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Conservation diversity of vascular plants and their communities *in situ*, applying the conception of ecosystem pool

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The paper discusses plant diversity *in situ* research in the global and regional context; attention is focused on the biogeographical regions of Europe. Original theoretical conceptions and terms of biological diversity presented by CIS countries' scientists in Russian are discussed in detail. The following issues are analyzed: biochorological basic units of plant diversity, evaluation of species conservation status, reasons for endemic species extinction, protected areas that belong to different territory level models and networks. The paper also discusses the ecosystem pool conception, which summarizes the anthropogenic impact on biological diversity. According to this conception, ecosystems that appear in the anthropogenic evolution are rather an essential part of the ecosystems' pool, the research object that is worth conservation.

Key words: plant diversity, biochorologic basic unit, endemic species, protected territories, ecosystem pool conception

INTRODUCTION

More than one decade has passed after the International Convention of Biological Diversity (CDB) was initiated. Thus, it is possible to evaluate the progress of conservation biology in plant diversity research. The aim of biological diversity research programs is to answer the following question: What are the ways to stop the loss of biological diversity until 2010? The paper presents a research of biological diversity with respect to the global and regional context, attention being focused on the biogeographical regions of Europe. Starting with the last decade of the twentieth century, research of plant diversity in East and Central Europe was being developed from a changed reference point, as the other social and economical factors started influencing the ecosystems. Only a slight change was done in the Commonwealth of Independent States (CIS) or it resulted in ecosystems' destruction, thus, the differences, that had appeared between CIS and East and Central Europe increased (Щербаков, 2004). Due to the difference of languages, works published in CIS countries are hardly accessible to EU scientists to allow developing the general data on European threatened plant species (Richard et al., 2004) as well fundamental works on geobotanics and ecosystems published in Russian. In Lithuania, research in plant diversity conservation has been started in the fifties of the twentieth century (Балявичене, 1991), although science policy was not favorable. After Lithuania joined CBD, plant diversity and landscape conservation became the priorities in research of natural sciences (Rašomavičius, 2001; Eringis, Pakalnis, 2005).

The aim of the paper is to summarize relevant studies of vascular plants' diversity conservation *in situ*, applying an ecosystemic approach – ecosystem pool conception, their practical importance for plant diversity conservation, sustainable use of ecosystems, and approval of selection criteria of protected areas.

MATERIALS AND METHODS

The paper includes the newest data on plant diversity conservation, published and reported at international conferences. Attention is focused on Pan–Europe through a territory description presented in *Flora Europaea* (Richard et al., 2004) and its regions including all East Europe and some CIS countries. The paper includes analysis of data of conservation biology, directly related with the first two objectives of Global Strategy for Plant Conservation (GSPC) (CBD Secretariat, 2002): 1. Understanding and Documenting Plant Diversity (includes 1–3 targets), 2. Conserving Plant Diversity (4–5). The other three objectives are not presented in detail. Data and material collected by the author during scientific expeditions in Lithuanian protected territories in 1981–2005 are also used in the paper.

RESULTS AND DISCUSSION

The main aims of CDB are as follows: conservation of biological diversity, sustainable use of its components, fair and equality-based distribution of benefit received from genetic resources (Zedan, 2004). During the last decade, programs of sustainable use of biological diversity were developed, management plans for all most important biomes were established, cooperation strategy with other conventions was developed. Global Strategy for Plant Conservation (decision VI/9) was approved at the CBD conference in Hague, 2002. In the majority of the countries of the world, botanical gardens are the most important institutions responsible for GSPC implementation (Wyse Jackson, Sutherland, 2000; Zedan, 2004). All activity programs related to CBD include conservation biology research, which is being performed together with social economic research: in search of a sustainable use of biological diversity and developing the management plans of protected territories. In West Europe, the International Plant Exchange Network (IPEN) system has been established, which defends the rights of origination countries to plant diversity and regulates the benefit received from sharing plant resources (Feit et al., 2005). CIS scientists, like earlier, continue studies on Eurasia extreme biomes such as the Bering sector of the Arctic tundra or West Siberia wetland systems (Юрцев, 1993; Лисс et al., 2001).

