most importantly for modern medicine, they represent an unlimited source of polysaccharides with anti-tumor and immunostimulatory properties. Many, if not all, basidiomycetous mushrooms contain biologically active polysaccharides in fruiting bodies, cultured mycelium or in culture broth. These polysaccharides are of different chemical compositions, with most belonging to the group of β-glucans which have specific chemical linkages that are needed for their anti-tumor action.

Unfortunately, the notion that fungal species can become endangered, just like other organisms on our planet, has been neglected. Moreover, awareness of the risk of fungal species reduction and the fact that some fungal species have already disappeared has come too late. In fact, it was only in the second half of the last century (during the 1970s) that the decrease in fungal abundance, and disappearance of some fungal species (especially those associated with complex and

well-preserved ecosystems) was reported (Jansen and Ławrynowicz 1991). At that time, a decrease in the number of fungal species collected for food from nature was also observed. In the late 1980s, after numerous reports of threats, international initiatives were launched to preserve mushrooms, which resulted in establishment of the European Council for Conservation of Fungi (ECCF). At that time fully developed organizations and movements for the protection of animal and plant species already existed for quite a time. Generally, it is considered that the main reasons for categorization of mushrooms as threatened organisms are the disappearance and contamination of their habitats, primarily due to human activities, such as pollution of the atmosphere, industrialized agriculture, unfavorable forestry practices and, anthropogenic alterations of large habitat areas. All of these issues lead to the degradation of fungal habitats. In addition, it is believed that uncontrolled and excessive commercial mass collection of mushroom fruit-bodies (sporocarps, carpofors) in a limited space has long-term negative effects (Moore et al. 2001).

After collection of a substantial body of knowledge on the vulnerability of mushrooms and lichens in the last decade of the twentieth century, fungi slowly began to be incorporated in nature protection programs, and frameworks of actions that address their conservation were becoming more formal and recognized (to a greater or lesser extent) by some states. At that time, the need to introduce some kind of control was also recognized in the Republic of Serbia, especially because of massive collecting of edible fungi. The first regulations adopted in Serbia that formally treated collection and trading of edible fungi, attempted to regulate issues in this field. However, these laws did not deal with protection and conservation of fungi in the modern sense: they did not address the protection of rare and specific fungal species that are vulnerable. Instead, this protection only focused on commercial edible species, which are usually very abundant. However, the Serbian state administration did recognize the need to establish some sort of limitations in fungal exploitation, at least for part of the population of mushrooms.

Protection and conservation of mushrooms and lichens is considered to be an extremely important aspect of environmental conservation as a whole; and numerous environmental, scientific, medical, economic, cultural and ethical reasons exist in support of their central significance. Because of this, the present paper provides an overview of legislation in Serbia regarding the protection of fungi (macromycetes, mushrooms, and lichens) in nature. The main objective of this paper is to present a chronological review of regulations on the protection of mushrooms and lichens; analyze the effects of enacted regulations on the population of mushrooms and lichens; and propose ways to improve their conservation and protection in the future.

Regulations dealing only indirectly with macromycetes, such as laws related to forestry, national parks and similar (e.g. laws regarding nature conservation but not explicitly mentioning mushrooms) were not considered; nor were laws governing other areas related to mushrooms/fungi, such as regulations focused on the fungal food industry, or the protection of materials, medical or pharmaceutical and related aspects.

Extensive knowledge on mushrooms and lichens as the basis for their protection

The basic condition for the preservation of macrofungi (or as any other organism) is increased awareness of existing problems, which necessitates in depth study, rapid and satisfactory taxonomic inventories, and extensive ecological and chorological studies. Although mycological research data have been collected in the Republic of Serbia for nearly a century, these studies were done randomly and non-systematically: driven by individual enthusiasm rather than as part of a systematic research project; thus, these data are not sufficient for guiding decisions and regulations for the protection and preservation of mushrooms and lichens (Ivančević 1995).

Adequate protection of fungi can only be established based on solid and reliable scientific data, collected through systematic and long-term scientific studies. It is therefore necessary to make a substantial investment in basic mycological research. Another necessary condition for determining the state of endangered fungi is careful monitoring of population sizes, abundance, diversity and distribution over a long period, using standardized methodologies. Then, based on

all of this collected data, a Red List of endangered fungi and lichens can be created, preferably using generally accepted IUCN classifications (IUCN 2001). However, it may be inappropriate to delay protective measures until the expected optimum level of knowledge about the population of mushrooms is reached (Matavulj et al. 1998; Matavulj and Karaman 2004).

Although data for a Red List of endangered mushrooms was first published nearly two decades ago (Ivančević 1993), and the first preliminary Red List of threatened mushrooms in Serbia was published in 1998 (Ivančević 1998), the opportunity to apply an official scientifically verified Red List toward preservation and protection of fungi was not taken advantage of by the Serbian government. This is particularly unfortunate, considering that the Red list of macromycetes took into consideration species of global importance, for which the Serbian state has a special responsibility, even if these species are not yet endangered in Serbia to a significant degree (Ivančević 1995).

A project focused on creating a revised version of the Red List for fungi, including detailed evaluation of vulnerability factors, was proposed to Serbian state authorities in 2007 (Ivančević et al 2007), but project implementation has not been approved so far. However, Article 36 of the Nature Protection Act 2009, specifically states that: "species that may be endangered should be protected as strictly protected species, or protected wildlife. Species protected according to this law shall be determined on the basis of national and international Red lists or Red books, professional findings and scientific knowledge and experience." Furthermore, the same Article 36 states that Red Books or Red Lists may be adopted by the Ministry of Environmental Protection. Consistent application of these legal provisions, once adopted, should provide the scientific basis for protection measures and contribute to harmonization of Serbian legislation with the laws of other countries that are more advanced in this area.

