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ECOSYSTEM SERVICES AND INTEGRATED MANAGEMENT OF THE SLOVAK WORLD HERITAGE "PRIMEVAL BEECH FORESTS OF THE CARPATHIANS"

Волощук І., Сабо П., Шкодова М., Швайда Я. **Екосистемні послуги та інтегроване управління Словацької частини об'єкта Всесвітньої спадщини ЮНЕСКО "Букові праліси Карпат"**. – Природа Карпат: науковий щорічник Карпатського біосферного заповідника та Інституту екології Карпат НАН України. – 2018. – №1 (3). С. 91–96.

У роботі коротко окреслено взаємозв'язок між послугами екосистем та комплексним управлінням природоохоронними територіями. Теорія екосистемних послуг була створена наприкінці ХХ століття. Найбільший її розвиток відбувся після 2005 року, коли були опубліковані результати Оцінки екосистем за тисячоліття, що проводився Організацією Об'єднаних Націй. Економічна оцінка екосистемних послуг вводить нову термінологію, яка раніше не використовувалася в екології ландшафтів (ринок, ціна, маркетинг тощо). Як фінансова оцінка, так і оцінювання за шкалою екосистемних послуг балів потребують широкої міждисциплінарної командної роботи економістів, соціологів, спеціалістів з просторового планування ландшафтів, експертів із ГІС та екологів. Найбільш значний внесок у глобальну оцінку та оцінку екосистемних послуг на сьогоднішній день був зроблений американськими авторами. Дуже важливими є ряд екосистемних послуг природоохоронних територій, які залежать від інтегрованого інструменту управління. Це означає інтеграцію різних видів діяльності – організації, планування, контролю, виконання та контролю за різними фізичними навантаженнями. Просто комплексний підхід означає гармонізацію інтересів різних зацікавлених сторін відповідно до принципів спільного підходу та сталості.

Ключові слова: екосистемні послуги, ЮНЕСКО, букові праліси, Карпати

Vološčuk, I., Sabo, P., Škodová, M., Švajda, J. **Ecosystem Services and Integrated Management of the Slovak World Heritage "Primeval Beech Forests of the Carpathians"**

The paper shortly outlines the relationship between ecosystem services and integrated management of protected areas. The theory of ecosystem services was established at the end of the 20th century. Its strong development has occurred after 2005, when the results of the United Nation's Millennium Ecosystem Assessment have been published. Economic evaluation of ecosystem services has used a new terminology, which previously has not been used in landscape ecology (market, price, marketing, etc.). Both financial and scoring assessment and valuation of ecosystem services requires wide interdisciplinary teamwork of economists, sociologists, landscape planners, GIS experts and ecologists. The most significant contribution to the global assessment and valuation of ecosystem services has been so far brought by the American authors. Rather important are multiple ecosystem services of protected areas, which depend on the integrated management tool. This means the integration of different activities – organizing, planning, controlling, executing and monitoring of various physical activities. Simply, the integrated approach means the harmonization of the interests of different stakeholders according to the principles of participatory approach and sustainability.

Key words: ecosystem services, UNESCO, Primeval Beech Forests, Carpathians

The concept of ecosystem services is highly actual. These services are generated by various physical, chemical, biological and ecological processes realized in ecosystems. Ecosystem services mean both direct and indirect benefits that people obtain from ecosystems. The complexity of the issue is illustrated by the synergy of emergent ecosystem properties, esp. ecological

complexity and biodiversity, connectivity and integrity, as well as ecological balance (due to ecosystem dynamics we prefer this term before ecological stability), which increase the capacity of ecosystems to provide these services.

Various authors analyze the issue from different perspectives. Despite several unifying concepts the lack of standardization is still a problem. The scientists are interested in natural ecosystems (esp. in forests), but also in anthropogenic ones (e.g. in agroecosystem, parks) and concentrate on the quantification and spatial localization of their services. Most of the approaches concentrate on ecosystem services supply, while the questions of humanity's demands and consequent real flow of these services are rather neglected (Burkhard et al., 2014).

These services are usually grouped into four broad categories (MEA 2005): supportive, provisioning, regulating and cultural services, which represent certain internationally accepted standards. However, supportive and regulating services may not be always easily differentiated. Therefore Common International Classification of Ecosystem Services developed within the framework of the European Environment Agency classified these services only into three groups: provisioning, regulating and maintaining, and cultural (CICES, 2017).