Understanding and Documenting Plant Diversity

Biological diversity may be described as a totality of life objects. It may be analyzed as a coexistence of different life objects within taxa and in a territory. We will consider various life organization and ecological system levels when analyzing biological diversity. Organism diversity is divided into taxonomic and typological diversity according to various criteria based on quality. Typological diversity is assessed according to structural, functional, geographical, synecologic and many other criteria, such as life forms and strategies, coenotypes, community succession status. The basic taxonomic diversity level is the level of species. Lower levels (population, together with different rank population sublevels, subspecies) are the most massive; genotypes (phenotypes), genes and their alleles level. A taxor, a higher level than a species, includes an hierarchy from the genus to the organism kingdom groups. This level shows the diversity of phyla. Paraphylletic and syngenesis conceptions complicate the interpretation of the type (Юрцев, 1992). What is the relation between biological diversity and taxonomical diversity (biotas or taxonomic organism groups of one territory)? The scientific names of taxa are only a conceptual scheme. Big taxonomic groups may also be provided by versatile characteristics regarding complexes of typological features.

Biochorologic diversity is a diversity of organism combinations of various territorial subdivision of the biosphere. In an even microclimate, in the limits of a distinct landscape habitat, diversity "plays out" and a constancy of succession processes is maintained. It results in the communities' and their composition stability all elementary flora stability. Two lowest basic levels of biochorologic diversity may be distinguished: 1) group level (the same rank objects of parallel sciences – ecotype, facies); 2) the level of elementary regional flora (biota) (respective – landscape flora/biota); Then much bigger divisions are distinguished, herein, elementary floral regions and botanical geographical regions can be mentioned.

Some of the conceptions were reconsidered during plant diversity consistent pattern research. Flora is the biota of any biosphere natural subdivision, consisting of a regular species combination and competitive populations existing in the frame of habitats' mosaic (Юрцев, 1992). Competitiveness among population individuals is realized in elementary vegetation cover systems – coenotic clusters. Species composing each native flora (biota), in respect to its composition and interrelation quantities, indicate the totality of ecological regimes of the territory (depending on the territory evolution history), initiate all trophic chains and strongly influence the nearby layers of the lithosphere and atmosphere, forming the ecosystem of a respective territorial level. Such large ecosystems, the functional cores of which are biota subdivisions (communities *sensu lato*) may evolve because of co-evolution of biotic system populations.

The only way for any phylum conservation is to preserve its all component species. Ecological niches of one and the same landscape in contrasting habitats usually are occupied by the same, but ecotypically differentiated species and/or different, even unrelated, species (functional change phenomenon). In poor biota (extreme habitats or ecological situations) the first modus prevails. Extinction of some of the species is historically unavoidable even without human interference. Here a bioethical question may be stated: is it worth trying to preserve the archaic types that are condemned by biota development logic? (Purvis et al., 2000).

The IUCN developed a set of criteria for conservation status of species evaluation and recognized at the international level (Hilton–Taylor, 2000). It is not so simple to assess the risk level of the majority of endemic species. It may be proved by the Conservatoire Botanique National de Brest (CBN) research, the objective of which was to evaluate the actual situation of 650 taxa spread in Europe and belonging to IUCN global categories Extinct (EX), Extinct in the Wild (EW), Critical Rare (CR) (Richard et al., 2004). Almost all of these species are European endemic. It was assessed that 83 species of 650 do not exist in wild habitats any more. The biggest number of threatened species is in the following Pan-European regions: the Balkan peninsula 24%, the Iberian peninsula 22%, Macaronesia Islands 22%, the Italian peninsula 12%. Only one fifth of the species investigated prevail in the remaining part of Europe. Is plant diversity of these regions of the low value because of the low endemic level?

The most significant reason for extinction (90% of all cases) is destruction of habitats, caused by: 1) agricultural activity (43%); 2) development of infrastructure (34%); 3) other causes (9%).

The Bern Convention list (Annex I) includes only 159 species of plant endemics, which are close to the extinction group (24.5% of 650). There are 629 close to extinction taxa in Bern Convention countries, versus 21 taxa found in the countries that do not belong to the Bern Convention. Thus, Bern Convention countries preserve 25.3% of species close to extinction. The directive of EU Habitats (Annex II and IV) protects only 24.5% of plant species close to extinction.

The following question: Are species the main conservation objects? As the representatives of unrelated phyla – plants, animals, microorganisms – are complementary interacting, form communities and biota – the nucleus of ecological systems' biota, the Red Books have only a control value. The richer the biota, the less part of it has a chance to be included into the Red Book.

