

## Landscape ecology and sustainability

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### The sustainability revolution and landscape ecology

One of the major themes of the recent 7th IALE World Congress was “Landscape Ecology and Sustainability.” However, in spite of the many planning, management, conservation, and restoration projects presented at the congress and published in “Landscape Ecology” and other journals, the real impact of landscape ecology (LE) on decision making on sustainable land use is still very limited. With exception of the Netherlands, Slovakia, and UK, the “landscape” as the most suitable, integrative conceptual, and practical tool for sustainable development has not yet reached nation- and world-wide recognition. This IALE World Congress took place in the crucial transitional period from the industrial age to the global information age. This “Macroshift” (sensu Laszlo 2001) is marked by a severe ecological, cultural, and socio-economic crisis, in which human society has little time left for the choice of navigating this transformation either to a breakdown or to breakthrough towards a sustainable world. Such a breakthrough is a “chaos point” (Laszlo 2006), during which any input or

influence on the system, however small, can replace existing trends by new trends and processes. It can be achieved only by an urgently needed, ecological, socio-economic and cultural and technological “*sustainability revolution*”, leading to the sustainable future of nature and human life on Earth.

In this sustainability revolution full use of scientific and technological potentials should be made for a *post-industrial symbiosis* between human society and nature. This requires above all a shift from the “fossil age” to the “solar age” of a new world economy, based on the limitless power of the sun as the non-polluting and renewable energy source. It requires a shift from depletion of natural resources to their more efficient and wiser sustainable use, by recycling and reducing through-flows of material and energy and their adverse impacts on human and landscape health. It will be driven not only by the widespread adoption of technological innovations of regenerative and recycling methods, but also the efficient utilization of solar, wind, water and other non-polluting and renewable sources of energy. As a *cultural evolutionary process* it must be coupled with more sustainable lifestyles and consumption patterns, caring for nature and even investing in nature.

We will only be able to gain a significant influence in the decision process towards sustainability if we will take an active role in steering this Macroshift towards such an all-embracing sustainability revolution as concerned landscape scientists. Our main challenge is to respond together with all those dealing

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with sustainable land use planning and development to the demands of the emerging global information society for sustainable healthy and attractive landscapes.

### **Transformation of landscape ecology into a transdisciplinary science of landscape sustainability**

To fulfill such a meaningful role, landscape ecologists cannot follow the well-paved road of prevailing conventional and chiefly outdated mechanistic and positivistic scientific paradigms, based on the assumption that the only obligation to society and all their merit as “true scientists” are to provide human-detached and valueless, so-called “objective” scientific information. We need to transform our science into a goal-oriented and mission-driven “post-normal” transdisciplinary landscape science. As such we will provide useful pragmatic information which becomes meaningful for the receiver in his reaction for helping to change reality by sustainable landscape planning and design, management, conservation, and restoration. Accepting this challenge we will have to become “committed actors” (Di Castri 1997) and join all those concerned with the future of life on Earth and the welfare of all its inhabitants.

We cannot predict with certainty what will happen to our landscapes by extrapolating from what has happened in the past, and we can therefore also not predict in certain terms their future. **But we can help to shape their future.** We can attempt to anticipate their fate and the risks involved by further misuse and degradation and the prospects for further sustainable development. We can illustrate these anticipations by modeling different scenarios, realizing the most desirable scenarios, both for human society and nature, and prescribe the best practical remedies. For this purpose our landscape theory cannot be bound by a rigid, human detached and mechanistic predictive theory, for which classical Newtonian physics has served as a model. Landscape ecology has to become a “post-normal” prognostic and prescriptive and normative science. It has to be guided by a much broader and flexible, future-oriented and holistic view of the world systems, of

our global, deep ecological and cultural crisis, and our readiness to contribute our expertise as scientists to become involved in their solution.

To cope with the complexity of landscapes as an integrative part of the complex network interactions between nature and modern life, we will have to bridge the gaps between the natural sciences, the social sciences, the arts and humanities. This will demand a shift from a disciplinary, reductionist, linear thinking to a much broader integrative systems thinking and acting, joining forces with concerned, environmentally and ecological-oriented scientists from all these fields in co-active landscape studies. This means that we cannot restrict ourselves merely to the study of the geophysical and ecological aspects. We will have to deal also with all relevant natural and human-ecological aspects, concerning the people living in these landscapes, using, perceiving and shaping them. We will have to consider not only the material and economic needs of the people, but also their spiritual needs, wants, and aspirations, their dignity and equity.

As I have pointed out in a transdisciplinary education program for sustainable development (Naveh 2002, 2007), most Asian developing countries, like China, have still the chance to avoid the fatal mistakes in highly developed industrial countries. Asian people should not accept uncritically the strife of most Western people to pursue only one-sided economic goals of quantitative and materialistic values, by which development is regarded as economic growth, and not as overall qualitative improvement and progress. They still have the opportunity to develop their own version of sustainable development, based on authentic and indigenous natural and cultural values and traditions, such as shaped by the naturalism of La-Tzu, the social discipline of Confucius, and the concerns with personal enlightenment of Buddha. The major challenge for landscape scientists in all developing countries is to ensure that in their work their native cultural values should be **modernized but not westernized** by careful, step-by step transformation into well-adapted, comprehensive, planning and land use strategies to provide lasting, synergistic benefits for the people, their economy, culture and their rural and urban landscapes.