Review of laws and other regulations

The material used in this paper consists of legal provisions of the Republic of Serbia (laws and other regulations) relating to environmental protection: Закон о заштити природе. Службени гласник Социјалистичке Републике Србије бр. 29, 1988 - [Nature Conservation Law, 1988]; Одлука о стављању под заштиту биљних врста као природних реткости. Службени гласник Социјалистичке Републике Србије 11, 17. 03. 1990 - [Decision on putting plant species under protection as natural rarities, 1990]; Одлука о изменама и допунама одлуке о стављању под заштиту биљних врста као природних реткости. Службени гласник СРС 49, 15. 08. 1991 - [Decision on amending the decision on putting plant species under protection as natural rarities, 1991] - Закон о заштити животне средине. Службени гласник Републике Србије 66/1991, 83/1992, 53/1993, 67/1993, 48/1994 и 53/1995 - [Environmental protection law, 1991]; Уредба о заштити природних реткости, Службени гласник Републике Србије 50, 09. 07. 1993 - [Regulation on the protection of natural rarities, 1993]; Наредба о контроли коришћења и промета дивљих биљних и животињских врста. Службени гласник Републике Србије 50, 09. 07. 1993. и 36/1994 - [Directive on control of use and trade of wild plant and animal species, 1993]; Наредба о стављању под контролу коришћења и промета дивљих биљних и животињских врста. Службени гласник Републике Србије 16, 05. 04. 1996. и 44/1996 - [Directive on control of use and trade of wild plant and animal species, 1996]; Наредба о стављању под контролу коришћења и промета дивљих биљних и животињских врста. Службени гласник Републике Србије 17, 07. 04. 1999 - [Directive on control of use and trade of wild plant and animal species, 1999]; Закон о заштити животне средине. Службени гласник Републике Србије 135/2004 и 36/2009 - [Environmental protectionlaw, 2004]; Уредба о стављању под контролу коришћења и промета дивље флоре и фауне. Службени гласник Републике Србије 31/2005, 45/2005-испр., 22/2007, 38/2008, 9/2010 - [Regulation on putting the use and trade of wildlife under control, 2005]; Convention on the conservation of European wildlife and natural habitats - the Bern Convention (the Republic of Serbia signed and ratified this convention on 9 January 2008 and implementation began May 1, 2008); Закон о заштити природе. Службени гласник Републике Србије 36, 12.05.2009. і 88/2010 - [Nature conservation law, 2009]; Правилник

о проглашењу и заштити строго заштићених и заштићених дивљих врста биљака, животиња и гљива. Службени гласник Републике Србије 5, 05. 02. 2010 - [Regulation on the proclamation and protection of strictly protected and protected wild species of plants, animals and fungi, 2010]. Listed legal provisions of the Republic of Serbia (laws and other regulations) were reviewed and analyzed in this paper.

Discussion

Overview of legislative regulations on the protection of mushrooms and lichens in Republic of Serbia

Nature conservation law. Official Gazette of the Socialist Republic of Serbia 29/88. (Закон о заштити природе. Службени гласник Социјалистичке Републике Србије бр. 29, 1988.).

Decision on putting plant species under the protection as natural rarities. Official Gazette of the 11/90, (March 17 1990), (Одлука о стављању под заштиту биљних врста као природних реткости. Службени гласник Социјалистичке Републике Србије 11, 17. 03. 1990), and Decision on amending the decision on putting under the protection of plant species as natural rarities. Official Gazette of the Socialist Republic of Serbia 49/91, August 15 1991 (Одлука о изменама и допунама одлуке о стављању под заштиту биљних врста као природних реткости. Службени гласник СРС 49, 15. 08. 1991). By alteration (amendments) of the text of the Decision of 1990, the following were listed as protected species of mushrooms since 1991: *Boletus edulis* (penny bun, porcino; прави вргањ, летњи вргањ), *Pleurotus ostreatus* (oyster mushroom; буковача), *Cantharellus cibarius* (chanterelle, golden chanterelle, girolle; лисичарка), all types of genera: *Morchella* (morels; смрчци), *Agaricus* (common mushrooms; печурке), and *Lactarius* (milk-caps; млечнице).

The Environmental protection law. Official Gazette of the Republic of Serbia 66/91, 83/92, 53/93, 67/93, 48/94 and 53/95 (Закон о заштити животне средине. Службени гласник Републике Србије 66/1991, 83/1992, 53/1993, 67/1993, 48/1994 и 53/1995) does not include mushrooms or lichens.

Regulation on the protection of natural rarities, Official Gazette of the Republic of Serbia 50/93, June 09 1993 (Уредба о заштити природних реткости; Службени гласник Републике Србије 50, 09. 07. 1993.). This regulation also does not include mushrooms or lichens.

Directive on control of the use and trade of wild plant and animal species. Official Gazette of the Republic of Serbia 50/93, June 09 1993 and 36/94 (Наредба о контроли коришћења и промета дивљих биљних и животињских врста. Службени гласник Републике Србије 50, 09. 07. 1993. и 36/1994.), placed under control (protected) all species of the genera *Morchella* and *Lactarius*, all edible species of the genus *Agaricus*, and the following species: *Cantharellus cibarius* (chanterelle; лисичарка), *Craterellus cornucopioides* (dark trumpet; црна труба), *Boletus edulis* (penny bun, porcini; прави вргањ), *Amanita caesarea* (Caesar's mushroom; благва, рујница), *Pleurotus ostreatus* (oyster mushroom; буковача), *Bovista nigrescens* (brown puffball, black bovist; црна пухара, црнкаста јајача), and *Bovista plumbea* (small, paltry puffball; оловаста јајача, мала пухара).

Directive on control of the use and trade of wild plant and animal species. Official Gazette of the Republic of Serbia 16/96, April 05 1996 and 44/96 (Наредба о стављању под контролу коришћења и промета дивљих биљних и животињских врста. Службени гласник Републике Србије 16, 05. 04. 1996. и 44/1996.), placed under control (protected) all species of the genera *Morchella* and *Lactarius*, all edible species of the genus *Agaricus*, and the following species: *Cantharellus cibarius* (chanterelle; лисичарка), *Craterellus cornucopioides* (dark trumpet; црна труба), *Boletus edulis* (penny bun, porcini; прави вргањ), *Amanita caesarea* (Caesar's mushroom; благва, рујница), *Pleurotus ostreatus* (oyster mushroom; буковача), *Bovista nigrescens* (brown puffball, black bovist; црна пухара, црнкаста јајача), and *Bovista plumbea* (small, paltry puffball; оловаста јајача, мала пухара)

Directive on control of the use and trade of wild plant and animal species. Official Gazette of the Republic of Serbia 17/99, April 07 1999. (Наредба о стављању под контролу коришћења и промета дивљих биљних и животињских врста. Службени