The plant diversity conservation shall be justified by the conservation principles of biochorological units, i.e. the biota of communities, landscapes and even bigger biospheric subdivisions. Theoretically, small communities (especially relict ones), which occupy unique habitats, belong to a group of risk, therefore, they shall be protected in more stable structures – facies, particular parts of landscapes, landscape contours (Юрцев, 1994). The biota of such landscape units is more stable, as the ecological topologic structure of local populations may change, especially under distinct climatic fluctuations or anthropogenic impact.

Conserving Plant Diversity

Starting with the evaluation of territories having a global importance to plant diversity, we will discuss the theoretical improvement models of protected territories belonging to different territorial levels. There are no network of protected territories on the global scale (Chape et al., 2003). Globally, important biological diversity territories are called hot spot territories (Mittermeier et al., 2004). The number of these areas has been increased from 25 to 34 by the Conservation International proposal. Very important criteria of a territory refer to hot spot ecosystems in respect to theoretical aspects: 1) a hot spot has at least 1500 endemic vascular plant species; 2) at least 70% of original vegetation is destroyed. Hot spot ecosystem territories are distinguished by a high plant diversity. The new territories include: the Madrean Pine–Oak Woodlands (East Mexico and Southwest USA); the Maputaland–Pondoland–Albany region in South Africa, Mountains of Middle Asia, Japan and others. One half of all plant species in the planet grow in hot spots, but the not yet destroyed vegetation of these territories occupies only 2.3% of the Earth.

The Natura 2000 network is established in order to preserve endangered species of plants, animals as well as their habitats all over Europe (Evans, 2006). When the EU finally approves the list of Sites of Community Importance, countries shall legalize territories as Special Areas of Conservation (Raudonikis, 2004). Lists of community importance territories are developed for different biogeographic regions. The first list was approved by the EU in 2001 (Macaronesia), followed in 2003 by the Alpine region, in 2004 by the Atlantic and Continental region and, in the end of 2005 by the Boreal region. The next list is being developed for the Mediterranean region. Biogeographic regions are based on potential flora maps and they are simplified for administration convenience. The Natura 2000 network includes two types of territories: 1) Special Protection Areas (SPA) – as per EU 1979 Wild Birds Directive; 2) Special Areas of Conservation (SAC) – EU 1992 Habitats Directive). After new members joining, it showed up a strict tendency to give priorities to some new types of habitats, but not to include new species (endemic too) into the Annex II. The number of SAC, which are suggested to be established, shall guarantee Favorable Conservation Status (FCS) for each indicated habitat or species. However, FCS content is not final and clear. The Natura 2000 network establishment and territory selection criteria improvement impelled new research in the field of conservation biology (Mucher et al., 2005).

Habitats (Annex I), in respect to size and homogeneity, are very different, from discrete, minimal size to landscape units. About one third of habitats are semi–natural: grasslands and meadows, dehesas and other wooded meadows, dry heaths (Motiekaityte et al., 2004). Some of EU countries set the limits of protected territories considering scientific concerns and apply planned control for their protection due to neighborhood activities. The Network of Sites of Special Scientific Interest (SSSI) is validated in the UK. Now, the UK system of conservation territories includes 6761 SSSI type territories (total area 2 377 714 ha), 601 SAC (2 500 884 ha) and 242 SPA (1 470 364 ha) (JNCC et al., 2004).

The system of IPA development coincides with GSPC target 5. An IPA is a natural or semi-natural area with a distinctive botanical richness and/or having a distinctive set of rare, endangered and/or endemic species and/or vegetation of high botanical value. In contrast to the selection criteria of other protected territories, three plant diversity criteria are applied in IPA: threatened species (A); botanic richness (B); threatened habitats (C).

Criterion A: the territory has to include one or more species population of global or regional value; Criterion B: a territory must have a distinctively rich flora on regional basis and its biogeographic zone. Criterion C: a territory shall be a distinctive example of global and regional conservation and habitat or vegetation type of botanic importance. The IPA conception establishers underline the necessity to improve the lists of species and habitats valid in a particular region (GSPC target 1).

