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A toolkit for assessing cultural ecosystem services at a community level

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Abstract. Agricultural systems provide people with multiple benefits (both commodity and non-commodity products). Agroecosystem services in this context describe the anthropogenic contribution to the generation of agroecosystem services. Agroecosystem services include a range of services from agricultural ecosystems – provisioning, regulation, maintenance and cultural services. Agroecosystem services adapt the ecologically based concept of ecosystem services to the specifics of managed agricultural ecosystems, thus making this concept more applicable to economically oriented agricultural production systems and agricultural policies. Based on their specific features and nature, it is accepted to group ecosystem services into four categories – material, regulating, supporting and cultural. The majority of benefits from the group of cultural ecosystem services (e.g., leisure and recreation, aesthetic interactions, traditions and rituals) are intangible and therefore often remain undervalued by society. For these reasons, in the last decade, intensive work has been done to deepen understanding of human dependence on natural processes at different temporal and spatial scales, as well as to search for appropriate economic and management criteria and indicators by which to measure the value of these ecosystem services. In this study, we aimed to present a toolkit for assessing cultural ecosystem services provided by agroecosystems. The data obtained through the proposed toolkit can serve to shape recommendations for the sustainable management of agricultural ecosystems, protecting livelihoods and natural resources, so that agro-ecosystems can continue to deliver ES in addition to food production.

Key words: biodiversity, ecosystem services, agriculture, intangible benefits.

Introduction

By definition, ecosystem services are the conditions and processes by which natural capital supports and sustains human life (Daily, 1997). The analysis and assessment of the state of ecosystems, trends in their changes, and their potential for providing ecosystem services have gained wide popularity since the publication of the Millennium Ecosystem Assessment (MA, 2005). Based on their specific features and nature, it is accepted to group ecosystem services into four categories – material, regulating, supporting and cultural. Each of the ecosystem services is provided by specific processes in ecosystems, therefore a given service can be the result of several different processes or one process can lead to the provision of several different ecosystem services.

Agriculture provides some and relies on other important ecosystem services (ES) provided by the natural capital of the system (Swinton et al., 2007; Heal & Small, 2002; Sandhu et al., 2005). Agriculture is the largest ecosystem, covering over one-third of the world's land area (FAOSTAT, 1999). Agriculture accounts for 38% of total land use worldwide (MA, 2005; Sandhu et al., 2015, 2016). Agricultural ecosystems provide people with food, fiber, bioenergy, etc., which are essential for human well-being.

Agricultural systems provide people with multiple benefits (both commodity and non-commodity products). Agroecosystem services in this context describe the anthropogenic contribution to the generation of agroecosystem services. Agroecosystem services include a range of services from agricultural ecosystems – provisioning, regulation, maintenance and cultural services. Agroecosystem services adapt the ecologically based concept of ecosystem services to the specifics of managed agricultural ecosystems, thus making this concept more applicable to economically oriented agricultural production systems and agricultural policies.

There is considerable evidence that most intensively managed agricultural systems provide services in an unsustainable manner, in which natural capital resources are progressively depleted at a rapid rate and are not replenished. For example, changes in natural habitats, mainly due to intensive agricultural production systems, are one of the main causes of biodiversity loss and the reduction of the quality and quantity of ESU. Furthermore, 30% of species are threatened by overexploitation (Pérez-Soba et al., 2012).

The majority of benefits from the group of cultural ecosystem services (e.g., leisure and recreation, aesthetic interactions, traditions and rituals) are intangible and therefore often remain undervalued by society. For these reasons, in the last decade, intensive work has been done to deepen understanding of human dependence on natural processes at different temporal and spatial scales, as well as to search for appropriate economic and management criteria and indicators by which to measure the value of these ecosystem services.

The valuation of cultural ecosystem services remains one of the most difficult and least completed tasks in ecosystem services research, due to their intangible nature, so they are rarely fully accounted for in the valuation of ecosystem services (Plieninger et al., 2013). Based on the above mentioned, we aimed to present a toolkit for assessing cultural ecosystem services provided by agrophytocenoses, developed by the project 01/23 "Analysis and Assessment of Ecosystem Services in Model Agroecosystems in Bulgaria and Turkey as a Prerequisite for Sustainable Local and Cross-Border Development", funded by the Agricultural University-Plovdiv).