гласник Републике Србије 17, 07. 04. 1999.), placed under control (protected): *Agaricus* spp. (common mushrooms), *Boletus aereus* (black porcino; црни вргањ), *Boletus aestivalis* (reticulated or cracked porcini; мрежасти или распуцали вргањ), *Boletus edulis* (penny bun, porcini; прави вргањ, летњи вргањ), *Boletus pinophilus* (pine mushrooms; боров вргањ), *Bovista nigrescens* (brown puffball, black bovist; црна пухара, црнкаста јајача), *Bovista plumbea* (small, paltry puffball; оловаста јајача, мала пухара), *Cantharellus cibarius* (chanterelle; лисичарка), *Craterellus cornucopioides* (dark trumpet; црна труба), *Lactarius deliciosus* (saffron milk cap, red pine mushroom; рујница), *Lactarius deterrimus* (false saffron milk-cap, bitterer milchling; смрекова рујница), *Lactarius salmonicolor* (salmon-color milk-cap; јелова рујница), *Lactarius sanguifluus* (blood lacteous mushroom; крвна млечница), *Lactarius semisanguifluus* (semi-blood lacteous mushroom; јелина рујница, полукрвна рујница), *Marasmius oreades* (scotch bonnet, fairy ring mushroom**,** вилин клинчић; note: in the text of this Directive, this was listed as „супача"), and *Pleurotus ostreatus* (oyster mushroom; буковача).

Convention on the conservation of European wildlife and natural habitats - Bern Convention (Конвенција о очувању европске дивље флоре и фауне и природних станишта - Бернска конвенција). The Republic of Serbia signed and ratified this convention on January 9, 2008 and provisions began to be implemented beginning May 1, 2008.

Environmental protection law. Republic of Serbia Official Gazette 135/04 and 36/09 (Закон о заштити животне средине. Службени гласник Републике Србије 135/2004 и 36/2009). Under the latest amendments to this Regulation (from 2010), the following species of mushrooms are now listed as protected: *Boletus aereus* (black porcino, црни вргањ), *Boletus reticulatus* (reticulated porcino, распуцали вргањ), *Boletus edulis* (penny bun, porcini; прави вргањ, летњи вргањ), *Boletus pinophilus* (pine mushrooms; боров вргањ), *Cantharellus cibarius* (chanterelle; лисичарка), *Craterellus cornucopioides* (dark trumpet; црна труба), *Lactarius deliciosus* (saffron milk cap, red pine mushroom; рујница), *Lactarius deterrimus* (false saffron milk-cap, bitterer milchling; смрекова рујница), *Lactarius salmonicolor* (salmon-color milk-cap; јелова рујница), *Lactarius sanguifluus* (blood lacteous mushroom; крвна млечница), *Lactarius semisanguifluus* (semi-blood lacteous mushroom; јелина рујница, полукрвна рујница), *Marasmius oreades* (scotch bonnet, fairy ring mushroom**,** вилин клинчић, listed as „супача"), *Tuber magnatum* (White truffle, бели тартуф), *Tuber aestivum* (Summer truffle, Burgundy truffle, летњи тартуф).

Nature conservation law. Official Gazette of the Republic of Serbia 36/09, May 12 2009, and 88/10 (Закон о заштити природе. Службени гласник Републике Србије 36, 12.05.2009. и 88/2010) and Regulation on proclamation of putting the use and trade of wildlife under control. Official Gazette of the Republic of Serbia 31/05, 45/05, 22/07, 38/08, 9/10 (Уредба о стављању под контролу коришћења и промета дивље флоре и фауне. Службени гласник Републике Србије 31/2005, 45/2005-испр., 22/2007, 38/2008, 9/2010.). On the basis of the latest amendments to this Regulation (from 2010), the following species of mushrooms are now listed as protected (Table 1) or strictly protected mushrooms species (Table 2), or as protected lichens (Table 3), or strictly protected lichen species (Table 4).

Regulation on the declaration and protection of protected and strictly protected wild species of plants, animals and fungi. Official Gazette of the Republic of Serbia, 5/10, February 05 2010 (Правилник о проглашењу и заштити строго заштићених и заштићених дивљих врста биљака, животиња и гљива. Службени гласник Републике Србије 5, 05. 02. 2010.). By this regulation, the following species of fungi are protected (Table 5).

This review of existing laws and regulations provides insight into basic trends that appear to be determining the approach toward protection of fungi in Serbia. On one hand, the need to protect certain mushroom species was recognized relatively early in Serbia (in the late 1980s). At that time, the rapid growth of interest in edible wild mushrooms led to a significant increase in economic investment in the organized collection and trade of wild mushrooms. In fact, for some time, former Yugoslavia was the world's largest exporter of porcini mushrooms; a large portion of which were collected from Serbia. Therefore, a legitimate concern existed that uncontrolled collection

of mushrooms in large quantities might lead to population thinning and vulnerability.

However, another interest of the state administration was to put collecting wild mushrooms under state control, in order to collect funds from the wild mushroom trade. Although an expert draft proposal on the basic protection of wild mushrooms existed (that included, among other things, limitations on the allowable amount that an individual can collect daily, mushroom picker licensing, supervision of the amount of collected carpophores and other measures) that would have enabled monitoring of macrofungi populations and their effective protection, these measures were not included in the adopted legislations. They were eventually included in modified form, or without the tools that could enable control of their application. In fact, the main role of these adopted measures was first of all to ensure regular payment of taxes from the mushroom wholesale trade, and to provide more favorable conditions for mushroom wholesale to the companies from Serbia in a way that the maximum purchase price for collected mushrooms was administratively limited. Consequently, companies outside of Serbia were no longer able to offer a higher purchase price, and thus priority was given to wholesale. The lower purchase price was supposed to make picking wild mushrooms unprofitable, and thus fungi would be protected from over-exploitation. However, despite this early expressed concern for the protection of fungi, these precautionary protection measures turned out to be ineffective.