The purpose of IPA conception is to select the territories that would form the fund of territories "waiting for their turn" to be integrated into the system of national protected territories. IPA is not a legal designation. IPA (796 territories, 14 739 174 ha) was selected for the first time in 7 countries of Central and East Europe (Belarus, Czech, Estonia, Poland, Romania, Slovakia, Slovenia) (Anderson et al., 2005). In Central and East Europe, 21% of the IPA network is not yet included into legally protected territory systems. Specific risks for each IPA have been assessed. The main risk is the bad practice of forestry (it formed half of all cases). The most important reason is that there is no efficient forestry policy on the EU level, contrary to agriculture. The second risk is caused by tourism and recreation activity (affects 38% of IPA).

The first plant microreserves (PMR) were established in the Valencia region in 1994. It is a new model of conservation, which was adopted in Europe and other regions (Laguna et al., 2004). The objectives of PMR until 2006: to inventory all PMR in the Valencia region; target species (600 taxa, 350 endemic) and vegetation types (habitats of the first priority) long-term tendencies' monitoring; ecological restoration, reinforcement of populations, or establishment of new populations. PMR areas are legally limited to 20 ha because of two reasons. First, the PMR purpose is not the conservation (isolation) of territories, but their plant diversity inventory and monitoring. Second, the best populations of target species usually are distributed in territories larger than 20 ha. PMR may be identified for separate species, high botanic value zones. PMR are reserves protected by the law, and they ensure a strict protection of plants and substrata, where traditional activity is harmonized with plant conservation. PMR may be established in large protected territories in order to observe the target species. At present, 230 PMR are established; they occupy 1440 ha or 0.057% of the Valencia region. The smallest PMR occupies 140 sq.m. in (Alicante Coast Island).

Ecosystem approach of the biological diversity conservation

As the analysis of protected territory practice has indicated, the conservation of the plant diversity does not confine within the taxonomic and syntaxonomic diversity protection on the level of species and plant associations. The plant diversity conservation, even in very specialized PMR, requires the setting of ecosystem protection in large territories. According to B.A. Jurcev's developed biota (biochorological basic unit) conservation conceptions, one of the most promising theoretical conceptions also might be the conception of ecosystem pool, the presumptions of which were formulated by Злотин, Тишков (1988), Левченко, Старобогатов (1990). According to these authors, an ecosystem is a biochorological phenomenon and a system of obligatory mass–energetic and informational relations, the characteristic feature of which is invariance when different species or groups of species often execute the same function in an ecosystem. As a result, it is not always important for the stability of the ecosystem which will appropriate the part of the initial production or utilize the part of the annual necron. The extinct species never revive, but there is a possibility that elements will combine under the environmental control and the ecosystem state close to the lost one will be achieved.

The topological and typological diversity of ecosystems is the basis of biomes' space and time structure element diversity, that is why we introduce the topic of biological diversity into the conception of ecosystem pool. This will help to describe the extent of the degradation processes of plant diversity and biosphere ecosystem layer, their unification in large territories, the extinction of different types of ecosystems, disturbances of the restorative processes and allows ascertaining minimum areas necessary for the organization of ecosystem conservation and the creation of protected territory networks, capacitates to compare the information about the diversity of habitats, plants and animals.

For the further estimation of the biological diversity, we employ the following items: initial environmental heterogeneity, initial ecosystem diversity and initial biota diversity. In this case we speak about the state which is accepted as a reference point of the relevant state analysis. Usually, in retrospective constructions the reference point is the stage before the anthropogenic territory appropriation, i.e. a period when the distribution, structure, functioning and dynamics of ecosystems were affected only by natural factors. The initial situation we can call the condition until the beginning of a particular stage of the anthropogenic transformation. In the early territory appropriation stages, anthropogenic activity enriched the ecosystem's pool in essence, creating anthropogenic modifications. Later they either disappeared or joined the anthropogenic evolution of ecosystems (for instance, pyrogenetic ecosystems (Работнов, 1986)).

The initial abiotic environment diversity, its chemical and physical gradients form presumptions (Mucher et al., 2005) that in relatively small territories there would exist not a little but rather limited biological diversity (that of gene and ecosystem pool). The continuum of abiotic conditions and biota is revealed on the background of a dynamics limitation of ecosystems (limited number of biota formation and restoration ranks and series; the final number of most expected states in the late succession stages). In the development process of an ecosystem, the ecotones of different size and origin develop, which may be described as newly formed but not as a result of interaction in the limits of contrastive structures.