Materials and methods

The survey method is widely used for scientific research purposes and in quantitative research, as it allows the collection of rich information about the studied phenomena, processes, individuals, etc. In order to obtain the necessary information for the assessment of cultural ecosystem services, an original questionnaire for a sociological survey was developed in Bulgarian and English, in electronic format and as a printable version. The layout of the questionnaires followed the standard requirements for structuring - an introductory part (to whom the survey is addressed, who is conducting the survey and for what purpose), instructions for filling in, data about the respondent (gender, age) and the main part, which contains the main questions, arranged in a certain system and subordinated to the purpose of the study.

Results and Discussion

The connectivity of agroecosystems with natural ecosystems defines the integration of the landscape, determines their mutual dependence, as well as the ability of the landscape to maintain the regional wealth of animal and plant species. Each region has a specific organization of its agroecosystem network, formed under the influence of soil-geographic, climatic, socio-economic and cultural factors. The method of land use determines the extent to which agroecosystems effectively fit into the landscape and maintain their ecological functions. Traditional crop production in the country relies on the cultivation of monocultures on large areas of agricultural land. This method of land use turns agroecosystems into ecosystems vulnerable to degradation, whose fertility is maintained by the

input of ever-increasing amounts of energy in the form of fertilizers, pesticides and irrigation water.

Nedkov (2018) points out that economic methods are becoming increasingly popular due to their high efficiency in analyzing and evaluating ecosystem services, since the financial values obtained from them are easy for everyone to understand. The economic valuation of ecosystem services involves expressing the various benefits associated with ecosystems in monetary value. It is in this way that it can be demonstrated that ecosystem services also have value, but as a result of the fact that the majority of them (with the exception of material ones) are not traded on the market, difficulties arise in valuation (Nikolov, 2018). For this reason, economists propose that the valuation of ecosystem services be based on their overall contribution to the well-being of human society, the term they introduce for this purpose is "total economic value" (TEV) (Pearce & Warford, 1993). The basic framework of the TEV also has various modifications in different studies, but in most cases it contains two categories: use values (direct, indirect and potential) and values that are not associated with the use of natural resources (non-use values), such as the desire to preserve natural resources for future generations or the satisfaction that ecosystems exist and function normally (Pascual et al., 2010).

Direct value (direct use value) is inherent to natural resources that are used directly by people (Pagiola et al., 2004). This includes material services or products obtained from nature such as food, water, plant and animal production, timber, construction products, medicines, animal hunting, etc. These products are exchanged at market prices as a result of supply and demand factors, so such ecosystem services can easily be valued (Nikolov, 2018).

Indirect value (indirect use value) is inherent to ecosystem services related to the maintenance and protection they provide to people. This includes most of the regulating and supporting services that provide benefits outside the ecosystems themselves (Pagiola et al., 2004).

Option value (possible use value) is assessed according to the possibility of future direct or indirect use of the natural resource. This includes those goods and services that may not be used at the present time, but may be used in the future by future generations. These are mainly regulating, cultural and material ecosystem services (Pagiola et al., 2004; Nikolov, 2018).

The value of ecosystem services that does not arise from use (non-use value) is due to the fact that people can receive benefits and satisfaction simply from the fact that a given ecosystem service, resource or object exists, even if they never use it (Pagiola et al., 2004). This is most clearly expressed in the group of cultural ecosystem services, where non-use value is associated, for example, with the desire of humans to preserve plant and animal species, and with them ecosystems and landscapes without receiving direct benefits from them.

Many studies indicate that the assessment of the benefits of cultural ecosystem services is a rather complex and sometimes contradictory task, as it requires a multidisciplinary approach involving ecology, economics and sociology (Milcu et al., 2013). The differences arise first of all from their inherent specificity and personalization, as they are highly dependent on the individual perceptions and value system of each person. This makes their assessment much less tied to quantitative indicators than for other types of ecosystem services (Nahuelhual et al., 2014). Secondly, the reasons are due to the difficulties in linking them to spatial geographical parameters (Abson & Termansen, 2011, Burkhard et al., 2012), which is why spatial units are often missing or applied too generally. There is no unified conceptual framework or unified methodology, as well as generally accepted indicators for their assessment.