On the basis of Nature Conservation law from 1988 (Official Gazette SRS 29/88; Службени гласник СРС 29/88), certain species of fungi were for the first time placed under protection in 1991, as a "natural rarities that are threatened by exploitation and trade", according to the Decision on amending the decision on putting plant species under protection as natural rarities (1991) (Одлуком о стављању под заштиту) (Official Gazette SRS 49/91, Службени гласник СРС 49/91). In addition to a completely inadequate formulation of "natural rarities", comprising mushrooms species that were on a large scale collected for commercial purposes, this regulation also considers mushrooms as plant species. Furthermore, the taxonomic nomenclature of these mushroom species contains grave mistakes. The regulation foresees two measures for the protection of mentioned fungal species, includ-

Table 1. List of protected mushroom species according to the Regulation on putting the use and trade of wildlife under control (Official Gazette of the Republic of Serbia 31/05, 45/05, 22/07, 38/08, 9/10).

Latin name	Authors	English name*	Serbian name
Boletus aereus	*Bull. Fr.*	Black porcino	црни вргањ
B. reticulatus	*(Paulet) Fr.*	Reticulated porcino	распуцали вргањ
B. edulis	*Bull. Fr.*	King bolete, Penny bun, Porcino, Cep	летњи, прави вргањ
B. pinophilus	*Pilat & Dermerk*	Pine mushroom	боров вргањ
Cantharellus cibarius	*L. Fr.*	Chanterelle, Girolle	лисичарка
Craterellus cornucopioides	*Pers.*	Dark trumpet	мрка труба
Lactarius deliciosus	*(L.) S.F.Gray.*	Saffron milk cap, Red pine mushroom	рујница
L. deterrimus	*Groger*	False saffron milk-cap, Bitterer milchling	смрекина рујница
L. salmonicolor	*Heim & Lecl.*	Salmon-color milk-cap	јелова рујница
L. sanguiifluus	*(Paul.) Fr.*	Blood lacteous mushroom	крвна млечница
L. semisanguifluus	*Heim &Lecl.*	Semi-blood lacteous mushroom	полукрвна млечница
Marasmius oreades	*(Bolt. Fr.) Fr.*	Scotch bonnet, Fairy ring mushroom	супача, вилин клинчић
Tuber magnatum	*Pico*	White truffle	бели тартуф
T. aestivum	*Vittad.*	Summer truffle, Burgundy truffle	летњи тартуф

*English names added in the Table for this edition are missing in the original List in the text of the Regulation.

Table 2. List of strictly protected mushroom species according to the Regulation on the declaration and protection of protected and strictly protected wild species of plants, animals and fungi. Official Gazette of the Republic of Serbia, 5/10.

Latin name	Authors	English name*	Serbian name
Albatrellus ovinus	(Schaeff.) Kotl. & Pouzar	Sheep polypore	овчје виме
Amanita vittadinii	(Moretti) Sacc.	Vittadini's lepidella	куштрава пупавка
Battarrea phalloides	(Dicks.) Pers.	Scaley-stalked, Sandy stilt puffball	пешчана штуласта пухара
Boletus dupainii	Boud.	Dupain ticket, Dupain bolete	дипенов вргањ
B. impolitus	Fr.	Iodine bolete	жутоноги вргањ
B. regius	Krombh.	Regal bolete, Butter bolete	краљевски вргањ
B. rhodoxanthus	(Krombh.) Kallenb.	Red and yellow bolete	жутоцрвени вргањ
B. satanas	Lenz	Devil's bolete, Satan's mushroom	лудара
Catathelasma imperiale	(Fr.) Singer	Commander, Imperial cap	царица, голема печурка
Entoloma bloxamii	(Berk. & Broome) Sacc.	Bloxam's, Big blue pinkgill	љубичаста рудолиска
Fomitopsis rosea	(Alb. & Schwein.) P.Karst.	Rosy conk	ружичасти труд, копитарка
Geastrum fornicatum	(Huds.) Hook.	Acrobatic or arched earthstar	гнездаста звездача
Geastrum melanocephalum	(Czern.) V.J. Staněk	Blackhead earthstar	црноглава звездача
Geastrum schmidelii	Vittad.	Dwarf earthstar	патуљаста звездача
Hapalopilus croceus	(Pers.) Donk	Saffron bracket	шафранска копитарка
Hericium alpestre	Pers.	Alpine lion's mane mushroom	јелова брада
H. cirrhatum	(Pers.) Nikol.	Tiered tooth mushroom	школјкаста игличарка
H. coralloides	(Scop.) Pers.	Coral tooth mushroom	букова брада
H. erinaceus	(Bull.) Pers.	Bearded tooth mushroom	медвеђа глава,
Hygrocybe calyptriformis	(Berk. & Broome) Fayod	Pink- or Ballerina waxcap	ружичаста влажница
H. coccineocrenata	(P.D. Orton) M.M. Moser	Peat moss waxcap	љускава тресетница
H. punicea	(Fr.) P. Kumm.	Crimson- or Scarlet waxcap	велика влажница
Hygrophorus marzuolus	(Fr.) Bres.	March waxcap	мартовка
Leccinellum crocipodium	Bresinsky & Manfr. Binder	Saffron- Oak bolete	жутоноги дедица
Leucopaxillus giganteus	(Sowerby) Singer	Giant funnel	левкаста дебелоношка
Mutinus canninus	(Huds.) Fr.	Dog stinkhorn	пасји стршак
Myriostoma coliforme	(Dicks.) Corda	Pepperpot earthstar	бронзана звездача
Panaeolus semiovatus	(Sowerby) S. Lundell & Nannf.	Shiny- or Egghead mottlegill	јајаста гнојиштарка
Phallus hadriani	Vent.	Dune stinkhorn	пешчарски стршак
Phylloporus rhodoxanthus	(Schwein.) Bres.	Gilled bolete	листићава вргањка
Podoscypha multizonata	(Berk. & Broome) Pat.	Atomic shrimp, Zoned rossete	каранфилка
Polyporus umbellatus	(Pers.) Fr.	Umbrella polypore	јеленово уво, кишобранка
Psilocybe serbica	M.M. Moser & E. Horak	Serbian magic mushroom	српска балегарка
Pycnoporellus alboluteus	(Ellis & Everh.) Kotl. & Pouzar	White orange polypore	осињача
Rhodotus palmatus	(Bull.) Maire	Rosy veincap or Wrinkled peach	наборана брестовача
Sarcosphaera coronaria	(Jacq.) J. Schröt.	Pink crown, Violet star-cup	љубичаста тулипанка
Scutiger pes-caprae	(Pers.) Bondartsev & Singer	Foot goat polypore	маглен
Strobilomyces strobilaceus	(Scop.) Berk.	Old man of the woods	црна, куштрава вргањка

*English and Serbian names and authors, added in the Table for this edition, are missing in the original list in the Regulation text.