The regularities of ecosystem pool formation depend on the size of elementary space. To reveal one or another form of dynamics, a minimum area is necessary. The differentiation of the space, related to different abiotic environment factors in respect to prevalence, including the limiting factors, activity and pattern as a result of that activity are not the same. Which structures do we have to type in order to perceive the diversity of an ecosystem pool? Vinogradov (Виноградов, 1984) suggested a hierarchic system of the space units existing objectively, ecochores, where the level of ecosystems in the map scale is 1: 10 000 – 1: 30 000 (nanochore – monochore); in ecology it complies with an elementary ecosystem and in geography with a facies. The space heterogeneity of ecosystem level is characterized by the concept the actual pool of ecosystems.

The main array of the typological diversity of ecosystems is created in a regional succession system – in its ranks, series, community syngenetic and restoring process in different habitats. In early stages, a wide spectrum of shortly existing (but very important for the survival and development of the biota) communities develops (Motiekaityte, 2002). Up to 50–60% of a particular flora is focused in these communities. They are important for the entrenchment of non–native species, micro–evolutional processes and the increase of gene pool diversity.

Middle long–term secondary stages of successions form a numerous selection of transitional relatively steady states (meadows, mires, seral communities of forests). Moreover, they are the most prevalent and become a structural background for the formation of natural and anthropogenic subclimaxes. In 1958, the initial landscapes (never ploughed) occupied 15% of Lithuania's territory. Another 15% were constituted by self-restored landscapes involving secondary immature and mature forests and secondary mires. Currently, there are no records about the territories occupied by the above–mentioned landscapes. The development of farming activities is connected with the middle stages of succession; production of timber – as a result of which young and middle-age secondary forests are composed; the subsequence of grazing, haymaking are meadows and swamp meadows (Боч, Смагин, 1993); the sequel of hunting is shallow water and wetlands. Narrow composition biota (10–30% of local flora) forms states that are close to the climax. It is a paradox that the climax is steady but sensitive to anthropogenic impact and restores heavily if ecosystems' relations are disturbed.

Man stimulated the diversity expansion but did not select the best variants for practical purposes, because he usually chose not the most steady and easily restored stages (the first step to the creation of anthropogenic ecosystems) but very fecund and unsteady ecosystems which require much substance and energy to maintain. Only at present, after acceptance of the strategy of sustainable development, the slogan to apply the existing ecosystems to the utilitarian needs may be perceived afresh. We may hope that gene and ecosystem pools will be preserved and the humanity striving for the welfare will become more realistic. The first scientific experiments to justify the effectiveness of means for ecosystem change (plant diversity regulation) applying "high" ecological technologies were performed in Australia, the scientific center of Perth Botanic Gardens (Rokich, 2004).

CONCLUSIONS

1. The applied significance of the biological diversity conservation research is the preparation of a universally acceptable working list of known plant species, effective conservation of important territories for plants; the use of production land and plant conservation; the conservation of threatened species by combining *in situ* and *ex situ* methods.

2. The strategic aim of biological diversity conservation is the conservation of each population variety in a maximum possible number of phytochores, and within their limits in a maximum possible number of habitats. The objectives of the biological diversity conservation taking into consideration the global change of the climate: 1) the conservation of habitats including the unique (relict) ones; 2) the conservation of vital, capable to evolve populations preferably of all known species.

3. In the early stages of reclamation of territories, anthropogenic activity essentially enriched the pool of ecosystems, creating the anthropogenic modifications of ecosystems. In the development process of ecosystems, the ecotones of different size and origin develop, which may be described as derivatives but not as a result of an interaction in the limits of contrastive structures. Ecosystems that appear in the anthropogenic evolution are rather an essential part of the ecosystems' pool, a research object worth conservation.

