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ЦЕНТРАЛЬНОЙ АЗИИ И СИБИРИ**

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Монография содержит информацию о самых современных методологиях и результатах в ландшафтных исследованиях. Она может быть использована в качестве руководства для исследователей, преподавателей, студентов и всех, кого интересует тема ландшафтной науки и смежных дисциплин. Монография является особо ценной информационной базой для лиц, принимающих решения на различных уровнях, от местных до международных органов по принятию решений. Приведенная в монографии информация представляет собой современный уровень ландшафтной науки в очень краткой форме.

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This monograph shall inform you about up to date methodologies and recent results in landscape research. It is intended as a guide for researchers, teachers, students, decision makers, stakeholders interested in the topic of landscape science and related disciplines. It provides information basis for decision makers at various levels, from local up to international decision bodies, representing the top level of landscape science in a very short form.

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## Chapter V/2: INTEGRATING ECOSYSTEM SERVICES IN LANDSCAPE PLANNING: SOME REFLECTIONS AND A CASE STUDY

### Глава V/2: Объединение полезных свойств экосистемы в ландшафтном планировании: некоторые размышления и тематическое исследование

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**ABSTRACT.** The concept of ecosystem services has found much interest in policy and science over the last years. One of the most promising approaches for applying the concept is in landscape planning to assess and value the impacts of current and potential future land use options. This contribution summarizes some considerations of options for integrating ecosystem services in landscape planning, illustrates them with a case study, and gives an outlook for future research and practical experimentation. We highlight that information on ecosystem services can provide additional information to usefully inform planning and decision-processes through highlighting the impacts of alternative land use options on human well-being. We further argue that in order to harness these opportunities, planners need to apply ecosystem services assessment methods in ways carefully adapted to the specific user groups and the respective governance and decision-making context.

**Резюме.** За последние годы понятие полезных свойств экосистемы вызвало большой интерес в политике и науке. Одним из наиболее перспективных подходов к применению концепции является ландшафтное планирование для определения и оценки воздействия существующих и потенциальных вариантов будущего использования земли. В данном материале кратко излагаются некоторые соображения относительно вариантов объединения полезных свойств экосистемы в ландшафтном планировании, приводятся примеры на основе тематического исследования, а также перспективы будущих исследований и прикладных опытов. Мы подчеркиваем, что информация о полезных свойствах экосистемы может обеспечить дополнительные сведения для необходимого информационного обеспечения процессов планирования и принятия решений путем выявления аспектов воздействия иных параметров землепользования на благосостояние человека. Мы далее утверждаем, что для использования этих возможностей планировщикам необходимо применять методы оценки полезных свойств экосистемы таким образом, чтобы они были тщательно адаптированы к конкретным группам землепользователей и соответствующему контексту управления и принятия решений.

**KEYWORDS:** landscape planning, ecosystem services, impact assessment

**Ключевые слова:** ландшафтное планирование, функции экосистемы, оценка воздействия

## INTRODUCTION

Landscape planning can be understood, according to the European Landscape Convention, as a “strong forward-looking action to enhance, restore or create landscapes”[1]. It has been institutionalized in several European member states as part of the spatial planning system. In an effort to enhance the uptake of actions for nature conservation and sustainable landscape development, landscape planning can choose between different pathways for implementation such as area protection measures, the targeting of agri-environmental measures, and impact mitigation regulations. [2]. Within the field of landscape planning, environmental issues have for long been considered. The German system of landscape planning (*Landschaftsplanung*), for example, evaluates landscapes concerning their significance to provide a set of landscape functions. These landscape functions represent the capacity of a landscape “to sustainably fulfill the basic, lasting and socially legitimized material or immaterial human demands“ [2].

The concept of ecosystem services has recently received a growing interest from policy and science communities, reflected – among others – in the creation of the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES - [www.ipbes.net](http://www.ipbes.net)). While numerous definition for ecosystem services exist, one of the most prominent understandings is of them as the direct and indirect contributions of ecosystems to human well-being [3]. Ecosystem services are also classified in various ways. One of the classic categorization systems is from the Millennium Ecosystem Assessment [4] which distinguishes Supporting services such as nutrient cycling, provisioning services such as food and fresh water, regulating services such as climate regulation, and cultural services including aesthetic and spiritual aspects. Figure 1 illustrates that these services directly or indirectly contribute to the constituents of human well-being.

The scientific evolution of the concept of ecosystem services over the last two decades took place relatively independent from the ongoing research and application of approaches for assessing environmental issues in landscape planning. An increasing number of publications recently emerged that aimed at bridging this gap and exploring opportunities for integrating ecosystem services in spatial and landscape planning [5,6,7,8,9,10]. This contribution explores options for integrating the ecosystem services concept in landscape planning, and highlights particular opportunities and challenges. The following sections are altered excerpts from the chapter entitled “Application of ecosystem services in spatial planning” [11] in the Handbook of Ecosystem Services Mapping [12].