Table 3. List of protected lichen species according to the Regulation on the declaration and protection of protected and strictly protected wild species of plants, animals and fungi. Official Gazette of the Republic of Serbia, 5/10.

Latin name	Authors	English name*	Serbian name
Cetraria islandica	(L.) Ach., 1803	True Iceland lichen, Island cetraria lichen	прави исландски лишај
Evernia prunastri	(L.) Ach., 1810	Oakmoss lichen, Ring lichen	шљивин лишај, храстов лишај
Pseudevernia furfuracea	(L.) Zopf, 1903	Purper geweimos,Treemoss, Tree lichen	пурпурни лишај
Usnea spp. (Excluded Strictly protected *Usnea* species)	Dill. ex Adans., 1763	Old Man's Beard, Beard lichen	дедина брада

*English and Serbian names and authors, added in the Table for this edition, are missing in the original List in the text of Law Regulation.

Table 4. List of strictly protected lichen species according to the Regulation on the declaration and protection of protected and strictly protected wild species of plants, animals and fungi. Official Gazette of the Republic of Serbia, 5/10.

Latin name	Authors	English name*	Serbian name
Alectoria sarmentosa	(Ach.) Ach. , 1810	Witch's hair	вештичја коса
Anaptychia crinalis	(Schleich.) Vězda, 1977	Fringed eyed centipede lichen	ресасти лишај
Cetrelia cetrarioides	(Duby) W.L.Culb. & C.F.Culb.	Giant shield lichen	штитасти лишај
Collema fragrans	(Sm.) Ach. , 1814	Clustered mini-jelly lichen	згрудвани мали пихтијасти лишај
C. nigrescens	(Hudson) DC.	Blistered jelly lichen	мехурасти црни пихтијасти лишај
Evernia divaricata	(L.) Ach., 1810	Ring lichen	прстенасти лишај
Fuscopannaria saubinetii syn. *Vahliella saubinetii*	(Mont.) P.M. Jørg., 2008	Pink-eyed shingle lichen	црeполики ружичасти лишај
Graphis elegans	(Borrer ex Sm.) Ach., 1814	Elegant script lichen	исписани лишај
Heterodermia speciosa	(Wulfen) Trevis., 1868	Powdered shield fringe lichen, Powdered centipede lichen	ресасто-штитасти стоноги лишај
Hypogymnia vittata	(Ach.) Parrique	Vitt tube lichen	увијено-тракасти лишај
Lempholemma polyanthes	(Bernh.) Malme, 1924	Bubbly skin lichen	мехурасто-кожасти лишај
Leprocaulon microscopicum	(Vill.) Gams ex D. Hawksw.	Mealy lichen	брашњави лишај
Leptogium hildenbrandii syn. *L. papillosum*	(Garov.) Nyl. 1856 (de Lesd.) C.W.Dodge, 1933	Hildenbrand's skin lichen	хилденбрандов кожасти лишај
L. saturninum	(Dicks.) Nyl., 1856	Saturn skin lichen, Bearded jellyskin	длакави кожасти лишај
L. teretiusculum	(Wallr.) Arnold	Terete skin lichen	ресасто-кожасти лишај
Letharia vulpina	(L.) Hue, 1899	Wolf lichen, Timber wolf	вучји лишај
Lobaria amplissima	(Scop.) Forss., 1883	Lungwort, Lung moss	лишај плућњак велики
L. scrobiculata	(Scop.) DC., 1805	Textured lungwort, Textured lung lichen	лишај плућњак мрежасти

Table 4 (continued)

Latin name	Authors	English name*	Serbian name
Menegazzia terebrata	(Hoffm.) A. Massal., 1854	Treeflute, Honeycombed lichen	чешљолики лишај
Moelleropsis nebulosa	(Hoffm.) Gyeln., 1940	Blue-gray grainy crust lichen	облаколики зрнасти лишај
Nephroma bellum	(Sprengel) Tuck., 1841	Kidney lichen	бубреголики лишај
Normandina pulchella	(Borrer) Nyl.	Clam lichen	шкољкасти лишај
Pannaria rubiginosa	(Ach.) Bory, 1828	Brown-eyed shingle lichen, Matted lichen	смеђеоки плишани цреполики лишај
Parmotrema chinense	(Osbeck) Hale & Ahti, 1986	Powdered ruffle lichen, Chinese parmotrema lichen	таласасти кинески прашкасти лишај
Peltigera collina	(Ach.) Schrader, 1801	Tree pelt, Felt lichen	филцани кожасти лишај
P. malacea	(Ach.) Funck, 1827	Veinless pelt, Felt lichen	глатки филцани лишај
Physcia biziana	(A. Massal.) Zahlbr., 1901	Frosted rosette lichen, Rosette lichen	розетасти смрзнути лишај
P. leptalea	(Ach.) DC.	Fringed rosette lichen	розетасти ресасти лишај
P. tribacia	(Ach.) Nyl., 1874	Edge-granulated rosette lichen	розетасти рубно-зрнасти лишај
Sclerophora peronella	(Ach.) Tibell	Pin-like lichen	чиодасти лишај
Solorina spongiosa	(Ach.) Anzi, 1862	Fringed chocolate chip lichen	Сунђерасто-иверасти лишај
Sphaerophorus globosus	(Huds.) Vain., 1903	Coral lichen, Globe ball lichen	Коралолики вршно-кугласти лишај
Thelotrema lepadinum	(Ach.) Ach., 1803	Bark barnacles, Barnacle lichen	богињави, пиштолики лишај
Trapeliopsis wallrothii	(Flörke in Spreng.) Hertel & Gotth.Schneider, 1979	Scaly mottled-disk lichen, Wallroth's trapeliopsis lichen	Громуљичави Валротов лишај
Tuckneraria laureri	(Kremp.) Randlane & A.Thell, 1994	Laurer's edged lichen	Лауреров иљем оперважени лишај
Usnea longissima	Ach., 1810	Methuselah's beard lichen, Beard lichen	метузалемова дугачка брада
U. scabrata	Nyl., 1873	Straw beard lichen, Beard lichen	сламната дедина брада

*English and Serbian names and authors, added in the Table for this edition, are missing in the original List in the text of Law Regulation.

ing a ban on collecting young and underdeveloped sporocarps, and prohibition of harvesting more than 90% of the "total number" at a picking site. In addition, this regulation stipulated that mushroom collecting should not be performed at waste dump sites and near traffic junctions, in order to protect users of the collected mushrooms.