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References

1. Anderson S., Kušik T., Radford E. (eds.). 2005. *Important Plant Areas in Central and Eastern Europe. Priority Sites for Plant Conservation.* U.K.: Plantlife International, P. 102
2. CBD Secretariat. 2002. *Global Strategy for Plant Conservation. Publication of Decision VI/9, Sixth meeting of the Conference of the Parties to the Convention on Biological Diversity.* Montreal: CBD Secretariat, 13 p.
3. Chape S., Blyth, S., Fish L., Fox P., and Spalding M. (compilers). 2003. *2003 United Nations List of Protected Areas.* Gland, Switzerland and Cambridge, UK: IUCN, and Cambridge, UK: UNEP World Conservation Monitoring Centre.
4. Eringis K., Pakalnis R. (sud.). 2005. *Kraštovaizdžio politikos ištakos.* Vilnius: Botanikos instituto leidykla, 192 p.
5. Evans D. 2005. *Natura 2000. Completing the EU s network of sites to conserve flora and fauna.* Plant Talk, N 39. P. 22–27.
6. Feit U., Driesch von den M., Lobin W. (eds.) 2005. *Access and Benefit–Sharing of Genetic Resources. Ways and means for facilitating biodiversity research and conservation while safeguarding ABC provisions. Report of an international workshop in Bonn, Germany held in 2005, 8–10 November.* Bonn: Federal Agency for Nature Conservation. P. 122.
7. Hilton-Taylor C. (compiler). 2000. *2000 IUCN Red List of Threatened Species.* Gland, Switzerland and Cambridge, UK: IUCN.
8. JNCC, Plantlife, Royal Botanic Gardens Kew. 2004. *Plant Diversity Challenge. The UK s response to the Global Strategy for Plant Conservation.* Peterborough: JNCC, Plantlife, Royal Botanic Gardens Kew, P. 53.
9. Laguna E., Deltoro V., Perez-Botella V., Serra L., Olivares A., Fabregat C. 2004. The role of small reserves in plant conservation in aregion of high diversity in eastern Spain. *Biological Conservation.* Vol. 119. P. 421–426.
10. Mittermeier R. A., Robles-Gil P., Hoffmann M., Pilgrim J. D., Brooks T. B., Mittermeier C. G., Lamoreux J. L., Fonseca G. A. B. 2004. *Hotspots Revisited: Earth's Biologically Richest and Most Endangered Ecoregions.* CEMEX, Mexico City, Mexico: CEMEX, P. 391.
11. Motiekaitytė V. 2002. *Urbofitocenozės: sintaksonomija, toksikotolerantiškumas, sukcesijos, funkcijos*. Vilnius: Botanikos instituto leidykla. 250 p.
12. Motiekaityte V., Meškauskaite E., Vainorienė R. 2004. Phytosociological analysis of vegetation of Šaukliai and Kulaliai (Skuodas district) boulder accumulations. *Botanica Lithuanica.* Vol. 10. N 4. P. 261–269.
13. Mucher C. A., Hennekens S. M., Bunce R. G. H., Schaminee J. H. J. 2005. Spatial identification of European habitats to support the design and implementation of Pan-European Ecological Network. *Planning, People and Practice. The landscape ecology of sustainable landscapes: 13th Annual IALE (UK) Conference, held at University of Northampton, 2005.* (McCollin D., Jackson J. I. (eds.). P. 217–225.
14. Purvis A., Agapow P.-M., Gittleman J. L., Mace G. M. 2000. Nonrandom extinction and the loss of evolutionary history. *Science*. Vol. 288. P. 328–330.
15. Rašomavičius V. (red.). 2001. E*uropinės svarbos buveinės Lietuvoje. Lietuvoje aptinkamų Europos Sąjungai svarbių buveinių tipų aiškinamasis vadovas.* Vilnius: Daigai. 138 p.
16. Raudonikis L. 2004. *Europos Sąjungos reikšmės paukščiams svarbios teritorijos Lietuvoje. Lietuvos ornitologų draugija*, Ekologijos institutas. Vilnius, Kaunas: Lututė. 468 p.
17. Richard D., Buord S., Lesouef J. Y. Consolidating knowledge on plant species in need for urgent attention at European level. *4th European Conference on the Conservation of Wild Plants, 17–20 September 2004, Valencia, Spain*. Electronic Database accessible at www.nerium.net/plantaeuropa/Download/Procedings/Richard_et_al.pdf
18. Rokich D. The role of Botanic Garden in Urban Bushland Restoration Research. Botanic Gardens: *A World of Resources and Heritage for Humankind: 2nd World Botanic Gardens Congress, 17–22 April, Barcelona.* (BGCI, ed.). *Barcelona*: BGCI, CSIC (electronic resource).
19. Wyse Jackson P. S., Sutherland L. A. 2000. *International Agenda for botanic Gardens in conservation*. U.K.: Botanic Gardens Conservation International, 56 p.
20. Zedan H. Reducing biodiversity loss by 2010: a challenge for the CBD and for botanic gardens. Botanic Gardens: *A World of Resources and Heritage for Humankind: 2nd World Botanic Gardens Congress,* 17–22 April, Barcelona. (BGCI, ed.). Barcelona: BGCI, CSIC (electronic resource).
21. Балявичене Ю. 1991. *Синтаксономо-фитогеографическая структура растительности Литвы*. Вильнюс: Мокслас. 220 с.
22. Боч М. С., Смагин В. А. 1993. Флора и растительность болот Северо–Запада России и принципы их охраны. *Труды Ботанического Института им. В. Л. Комарова.* Вып. 7. 225 с.
23. Виноградов Б. В. 1984. Определение пространственных единиц экосистем. *Современные проблемы географии экосистем*. Москва: Институт географии АН СССР. С. 22–26.
24. Злотин Р. И., Тишков А. А. 1988. Подходы к созданию Кадастра исчезающих экосистем. *Известия АН СССР. Серия географическая.* № 2. С. 49–55.
25. Лисс О. Л., Абрамова Л. И., Аветов Н. А., Березина Н. А., Инишева Л. И., Курнишкова Т. В., Слука З. А., Толпышева Т. Ю., Шведчикова Н. К. 2001. *Болотные системы Западной Сибири и их природоохранное значение.* (Под ред. Куваева В. Б.). Тула: Grif i Co. 584 с.
26. Работнов Т. А. 1986. О значении пирогенного фактора для формирования растительного покрова. *Бюллетень МОИП. Отд. биол.* Т. 85. Вып. 6. С. 1605–1611.
27. Щербаков А. В. (ред.). 2004. *Ключевые ботанические территории Северной Евразии.* Москва: Издательство Представительства Всемирного Союза Охраны