The Millennium Ecosystem Assessment emphasizes the linkages between ecosystems and human well-being and points out that the actions people take to influence ecosystems should result from a concern about human well-being, but also from a burning consideration of the intrinsic value of species and ecosystems. (Intrinsic value is the value of something in itself and for its own sake, it means irrespective of its utility for people).

The integrated approach means integration of various interests, in case of protected areas it includes integration of various management categories and approaches to species and territorial protection, various availability of resources, regional requirements and international obligations. At the end this means harmonization of the interests of different

sectors and different stakeholders on the basis of sustainable development concept (Miklós, 2014). The management may have rather different results: e.g. preservation of the existing state of ecosystem; strengthening of the existing functions or obtaining new ones; restoration of degraded ecosystem to renew destroyed services; adaptation to the loss of ecosystem services.

The main ecosystem services of the Carpathian World Heritage

The Primeval Beech Forests of the Carpathians, situated in Slovakia and in Ukraine, have been inscribed into the World Heritage List on June 28, 2007, on the basis of these forests being indispensable to understanding the history and evaluation of the genus *Fagus*, which, given its wide distribution in the northern hemisphere and its ecological importance, is a globally significant species. This still undisturbed, complex temperate beech forests exhibit the most complete and comprehensive ecological processes within the framework of the European deciduous forests.

To outline the importance of these primeval forests we start from the typology by de Groot (2010), representing 23 main ecosystem services. In case of Primeval Beech Forests of the Carpathians their potential provisioning services include 1) food (edible plants and animals), 2) water (natural reservoirs), 3) fiber and fuel (esp. timber), 4) genetic materials (diverse species and populations), 5) biochemical products (species of medicinal importance) and 6) many ornamental species. The problem is esp. with the service No. 3, as even in the protected forests a timber extraction is not an exception today. The real flows of the provisioning services should be strictly regulated to minimize anthropogenic impacts on the forests of the World Heritage.

Regulating services include high ability of beech forests 7) to enhance air quality (by extracting aerosols and chemicals from the air), 8) to regulate climate (on regional and a global scale), 9) to mitigate natural hazards (by protecting soil and by mitigating floods), 10) to regulate water (huge water retention capacity),

11) to absorb wastes (removal of organic matter, change of chemical compounds), 12) to protect soil before erosion (esp. soil retention by vegetation), 13) to form and regenerate soil (by natural processes of its formation), 14) to provide pollination (by a high diversity of pollinators) and 15) to provide biological regulation (of various pest populations). De Groot (2010) recognizes only two supportive services: 16) nursery habitats (for breeding, feeding and resting) and 17) genepool protection. Both of these services are strongly represented in the primeval beech forests. The forests capacity to provide maintaining and regulating services should be maintained for the future.

The potential of cultural services of these forests include 18) aesthetic quality of landscape, 19) recreational opportunities, 20) inspiration for culture and art, 21) cultural heritage, 22) spiritual and religious inspiration and 23) unique educational, scientific and research ecosystem services. Apart from the last group of services (science and education) other groups of cultural services are currently utilized only very slightly, thus providing bigger options for a future.

For the visitors of the Primeval Beech Forests of the Carpathians, these evidently contain areas of an exceptional natural beauty and of a high aesthetic importance. The services provided by the Primeval Beech Forests beside their social significance include principal cultural services – education and scientific research, aesthetics, tourism and recreation, cultural and spiritual values (Pichler et al., 2007).

The ability of ecosystem to deliver services can be assessed by a variety of qualitative and quantitative methods. The point (scale based) evaluation usually start from the ecosystem service potential matrix. with rows denoting ecosystem or landscape types and columns denoting ecosystem services. For example, Burkhard et al. (2014) and Sabo & Repiský (2013) use the 6-point scale (from 0 denoting no relevant service supply to 5, denoting maximal possible service supply). The values inside the matrix are calculated on the basis of expert knowledge, interviews, ecological modelling

and landscape statistics. Combining potential of ecosystem services with the matrix of real societal demands for the individual services another matrix can be constructed – of the real flows of ecosystem services.