Measures for the control of mushroom collecting should include the approval issued by the national Institute for Environmental Protection (Завод за заштиту природе), conditioned by payment of the appropriate tax and the obligation to submit data on purchased quantities supplied by the mushroom purchaser (legal or natural person) to the same Institute. Optionally, with respect to the fungi that are listed as natural rarities, by Article 4 of the same Decision it was envisaged that "a program of protection and development will be adopted which will establish conditions for complete information and popularization of the protected natural rarities." It was not envisaged

Table 5. List of mushroom species protected according to the Regulation on the declaration and protection of protected and strictly protected wild species of plants, animals and fungi. Official Gazette of the Republic of Serbia, 5/10.

Latin name	Authors	English name*	Serbian name
Amanita caesarea	(Scop.) Pers.	Caesar's mushroom	кнегиња, благва
Boletus aereus	Bull.	Black porcino	црни вргањ
B. edulis	Bull.	King bolete, Penny bun, Porcino, Cep	вргањ, јесењи вргањ
B. pinophilus	Pilát & Dermek	Pine mushroom	боров вргањ
B. reticulatus	Schaeff.	Summer or Reticulated cep	мрежасти, пролећни вргањ
Cantharellus amethysteus	(Quél.) Sacc.	Amethyst chanterelle	аметистна лисичарка
C. cibarius	Fr.	Chanterelle, Girolle	лисичарка
C. cinereus	(Pers.) Fr.	Gray or Ashy chantarelle	сива лисичарка
C. friesii	Welw. & Curr.	Orange or Velvet chanterelle	ситна лисичарка
Craterellus cornucopioides	(L.) Pers.	Dark trumpet	мрка труба
Hydnum repandum	L.	Hedgehog mushroom	жута јежевка
Hygrophorus russula	(Schaeff.) Kauffman	Pinkmottle woodwax, Russula-like waxcap	црвена пужевка
Lactarius deliciosus	(L.) Gray	Saffron milk cap, Red pine mushroom	рујница
L. deterrimus	Gröger	False saffron milk-cap, Bitterer milchling	смрекина рујница
L. salmonicolor	R. Heim & Leclair	Salmon-color milk-cap	јелина млечница
L. sanguifluus	(Paulet) Fr.	Blood lacteous mushroom	крвна млечница
L. semisanguifluus	R. Heim & Leclair	Semi-blood lacteous mushroom	полукрвна млечница
Marasmius oreades	(Bolton) Fr.	Scotch bonnet, Fairy ring mushroom	супача, вилин клинчић
Morchella elata	Fr.	Black morel	високи смрчак
M. esculenta	(L.) Pers.	True, Yellow, Sponge morel	округли смрчак
M. vulgaris (syn. *M. conica* Pers.)	Pers.	Common morel mushroom	купасти смрчак
Russula cyanoxantha	(Schaeff.) Fr.	Charcoal burner	модрозелена красница
R. virescens	(Schaeff.) Fr.	Green-cracking or quilted green Russula	голубача
Tuber aestivum	Vittad.	Summer truffle, Burgundy truffle	летњи тартуф
T. macrosporum	Vittad.	Garlic truffle, Black truffle	јесењи црни тартуф
T. magnatum	Pico	White truffle	бели тартуф

*English and Serbian names and authors, added in the Table for this edition, are missing in the original List in the Regulation text.

how to implement the control of these two proposed measures for fungal protection, and expert proposals that involved additional measures of protection were included in the text of this regulation. However, even this flawed document was useful in terms of raising general awareness that mushrooms have importance, value and place in the living world, and that we cannot use them as an inexhaustible natural resource without restrictions.

After the Nature conservation law of 1988, the Serbian Government adopted the Environmental protection law of 1991. This Act then took over the protection of endangered species that were still designated as "natural rarities", which was an inadequate definition subjected to sharp criticism by environmentalist experts on endangered species. Based on this Law from 1991, The Regulation on the protection of natural rarities (Уредба о заштити природних реткости) was adopted in 1993 (Official Gazette 50/93) (Службени гласник СРС 50/93), but, unfortunately, endangered species of fungi were not included, and their protection was omitted; although at that time data already existed on endangered fungal species in Serbia (Ivančević 1993).

Regrettably, mushrooms were at the time still perceived by the public as a less important part of the plant kingdom, and their unique and important role in nature was not understood. Based on the Environ-

Table 6. Quantities of mushrooms collected in the Republic of Serbia between 1993-1997.

		The quantities of mushrooms purchased (in kg)					
Year		*Boletus edulis*	*Cantharellus cibarius*	*Craterellus cornucopioides*	*Morchella* spp.	*Lactarius* spp.	*Amanita caesarea*
	Requested	9 769 200	5 778 300	?	963 570	115 000	0
1993	Allowed	5 186 100	2 605 500	?	36 610	63 000	0
	Requested	15 688 600	6 545 700	167 500	127 900	82 000	17 000
1994	Allowed	1 212 981	631 004	18 800	1 800	40 000	0
	A priori	4 500 000	2 000 000	?	?	60 000	0
1995	Issued aproval for	3 792 036	1 502 027	119 200	2 520	0	0
	A priori	5 000 000	3 000 000	100 000	15 000	100 000	100 000
1996	Issued aproval for	3 948 682	1 192 950	65 550	1 130	60000	5 000
1997	A priori	5 000 000	1 500 000	100 000	2 000	300 000	5 000

Legend: In 1993. and 1994, buyers applied for a planed amount of mushrooms ("Requested") under which they were allowed to buy up a certain amount from individual collectors ("Allowed"). The allowed amounts were determined based on assessments after all submitted applications were considered. Since 1995, a competition was opened for the maximum, in advance, at the very beginning of that year, and determined a certain amount of mushrooms that could be collected that year ("A priori"). The total amount that buyers really demanded was tallied at the end of the year ("Issued approval for"). Buyers paid for a purchasing license whether or not they collected the required amount of fungi. ? = Missing data.

mental protection law (1991), only a Directive on control of the use and trade of wild flora and fauna was adopted (Наредба о контроли коришћења и промета дивљих биљних и животињских врста) (Official Gazette 50/93) (Службени гласник 50/93), which included commercial species and largely reiterated the provisions of the previous Decisions on the control of trade from 1991, so that instead of the phrase "collection of a maximum of 90% of the fruiting body of existing specimens is allowed", the new regulation states that "10% of existing fruiting bodies are not allowed to be collected". The only novelty is the provision in Article 7, that collection cannot be done in the same area every year and that there must be a period of at least one year in which collection is not done. However, implementation of this provision was not mandatory if it was estimated that there was no need for such a measure. Unfortunately, there were no criteria and instruments included for objective assessment. The list of species was somewhat extended due to an interest in enabling commercial collecting of species not covered by the previous Decision. In addition, some of the errors in the nomenclature of these species were fixed, although some still existed; indicating a lack of cooperation of legislators and expert mycologists.

