

Title of the symposium:

From conservation priority area to ecological security pattern

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Symposium abstract

With widespread concern about socioeconomic and ecological problems, ecological security has become a focus in regional landscape ecology research. The term 'security' can be interpreted as a goal of preventing ecological risks in the ecological studies. This generalized concept forms a visual target of ecosystem based management. The integrated management for habitat protection at the landscape scale is such an approach of ecosystem-based management. Accordingly, ecological security patterns (ESPs) is a concept considering ecological security in the fields of landscape ecology, urban planning, and landscape design. Based on the interaction between landscape patterns and ecological processes, ESPs will not only provide basic regional protection for necessary ecosystem services and a healthy living environment, but can also be seen as an effective measure to control urban expansion in a sustainable way.

Being advanced to the conventional priority area conservation, ESPs are referring to the elements of landscapes, such as ecological source patches and corridors, which are critical to health of the region's ecological system. The spatial configuration of ESPs is formed by strategic points, lines, polygon, and networks that are critical to maintaining ecological processes. Ecological security sources (the points) are natural areas that play a crucial role in overall ecosystem health. From the perspective of ecological economics, cost and benefit factors must be considered simultaneously in order to make well-informed decisions targeting ecological protection, because both these cost and benefit factors will influence the ecological security sources present within the considered area. Furthermore, ecological corridors (the lines) convey the transfer of ecological flow, ecological processes, and ecological functions in a region, which are usually identified through a least-cost path analysis based on ecological resistance surface.

Generally speaking, the concept of ESPs is currently more commonly used in China, whereas in Europe and the USA other concepts are more widely applied. This difference in methodological approaches are probably the consequence of the general relatively higher severity of ecological problems in China as compared to Europe and the USA. As we know, the enormous negative ecological effects caused by highly intensive construction activities in a condensed urbanization process, have become a serious threat to the maintenance and renewal of natural ecosystems in China. Besides the low recovering feasibility from ecological hazards due to the rather fragile environmental background of many regions in China, societal demand for high environmental quality as well as outdoor recreation opportunities in ecological land is also growing rapidly under the national policies of new-type urbanization and ecological civilization.

In recent years, some scholars outside of China have integrated critical ecological

infrastructure into ecological security research, and given conservation priority to key ecological elements with important roles in ecosystem maintenance and social development in approaches termed “secure urbanism and resilient infrastructure” (SURI). A conceptual framework of planetary boundaries has also been proposed to regulate the earth system and identify ecological security space that are necessary for human survival and development. This threshold-based concept has great similarity with the minimum bottom line management of ESPs. The priority of conserving key habitats combined with ecological patches and corridors also corresponds with the concept of habitat sustainability or habitat connectivity. Consequently, the concept of ESP has a great potential to be accepted by other fast urbanizing regions in developing countries elsewhere in the world.

How your symposia will improve landscape ecology science?

Constructing an ESP through an understanding of the interaction between ecological processes and landscape patterns to effectively safeguard regional ecological security is an important way to maintain sustainability. In other words, with a view to landscape connectivity and human demand anticipation, ESP is an improvement on the former landscape planning approach based on selecting ecological elements. This approach could ensure sustainable ecosystem management in the context of rapid urbanization with high landscape dynamics and habitat fragmentation. Moreover, the indicators at landscape scale applied in ESPs are selected in social-ecological aspect, which is in great need in landscape planning studies.

The concept of ESPs originated from landscape design and landscape planning, and has similarities with the concepts of ecological networks and green infrastructure, as well as the new concept of planetary boundaries, which aims to protect natural ecosystems within specific secure borders. From the park system and garden city concepts in the late 19th century to the concepts of urban growth boundary (UGB), ecological network (EN), and green infrastructure (GI) in the 20th century, all of these concepts are concerned with resource conservation and ecological construction, and have been regarded as effective ways to achieve urban sustainable development with smart growth and protection, i.e. low costs for high benefits. Specifically, the drawing of UGB is aimed at preventing uncontrolled urban sprawl; EN is designed to create a reserve network composed of ecological nodes, patches, and corridors with a special focus on biodiversity protection; GI refers to natural life support system consisting of series of ecological elements; and ESPs are focused on maintaining key ecological processes through protection of important ecological patches and corridors.

Although the methods for ecological management are different, the ultimate goal of all the approaches is similar, i.e. to safeguard regional ecological security and then satisfy human demanding for ecosystem services. However, due to differences in researchers’ academic background, concerns and the actual problems faced in different study areas, there are big

differences between these concepts. In the context of global environmental change, controlling and safeguarding regional ecological security has become a serious problem and a topic that cannot be ignored. Therefore, the main difference between ESPs and the other three related concepts is that ESPs focus more on baseline ecological functioning while the others highlight more on maximum ecological profits. Considering the fast urbanization in most of the world's developing countries as well as the increased availability of urban landscape databases and new innovations in ESPs identification technologies, there is a rapidly growing potential for applying ESPs in urban landscape management in order to meet environmental sustainability targets.

Broad thematic areas

Broad thematic areas 1st choice: Landscape planning

Broad thematic areas 2st choice: Landscape ecosystem functions and services

Free Keywords

Landscape pattern; Ecological source; Ecological corridor; Ecosystem services demand; Ecosystem services flow; landscape planning

Outcomes of symposium

Special issue in a scientific journal (to be negotiated)