## Trends towards holistic and transdisciplinary landscape ecology

Already in 1982, the first president of IALE Isaac Zonneveld, raised the flag of a holistic and transdisciplinary landscape ecological paradigm at the first international conference, organized by the Netherlands Association of Landscape Ecology (Zonneveld 1982). Dutch landscape ecologists succeeded to create a truly interdisciplinary and influential science of landscape assessment, design, planning, and conservation management. They took the lead in innovation and transformation towards inter- and transdisciplinary landscape research and management in Europe, demanding much broader holistic conceptions with clearer definitions of theoretical and practical aims (Klijn and Vos 2000; Tress et al. 2003, 2004). As reflected in the special symposium on holistic LE in action (Palang et al. 2000), also in other European countries, there are similar trends. The implementation of transdisciplinary concepts, methods and practices in Germany and Central Europe was discussed by Bastian and Steinhardt (2002). Major advances towards transdisciplinary concepts and their application in the Mediterranean have been presented by Makhzoumi and Pungetti (1999). There are also many promising signs in the USA and Canada—the strongest and most active branch of IALE—transdisciplinary aspects are getting more and more attention (Wu 2006).

## The true meaning of transdisciplinarity

Transdisciplinarity has become of great significance in almost all spheres of life and many different fields of knowledge. However, the rapidly growing number of publications dealing with transdisciplinarity has not contributed much to a better understanding of its true meaning. In the context of scientific activities this has caused a misunderstanding of the true distinction between interdisciplinarity and transdisciplinarity, regarding the latter merely as a broader range of partnership in research than interdisciplinarity.

Transdisciplinarity certainly involves a higher level of integration and cooperation, but these distinctions are not sufficient to identify its true conceptual and epistemological meaning. They are not sufficient for a full comprehension and realization

of its potentials. As the prefix “*trans*” indicates, in contrast to interdisciplinarity it *goes not between but across and even beyond disciplines* and their related activities, creating *an entirely new type of integrative knowledge, leading to new relationships between researchers and all others involved*. Based on systems theory and network thinking a new quality of scientific knowledge should emerge, enabling a better comprehension of the complexities of the real world, which has been fragmented both by academicians and practitioners into different fields of disciplinary knowledge and interests. The main difference between both concepts lies therefore not only in the broader range of participants in landscape research, but *in the different nature of the mutual relationships of these participants, opening many more options for resolving the complex problems which landscape research is facing* (Naveh 2007).

The first prerequisite to attain this goal is to provide better opportunities for a constructive dialogue and for fruitful interactions in our IALE conferences and initiate joint meetings with other relevant scientific organizations. Instead of organizing many parallel sessions with an overwhelming amount of fragmented frontal information in overlapping sessions, each participant should present before the conference his or her lecture on the internet and only a short summary at the meeting itself in joint, interdisciplinary lectures. Also, questions and first comments and their feedback could be interchanged through the internet, and the meeting should be devoted chiefly to the final discussion, leading—if possible—to joint conclusions. Instead of publishing the lectures, which are anyhow already available on the internet, it would be much more important to publish the (edited) full protocol of summaries, discussions and conclusions of the meeting. This will be much more demanding for the organizers, but it would be much more efficient in its final transdisciplinary outcome. It will enable to utilize the benefits of electronic information with the important, enlightening person-to-person contact which we should never sacrifice to the cult of the computer.

## References

- Bastian O, Steinhardt U (eds) (2002) Development and perspectives in landscape ecology. Conceptions, methods, application. Kluwer Academic Publishers, Dordrecht, The Netherlands

- Di Castri F (1997) Editorial: landscape in a changing globalized environment. *Landscape Ecol* 12:3–5
- Klijn J, Vos W (eds) (2000) From landscape ecology to landscape science. Kluwer Academic Publishers, Dordrecht, The Netherlands
- Laszlo E (2001) *MACROSHIFT navigating the transformation to a sustainable world*. Berret-Koehler Publishers, Inc. San Francisco, USA
- Laszlo E (2006) *The chaos point. The world at the crossroads*. Hampton Roads Publishing Company, Inc
- Makhzoumi J, Pungetti G (1999) *Ecological landscape design and planning: the mediterranean context*. E& FN Spon, London, UK
- Naveh Z (2002) A transdisciplinary education program for regional sustainable development. *Int J Ecol Environ Sci* 28:167–191
- Naveh Z (2007) *Transdisciplinary challenges for landscape ecology and restoration ecology—an anthology with forewords by E. Laszlo and M. Antrop and Epilogue by E. Allen*. Springer Landscape Series 7, Dordrecht, The Netherlands
- Palang H, Mander U, Naveh Z (eds) (2000) *Holistic landscape ecology in action (Special Issue)*. *Landscape Urban Plan* 50:1–6
- Tress B, Tress G, van der Valk A, Fry G (eds) (2003) *Interdisciplinary and transdisciplinary landscape Studies: potentials and limitations*. Delta Series 2, Wageningen, The Netherlands
- Tress, G, Tress B, Harms, B, Smeets P, van der Valk (eds) (2004) *Planning metropolitan landscapes*. Delta Series 4, Wageningen, The Netherlands
- Wu J (2006) Landscape ecology, cross-disciplinarity, and sustainability science. *Landscape Ecol* 21:1–4
- Zonneveld IS (1982) Land(scape) ecology, a science or a state of mind. In: Tjallingii SP, de Veer AA (eds) *Perspectives in landscape ecology*. Pudoc, Wageningen, The Netherlands, pp 9–16