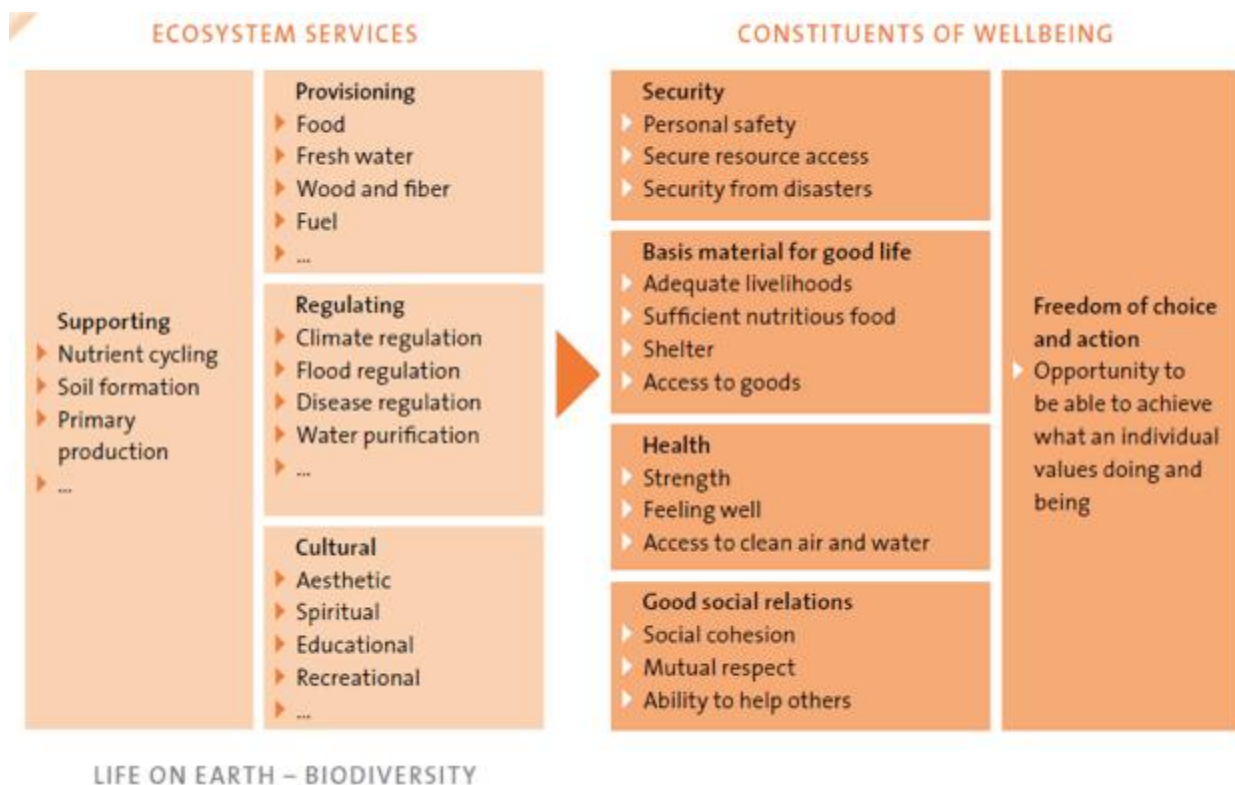
## OPTIONS FOR APPLYING ECOSYSTEM SERVICES IN LANDSCAPE PLANNING

Landscape planning and decision making can be supported by the application of ecosystem services information in many ways. The manner to apply ecosystem service information depends upon the specific planning instrument in use, the need to fulfil statutory requirements for the implementation of the respective instrument, the needs and interests of instrument users and decision-makers, as well as the time and resources available for developing ecosystem services assessments (additionally to what is already legally required).

Several frameworks have been proposed on how to integrate the ecosystem services concepts in landscape planning and decision-making. One of these concepts is the approach proposed by van Oudenhoven et al. [13] for the selection of environmental indicators. Another example is the ES-in-Planning framework which attempts to connect ecosystem services with a landscape planning approach based on the Driving Forces-Pressures-States-Impacts-Responses (DPSIR) model.

Integrating the ecosystem services concept in planning can help assessing the impacts of proposed planning decisions [13,14]. Spatial assessments of ecosystem services are useful to identify the location of areas of particular environmental sensitivity, of high potential for ecosystem services delivery, or of high demand for ecosystem services. Based on information on ecosystem services, development plans can more strategically consider environmental aspects and their impacts on human well-being. By using ecosystem services information, landscape planning can identify and devise appropriate actions for safeguarding, enhancing or restoring areas in of particularly significance for ecosystem services.