Природы (IUCN) для России и стран СНГ. Вып. 1. С. 75.
28. Юрцев Б. А. (ред.). 1993. Арктические тундры острова Врангеля (Материалы ботанического полустационара „Бухта сомнительная“ 1984–1988 гг.). *Труды Ботанического Института им. В. Л. Комарова.* Вып. 6. 280 с.
29. Юрцев Б. А. (ред.). 1992. *Биологическое разнообразие: подходы к изучению и сохранению: материалы конференции БИН РАН и ЗИН РАН 14–15 февраля и 14–15 мая 1990 г., Ленинград (СПб)*. Санкт-Петербург: Зоологический институт РАН. 222 с.

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INDUOČIŲ AUGALŲ IR JŲ BENDRIJŲ ĮVAIROVĖS *IN SITU* IŠSAUGOJIMAS, TAIKANT EKOSISTEMŲ FONDO KONCEPCIJĄ

Santrauka

Apžvalginiame straipsnyje augalų įvairovės tyrimai in situ aptariami globaliniame bei regioniniame kontekste, didžiausią dėmesį skiriant Europos biogeografiniams regionams. Detaliau analizuojamos NVS šalių mokslininkų rusų kalba paskelbtos originalios biologinės įvairovės teorinės koncepcijos bei sąvokos. Analizuojami duomenys yra tiesiogiai susiję Globalios augalų išsaugojimo strategijos pirmaisiais dviem tikslais: Augalų įvairovės supratimas ir dokumentavimas; Augalų įvairovės išsaugojimas. Straipsnyje išnagrinėti tokie klausimai, kaip biochorologinė induočių augalų įvairovė, rūšių konservacinio statuso įvertinimas; endemų nykimo priežastys, saugomų teritorijų, priklausančių skirtingiems teritoriniams lygmenims, modeliai ir tinklai.

Augalų įvairovės konservacijai, net jeigu ji vykdoma labai specializuotuose mikrorezervatuose, reikalingas ekosisteminių procesų apsaugos didelės teritorijos ribose fonas. Straipsnyje pateikiamos biochorologinių bazinių vienetų išsaugojimo koncepcijos, išnagrinėta ekosistemų fondo koncepcija, kuri apibendrina antropogeninio poveikio reikšmę biologinei įvairovei. Pagal šią koncepciją, antropogeninėje evoliucijoje atsirandančios ekosistemos – pakankamai esminė ekosistemų fondo dalis, vertas išsaugojimo objektas.

Raktažodžiai: augalų įvairovė, biochorologiniai baziniai vienetai, endemai, saugomos teritorijos, ekosistemų fondas