Concerning financial assessment of ecosystem services, there exist two principal groups of methods: biophysical and preference-based methods.

Second group of methods comes from deriving of environmental values from preferences of respondents. These methods can be divided into methods of deriving values from markets (e.g. hedonic method, travel cost method) and direct survey willingness to pay method (WTP, contingent valuation). A rapid assessment of ecosystem services in the Carpathian protected areas was given in the guidelines by WWF (Bucur & Strobel, 2012). The first step consists of a collection and interpretation of the relevant ecological data on ecosystem services of the area, and on a geographical assignment of the relevant region. After collection of the data available, the second step consists of linking the quantitative information to prices. The values and benefits in monetary terms are adapted to local/national circumstances (income, GDP, other information regarding preferences or socio-demographics if necessary and feasible) – see also Getzner (2010). Additionally, a visitor survey is used to collect data on individual's willingness-to-pay for specific ecosystem services. Finally, the individual values are aggregated, e.g. by means of the annual number of visitors to the national park, to derive a broad indication of the potential value of ecosystem services provided by the national park.

From previously published methods of valuation of ecosystem services can be mentioned a combination of biophysical approach and cost compensation, method of analyzing energy input, preferential methods (questionnaires, demand driven) and cost expertise methods. Economic methods, market tools and financial schemes highlight the economic value of ecosystem services and the growing costs associated with restoring degraded ecosystems. The weakness of market mechanisms is the fact

that the financial assessment and valuation of ecosystem services suppresses a comprehensive view of ecosystems and their services. The complexity of ecosystem services lies in the interconnection and dependency of biotic and abiotic components that generate ecosystem services. If a person perceives ecosystem services only through money, viewing the values for which it is important to protect biodiversity. Market mechanisms and economic assessment of ecosystem services could lead to a shift of thinking and acting man from what is generally considered to be appropriate and necessary to do what is best and the profitable for himself. (Vološčuk, 2013).

Among the most challenging, at the same time criticized and most complex economic assessment includes cultural services. As criticism of this approach sounds particularly close focusing on the protection of ecosystem services, which do not always lead to the protection of biodiversity (Schröter et al., 2014).

Criticism of monetary evaluation of cultural services lies in the fact that (1) the cultural values of natural and cultural landscape can not be assessed by ecological methods used in assessing the structure of ecosystems, (2) cultural services of natural and cultural landscapes have symbolic meaning; subject to evaluation are not ecosystems in the country, but natural phenomena such as mountains, lakes, forests, landscape scenery, (3) cultural ecosystem services do not result from the properties of the ecosystems, but are a result of certain traditional land use by humans in a given cultural context with a specific token experience.

In Slovakia research of ecosystem services was aimed at evaluating them in national parks. For example, assessment of ecosystem services (recreational and non-use values) in the National Park Malá Fatra was based on a questionnaire survey of visitors of the National Park Malá Fatra, where is 160 km marked hiking trails. Average annual attendance in National Park is about 500,000 visitors. The questions concerned the willingness to pay for entrance to the national park, to the knowledge of the national park, favorite activities, the

costs concerning of visits to the territory of the national park, willingness to participate in financing the activities of nature protection and demographic characteristics of visitors.

Total economic value of ecosystem services provided by Malá Fatra NP is 50 mil. Eur per year and these results can be compared with previous studies in other protected areas of Carpathians by implementation of same methodology – Tatra NP in Poland 740 mil. Eur, Slovenský raj NP 232 mil. Eur and Veľká Fatra NP 179 mil. Eur.

We can also analyze contribution of individual ES for the total economic value in selected areas. As in other cases, in Malá Fatra NP from use values dominate recreational values (38 mil. Eur per year) and non-use values are also quite high (10 mil. Eur per year). In other national parks recreational values are even much higher – Veľká Fatra NP (53 mil. Eur), Slovenský raj NP (152 mil. Eur) and Tatra NP in Poland (519 mil. Eur).

The research results allow, based on the valuation of selected ecosystems services, their including into cost and price of PA management as well as making planning and decision-making process of "development" in protected area more objective and effective (Vološčuk et al., 2016).

World Heritage areas in Slovakia have not been evaluated for ecosystem services. This task is very urgent and therefore scientific institutions should focus on research of ecosystem services in the territories of the World Heritage.