In particular, ecosystem services information can be considered in planning initiatives to develop green and blue infrastructure. Maps of ecosystem services delivery potential, coupled with data on people’s values and actual use of ecosystem services, support spatial planners to identify mismatches between supply and demand, as well as where trade-offs occur or where compensation actions need to be undertaken.



**Figure 1** – Ecosystem services categories and their contributions to human well-being. Figure from [4], altered.

A particular added value of the ecosystem services concept is its capacity to further enhance stakeholders' and decision-makers' engagement by better communicating the values, benefits and shortcomings associated with proposed planning options. Ecosystem services information can help assessing the multiple values that ecosystems provide to people, and illustrate the trade-offs that can be caused by changes in land-use patterns and urban management alternatives for ecosystem services provision. Along this line, ecosystem services information can also support valorization. For example, selling agrarian and touristic products with price premium may be a way co-finance environmentally sensitive land use management.

Finally, information on ecosystem services can enhance the understanding of spatial relationships between the planning area (which typically corresponds to a jurisdiction, for example, at the regional or national level) and the areas where ecosystem services are used and supplied. A proper recognition of these relationships can address situations where the benefits of planning decisions grow at one scale, but costs are borne at another scale. Similar approaches can easily be made available, e.g. for scientific review, practical applications, regional comparative studies and further development, using open access data and mapping methods.

### CHALLENGES AND OPPORTUNITIES

Several challenges exist concerning the application of ecosystem services information in landscape planning [5,16]. Information on ecosystem services is only one of the various types of information and concerns that planning needs to take into consideration. Information on ecosystem services may illustrate and, thus, helpfully support efforts to integrate environmental considerations in decision-making, but the actual potential to influence decision-making is limited (especially within statutory planning).

The integration of ecosystem services in decision-making may increase the complexity of planning process. This is a significant challenge that might be alleviated through the development of assessment standards and the provision of ecosystem services mapping and information by national institutions. Simple but robust methods and tools for the assessment and valuation of ecosystem services should be considered to increase the ecosystem services information.

Spatial assessments of ecosystem services often have “an air of authority”[17], but the uncertainties inherent to such maps are rarely assessed or communicated. Explaining this uncertainty to the audience and appropriately addressing the uncertainty by planning- and decision-makers is an enduring challenge. The opportunities provided by using ecosystem services relate to the supplying of fundamental and important information for planning. The use of the ecosystem services concept, despite other concepts such as landscape functions, offers the potential to communicate well to diverse groups of users and stakeholders through the concept of ‘services’ provided by nature and landscape to people. Consequently, the ES concept facilitates cooperative landscape and spatial planning and implementation in practice [18]. Ecosystem services studies can complement existing environmental information and approaches, offering more particular information about the actual use and provision of ecosystem services [19,20]. Furthermore, trade-offs and synergies of land use options considering the delivery of various ecosystem services and the spatial distribution of the supply and demand for ecosystem services can be better conveyed [21,22]. Spatial assessments of ecosystem services can provide a useful basis for quantification and economic valuation of ecosystem services which in turn may provide additional added value for planning and decision-making.

## CONCLUSIONS

1. Information on ecosystem services can provide additional information that can usefully inform planning and decision-processes through highlighting the impacts of alternative land use options on human well-being.
2. To harness these opportunities, planners need to apply ecosystem services assessment methods in ways carefully adapted to the specific user groups and the respective governance and decision-making context.

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### **Глава V/3: МЕТОДЫ ОЦЕНКИ И КОМПЕНСАЦИИ НАРУШЕНИЙ ОКРУЖАЮЩЕЙ СРЕДЫ И БИОРАЗНООБРАЗИЯ**

#### **Chapter V/3: Methods for Assessment, Compensation and Biodiversity Offsets of Environmental Impacts**

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**РЕЗЮМЕ.** Дан обзор методов оценки воздействия намечаемой деятельности на окружающую среду и биоразнообразии, в целом составляющих каркас российской национальной процедуры ОВОС. Описаны методы выявления факторов воздействия и их уровня, состояния всех учитываемых компонентов окружающей среды, прогноза нарушений, выбора места размещения объекта. Суть этих методов базируется на оценке интегральных и покомпонентных показателей экологического риска. Такой подход позволяет использовать любую доступную информацию об окружающей среде, в частности, количественные, полуколичественные, качественные, вербальные и экспертные оценки. На основе прогноза составляются мероприятия по предотвращению и снижению нарушений окружающей среды и выявляются остаточные нарушения, для которых разрабатываются мероприятия по их натуральной компенсации. Эта технология позволяет сделать оценку нарушений более объективной, а разработанные на ее основе мероприятия по компенсации нарушений адекватными этим нарушениям, что делает реализацию намечаемой деятельности экологически безопасной.