A new Directive on the control of wildlife use and trade (Наредба о контроли промета дивљих врста) in 1996 (Official Gazette 16/96) (Службени гласник 16/96) brought nothing new, and only repeated earlier paragraphs. The term "individual mushroom" ("јединке гљива") was incorrectly replaced in several places by the phrase "the same mushrooms", ("исте гљиве") such that Article 5 becomes confusing and meaningless. The Directive about leaving a number of fruit-bodies in nature does not specify how much should be left.

At that time, the largest gap existed between inadequate legal protection and the enormous pressure on nature and mushroom habitats, which had become seriously endangered due to mass collections of commercial species. Because of this, a number of negative direct and/or indirect effects appeared, such as the permanent removal of mushroom sporulating (fruiting) bodies from certain areas, soil compacting, intentional destruction of all other mushroom species, and littering and pollution of fungal environments (Ivančević 1998b). Moreover, the trade control regulations only took into account fresh mushrooms, while dried and processed mushrooms avoided control and were exported to Western markets in large quantities. In fact, young immature specimens of bolete mushrooms, whose collection was formally forbidden, were exported in brine. Table 6 shows some quantities of species that were traded in that period, based on data

obtained from the Ministry for the environment.

Due to the alarming situation related to the protection of fungi in Serbia (which was similar to that in some other countries of Southeast Europe) the European Council for the Conservation of the Fungi expressed its concern at their 1997 meeting in Vipiten, Italy. Based on this, an international ECCF scientific symposium was scheduled for September 22-27, 1998 at Tara Mountain, with the participation of experts from Serbia. Unfortunately, this meeting was canceled and never held. After the end of 1999 war and the turbulent social upheaval that followed, the ECCF offered official advisory support to the Government of Republic of Serbia in 2001, through the Directorate for Environmental Protection of the then Ministry of Health and the Environment, but this offer was not accepted (Bohlin 2006, 2007).

In the meantime, many signals pointed to a worsening situation for threatened mushroom species. Thus, by late 1998, Serbia started work on new documents that were supposed to provide adequate protection for both commercial mushroom species and other species of endangered fungi. It was planned that some relatively rare edible species would be listed as endangered, but would still be allowed for commercial collection, subject to prior estimates and evaluation. A directive on control of the use and trade of wild species was issued in April 1999 (Official Gazette 17/99) (Službeni glasnik 17/99). In this document, fungi were for the first time listed separately from plants, and species of lichens were mentioned. In addition, the nomenclature of species' names was corrected. Finally, some provisions on how to protect endangered species were listed (e.g. a better way to pick mushrooms, and how to keep accurate records on the amounts of mushrooms collected). Unfortunately, this directive was not written in the form proposed by the expert mycologist consultants. Thus, for example, Article 8 prescribed a rule that "…fruiting bodies should be collected in a container that allows ventilation for dissemination of the spores." Proper packaging conserves the quality of the harvested mushrooms, and dissemination of spores during transport is a phenomenon that, in our opinion, does not affect the protection of mushrooms (spore dissemination is possible since many fruitbodies are capable for subsequent sporulation after picking). Packaging that allows for dissemination of spores was referred to in the first version of Slovenian regulations on protection of wild mushrooms from 1994 (Official Journal RS, 38/94) (Uradni list RS 38/94), but was excluded from the text of the next version in 1998 (Official Journal of RS 57/98) (Uradni list RS 57/98).

Because of a lack of understanding of foreign experiences on the part of the lawgivers, this provision was copied from the regulations of countries in the region that were published at that time (Pirman 1994). However, the form of approved quantities of wild mushrooms allowed to be collected was specified for the first time, *i.e.* whether they were fresh or dried mushrooms (weight ratio 10:1). In addition, reports on the amounts collected were for the first time required to indicate the site where the mushrooms were picked, and to keep track of quantities of protected species collected, for monitoring purposes. Thus, this regulation finally brought some positive changes, though not all that were needed. (Earlier, the purchaser had had to provide general information on the amounts collected and sold). Picking more than 66% (two thirds) of protected "individuals" (fruiting bodies) in the collection area was prohibited. Members of the genus *Morchella* (morels) were no longer among the protected species, since they were intended to be covered by other regulations on endangered species, but the war and subsequent social changes delayed adoption of such regulations for a decade.

A new Law on environmental protection was adopted in 2004, and on the basis of this Law a new Regulation on control of the trade of wild fauna and flora was passed 2005 (Official Gazette 31/05¸ Службени гласник 31/05). Positive innovations in this regulation are provisions on procedures for collecting hypogeic species of mushrooms, as well as inclusion of two species of genus *Tuber* to the list of protected mushrooms. This Regulation applied to this day, without significant alterations. However, the (in our opinion) unnecessary regulation on packaging, which requires ventilation to enable spore dissemination, still exists in the text, indicating the difficulties faced by mycologists and other experts trying to influence lawmakers.

A new actual Nature conservation law (the first since 1988) was adopted in 2009. (Official Gazette 36/09) (Службени гласник 36/09), which introduced

many new solutions, as a consequence of the desire to be harmonized with EU regulations. Article 59 states which parts of this Law (which is currently inactive) will be applied upon accession of the Republic of Serbia to the European Union. Mushrooms are listed as a group of organisms which are separate from plants and animals, and on par with them. In Article 27, the protected species are listed as protected natural goods, which may have the status of 'protected' or 'strictly protected' species. Measures for strict protection of protected species of fungi finally allow inclusion of rare and endangered species of mushrooms, in addition to commercial species.