The assessment of the capacity of ecosystems in the study area to provide ecosystem services includes not only quantitative but also qualitative indicators, including feedback from the users of these services (local population, tourists, etc.). It is they who allow a more complete assessment of the importance and role of ecosystems, as well as their capacity to provide ecosystem services. The information on these indicators can be obtained using the toolkit, proposed below.

Questionnaire for the assessment of cultural ecosystem services

Please, read all questions and answer by ticking the box or by providing a brief explanation where appropriate

The survey is anonymous and we assure you that the confidentiality of your individual responses will be maintained.

1. Gender

□ male □ female □ other .....

2. Age

□ under 20 years old □ 20-30 years old □ 31-40 years old
□ 41-50 years old □ 51-60 years old □ over 60 years old

3. Place of residence

Country ..... Town/Village .....

4. Employment

□ pupil □ student □ working person □ retired person

5. How often do you visit the area?

□ every day □ every week □ every month □ other .....

6. In which month are you visiting the area?

□ January □ February □ March □ April □ May □ June
□ July □ August □ September □ October □ November □ December

7. What is the length of your stay in the area?

□ 1 day □ 2 days □ 3 days □ 5 days □ 7 days □ other .....

8. What is the purpose of your visit to the area?

□ relaxation and recreation □ tourist attractions □ aesthetic and spiritual interactions
□ cultural events □ social interactions □ scientific and educational activities
□ meeting friends □ picnic □ walking a pet
□ nature protection □ sport activities □ other .....

9. How much time do you spend outdoors in the area?

□ 15-30 minutes □ 30-60 minutes □ 1-2 hours □ 2-3 hours □ more than 3 hours

10. Who are you visiting the area with?

□ my family □ friends □ alone □ other .....

11. What is the amount of your expenses (in euro) for a 1-day stay in the area?

□ travel costs ..... □ accommodation ..... □ attractions/entertainment .....
□ food ..... □ entrance fees ..... □ other .....

12. Do you think your visit to the area is important for your physical/mental health?

□ Yes, for my physical health □ Yes, for my mental health □ No □ other .....

13. What do you like most about your visit to the area?

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14. What do you like least about your visit to the area?

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15. What kind of transport do you use during your visit to the area?

□ private car □ public transport □ on foot
□ bycicle □ other .....

16. What sites/places are you planning to visit in the area?

□ natural sites □ historical places □ archeological objects
□ cultural events □ easily accessible by car □ other .....

17. Your satisfaction with the natural resources in the area

RESOURCES	HIGH	MEDIUM	LOW
Forest / trees			
Meadows / herbs			
Wild flowers			
Wild animals			
Rocks			
Landscape			
Rivers / lakes			
Clean air			
Other			

18. Your satisfaction with the infrastructure in the area

INFRASTRUCTURE	HIGH	MEDIUM	LOW
Roads			
Tourists paths			
Places to eat			
Places to rest			
Places for a picnic			
Waste bins			
Information boards			
Tourist safety			
Other			

The provided assessment of ecosystem services can be used to solve a wide range of management tasks such as: selection of agricultural crops, selection of agricultural practices, preparation of integrated plans for sustainable management, etc.

Conclusions

The assessment of ecosystem services is necessary as a common basis for comparison when choosing alternatives/projects, allowing us to track what we lose for the economy and society when choosing certain investment and local development decisions, to assess the benefits and costs. The assessment of the future effect of public policies is a priority when choosing a given ecosystem service over another based on information for businesses and consumers about the value of the benefits of nature, which until recently were perceived as free, as well as the costs that would be required if we were to fully restore them.

The data obtained through the proposed toolkit can serve to shape recommendations for the sustainable management of agricultural ecosystems, protecting livelihoods and natural resources, so that agro-ecosystems can continue to deliver ES in addition to food production. The long-term sustainability of agriculture depends on healthy and functional ecosystems that are managed in an integrated manner.

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