Key problems with implementation of integrated management

Effective implementation of the integrated management plan means the application and harmonization of interests of different sectors, with an emphasis on sustainable development. The key of integrating activity is organizational planning of space (planning – regulation – control) and integrated (non-sectoral) spatial information system.

Integrated management of ecosystem services does not set the physical sectoral activities or carrying out various sectoral

measures, such as forest management, planting of greenery, plowing through contour (line), and so on. It can not be integrated plowed, planted or cut down trees or integrated mow, use or do not use chemicals. Integrated management is deciding the time – spatial location of these activities, determine the course of action, therefore, where the plow, mow, build, cut down or planted trees in order to accommodate as many sectors and that these activities had also a positive impact on the provision of ecosystem services. Principles of integrated management of ecosystem services is a partnership (the principle of inter-sectoral integration), regional cooperation (space-political conditions of integration) and complexity (landscape-ecological conditions of integration) (Miklós, 2014).

Social, political and economic conditions for the application of integrated management are different in Ukraine and in Slovakia. In Slovakia, the main causes of failure include the recovery of private ownership of land in nature reserves in 1991.

The main problem is the reluctance of private forest owners with the inclusion of planning A zone of Poloniny National Park and Vihorlat Protected Landscape Area into new nature reserves and re-classification of economic forests for special purpose forests.

Consequently, the state is unable to achieve harmonization between the requirements of nature protection, owners and users of land, including state forests. Long-time trade-off is not yet completed.

Another serious problem is absent of valid zonation in the Poloniny National Park and Vihorlat Protected Landscape Area. Although proposals exist, they were not yet approved. Proposed A zone in those protected areas was not included in the World Heritage. Private owners, including military forests in Vihorlat, oppose the inclusion of the complete A zone to the Primeval Beech Forests of Carpathians World Heritage.

Zones in the national parks and national nature reserves are established by Ministry of Environment upon agreement with the Ministry of Agriculture and Rural Development. Due

to the outstanding zoning of protected areas it was not possible to accept the request for strict nature protection of the forests across the A zone, within the category of special purpose forests, where conservation is a priority. Forest management plan is a classic example of integrated management of forests, for harmonizing the interests of stakeholders in the use of forests. However, if conservation is unable to assert their interests in the A zone, forest planning in this zone did not allow to establish the category of special purpose forests with priority of nature protection.

The management documents for integrated nature conservation in the protected areas are "Programme of national park care" (i.e. management plan documents for the national park). Zoning is important part of national park management plan. If it is not approved it cannot be realized, neither respective management care. The management documents (management programmes) for the national parks and national nature reserves are developed by the Ministry of Environment and approved by the Government. The nature protection organization delegated by the Ministry of Environment (State Nature Conservancy of the Slovak Republic in Banská Bystrica) is responsible for documents acquisition / elaboration of these.

For mentioned reasons to date (2017) the Integrated Management so far cannot be applied in the territories of the Slovak World Heritage.

The institutional tools for integrated management of ecosystem services and landscape in Slovakia and internationally is sufficiently developed. The most important tools are supported by law, specific procedures are defined methodologies. In the case of World Heritage Primeval Beech Forests of the Carpathians problem remains the fact that the lack of an spirit for integrated approach and persists sectorialism that is very difficult to overcome. Lack of the application of these tools in practice. Nature Conservancy for an integrated approach in World Heritage considers the respect for the principles of conservation, protection of natural resources, preservation

of vegetation elements in the landscape, water retention in the country, close to nature forestry and agricultural measures and support specific conservation activities at World Heritage.

Conclusions

As we have just briefly outlined, Primeval Beech Forests of the Carpathians provide various ecosystem services, among which the priorities are of regulating and of cultural ecosystem services. Research, mapping, assessment and evaluation of these services in the World Heritage in Slovakia are currently not occurring.

Integrated management of ecosystems and landscape of the World Heritage in Slovakia did not take place yet due to lack of zoning. Zoning of the World Heritage areas approved by Slovak Government is a comprehensive condition for elaboration of management programme. Unfortunately the elaboration of highly important management programme and project of integrated management for the Slovak part of World Heritage was even not yet prepared and thus not approved by the Slovak Government.

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