Moreover, a large number of Articles of the Law concern the protection of fungal species' habitats, providing the necessary protection of these species. This allows the prescription of new, more effective conservation measures. In accordance with this Law, the Regulation on the proclamation and protection of strictly protected and protected species of plants, animals and fungi was adopted (Official Gazette 05/10) (Службени гласник 05/10). This list contains 38 strictly protected species of mushrooms, and 26 protected fungal species. However, preparation of the lists of protected species was not based on the Red List, or other well-documented studies (which would be in accordance with the Law itself) but instead were defined in a very short time, causing later problems and drawing criticism from experts for specific groups of organisms. The Nature conservation law (2009) provided for the protection and preservation of nature, previously governed by the still valid and applicable Environmental protection law (2004) regarding to wild mushrooms, contain certain parallelisms and inconsistencies. Regulation on the Control of Trade has the "senior" position and originates from an earlier period than the Regulation on protected species (2010), and Articles from these regulations do not refer one document to the other.

The Environmental protection law (2004), which was used for preparing the Regulation on putting the use and trade of wildlife under control (2005) does not recognize the new Nature conservation law (2009), since it was accepted much earlier. The Nature conservation law (2009) does not include ordinances from the Regulation on putting the use and trade of wildlife under control (2005), which was prepared according to the older Environmental protection law (2004), so one subset of species protection is regulated according to the old Environmental protection law (2004) and another by the new Nature conservation law (2009). In this way, both laws are broken by the same activity, while the supervising inspection services do not have any evidence. The nomenclature of scientific names in these two laws is different, as well as some of the vernacular names used for the same species in the simultaneously applicable regulations prepared according to these different laws.

In addition to domestic legislation, there are obligations originating from international conventions signed by Serbia that have obligatory character. Regulations of the Bern convention, which protects the flora, fauna and habitat of species in Europe, came into force in Serbia in mid 2008. Mushrooms have not yet been officially included into the lists of species covered by the Bern convention, primarily for administrative and political reasons, and their protection under the provisions of the Bern convention is not mandatory in Serbia. The list of species of fungi that have been proposed for inclusion in the Bern convention is now in the form of an official proposal confirmed by the Standing Committee of the Bern convention. On this basis, the Council of Europe adopted a Recommendation on the conservation of wild mushrooms in Europe that would be desirable to implement by countries that have signed a contract (Recommendation 132; 2007).

By this Recommendation, the countries are invited in different areas of their activity to define the management and maintenance of habitats as a priority, with the aim of protecting European species of mushrooms: to take into account the Directive of the European Council to protect European macromycetes, to apply the same directives when developing and implementing their national policies to protect macromycetes, and to include those who have a surplus of mushrooms when protecting mushroom habitats. In this way, a powerful tool for the correction of national legislation was obtained relating to the protection of mushrooms. Unfortunately, the public, experts and competent authorities and institutions are poorly acquainted with the Recommendations that apply to the Republic of Serbia. In the first half of 2011, the Council of Europe demanded a national report on the imple-

mentation of this recommendation, and this was the first opportunity to discuss the contribution of and the possibilities of acting in accordance with the Recommendations in Serbia.

Unfortunately, although a project for making a revised version of the Red List for fungi was proposed to the state authorities in 2007, including a detailed evaluation of vulnerability factors (Ivančević et al. 2007), its implementation has not been approved to date. However, Article 36 of the Nature conservation law (2009) provides that: "species that are or may become endangered shall be protected as strictly protected wildlife, or protected wildlife. The species protected under this law shall be determined on the basis of national and international Red Lists or Red Books, professional findings and scientific knowledge." Moreover, the same Article provides that the Red Book or Red List may be adopted by the Ministry of Environmental protection. Consistent application of these legal provisions, once they are enforced, should provide a scientific basis for protection measures, and help align Serbian legislation with the legislation of other countries that have had more developments in this field.

The first regulations dealing with the protection of fungi in Serbia were adopted in 1991, and were related to several edible species that are collected for commercial purposes. The aim of these adopted measures was protection of mushrooms against excessive collection; however, in practice, these regulations served to secure revenue for the state from the wild mushroom trade. Subsequently, during the last twenty years, new regulations were adopted several times, but only with minor changes, while the basic purpose remained the same, and provisions that would ensure protection based on the advanced experience of other countries, and on scientific data, were not incorporated in this new legislation. Furthermore, the initial positive effect of such regulations, which raised public awareness of the threat to wild mushrooms, was lost over the years, and even became a negative factor, based on the general opinion that when something is paid for (e.g. taxes for collecting wild mushrooms) then it may be fully disposed of without much regard. Thus, the effect of the prescribed measures on wild mushroom protection was not significant, and did not prevent the removal of huge amounts of fruiting bodies from nature in certain territories, accompanied with habitat disturbance and a number of harmful side effects.

The first major changes occurred with the adoption of the Law on nature protection in 2009, which finally placed rare and endangered species of fungi and their habitats under protection, in addition to commercial species. Due to the provisions of this Law, the first study was drafted with the aim of protecting an area specifically because it was a habitat for strictly protected species of wild mushrooms. The proposed protected area, located on Ada Ciganlija near Belgrade, had a size of 21 ha. At the time of submission of this paper to print, the procedure for official declaration of protection was in the final stages. Only a formal final decision on the declaration was missing, which would make the Republic of Serbia one of the first countries in Europe to protect a fungal habitat, in accordance with the recommendations of the Bern convention. Therefore, the application of these legal provisions is expected to bring developments to the adequate protection of fungi in the Republic of Serbia, and to have a positive effect on populations of endangered fungal species.

When the actual Nature conservation law (2009) and bylaws were adopted, the existing errors and omissions were not removed, and the legal provisions concerning the election and proclamation of protected species were not fully observed. Therefore, it is necessary to address this problem in the future. Other regulations should also be amended, especially the Law on environmental protection, and other regulations dealing with the protection of fungi. Moreover, these regulations must be brought in line with one another. Although this process took unnecessarily long, legislation concerning wild mushroom protection in Serbia has now evolved to a stage where acceptable and more effective modes of protection are being prescribed; however, changes that would enable Serbia to attain an optimum state of affairs have yet to be undertaken.

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