

Towards effective ecological knowledge for changing human dominated landscapes

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The problems in land use and in ecosystem and biodiversity management are still increasing. The Millennium Assessment (2005) concluded that 60% of the ecosystem functions that are essential to life on earth deteriorate or are not used in a sustainable way, due to human population growth and economic development. The effects of man-induced global warming are predicted to increase exponentially as temperature rise, with accordingly expanding environmental, social and economic damage, in particular in underdeveloped countries. This should augment the significance of science in finding and implementing sustainable solutions. Yet, recent insight in the effectiveness of science suggests a rather poor performance. For example, ecological knowledge is poorly used in spatial planning (1).

In this presentation I will propose and discuss the following seven causes for this inappropriateness of scientific knowledge in land use change.

- Ecological knowledge is often focusing at processes only, without explicit quantitative relations to patterns of landscapes and land use;
- Thresholds in non-linear relationships are relatively unknown, suggesting that ecologists do not realize how important these are for decision making;
- Ecological knowledge on pattern-process (the landscape ecological paradigm) is not linked to value. Yet, spatial planning is about the spatial redistribution of values, not that of processes;
- Values attributed by scientists may be built into predictive models and guidelines, making these tools illegitimate to users;
- Most ecological models are prescriptive linear chains of knowledge, not allowing flexibility for use in the local context of planning areas, and inappropriate to collaborative landscape planning;
- Most ecological models and decision supporting tools may be suitable for policy assessment at large spatial scales, but inappropriate to the local scale, where many land use decisions are being taken;
- Ecological knowledge is often developed in isolation from other scientific disciplines, preventing interdisciplinary solutions.

In summary, most models prescribe positivist, biologically focussed solutions to what are normative, complex conservation problems typically driven by social and economic issues (2). Recent experiences with knowledge co-production show scientists can improve the effectiveness of their knowledge in solving land use problems by developing their methods in interaction with practitioners, and testing its generic value in other case studies [3].

[1] Termorshuizen, J., Opdam, P., Van den Brink, A. (2007): Incorporating ecological sustainability in landscape planning. *Landscape and Urban planning* 79: 374-384.

[2] Knight A.T., Cowling R.M., Campbell B.M. (2006): An operational model for implementing conservation action. *Conservation Biology* 20:408-419.

[3] Nassauer, J., Opdam, P. (2008): Design in science: extending the landscape ecology paradigm. *Landscape ecology* 23:633-644.