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Planning-Based Approaches for Supporting Sustainable Landscape Development

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Abstract

Planning often yields only limited influence on policy making. This paper explores how planning could address this challenge and support most effectively transitions towards sustainable landscape change. In merging insights from sustainability science research and nine recently concluded case studies of landscape planning, the paper reflects upon the applicability of the concept of "transition support", discusses planning approaches and their perceived effectiveness to induce change in landscape governance, and identifies lessons learned. The paper's outcomes include insights and potentially useful approaches that can be attributed to four emerging cross-cutting themes: approaches for (i) dealing with the high degree of complexity and uncertainty of landscape systems, (ii) integrating the various perspectives of experts, decision makers, and stakeholders in the assessment process (transdisciplinarity), (iii) enhancing policy influence, and (iv) initiating and sustaining learning and adaptive governance.

Keywords:
landscape planning, sustainability science, transdisciplinarity, sustainable development, transitions

Introduction

A topical issue of contemporary landscape ecological research is the question of how planning-based approaches could influence landscape transformations and support society's efforts for navigating them towards more sustainable pathways. Conventional disciplinary views of landscape ecology and planning often yield limited influence on transdisciplinary discussions that move forward actions for sustainable landscape transformation. In order to gain insights into possible reasons for this limited influence, this paper attempts to realign landscape planning approaches at the nexus of insights of the emerging sustainability sciences (Clark and Dickson 2003, Kates et al. 2001, Kauffman 2009), an interdisciplinary field explicitly focusing on theory and methods of transitions supported by science and planning.

Recent work in the fields of research on governance for sustainable development, sustainability science, and related areas established three points of departure:

First, the term "sustainable development" today is used ambiguously and almost always discordance exists about what exactly is to be developed, to be sustained, and for how long (cf. Kates et al. 2005). Therefore, this paper discusses the extent to which sustainable landscape development should be understood as a transitional process rather than a static optimal configuration of land uses.

Second, we argue that navigating such transitions would require continuous negotiations between socio-economic and political forces around land use development and the long-term benefits of sustained provisions of ecosystem goods and services (cf. Albert and Vargas-Moreno 2009). Science and planning can provide relevant support, but will require new modes of conduct (cf. sustainability science, Kates et al. 2001).

Third, landscape ecology and planning is arguably well positioned to adopt a key role in the emerging sustainability sciences (cf. Wu 2006, Wu 2008). However, innovative approaches are needed to realign landscape planning theory and practice with the foundational concepts of sustainability science. Key contributions from sustainability science to landscape planning include approaches for considering and dealing with the different magnitudes of scales (time, space, and function), multiple balances (dynamics), multiple actors (interests) and multiple failures (systemic faults) around sustainable development issues (Reitan 2005). Vice-versa, landscape ecology and planning contributes integrative approaches to coupled human-environment systems, provides theory and methods for studying spatial heterogeneity, tools for scaling and uncertainty analysis, as well as metrics for quantifying sustainability (cf. e.g. Blaschke 2006, Naveh 2007, Wu 2006, Wu et al. 2006). In particular, the planning focus on landscapes and their cultural, natural, and political dimensions serves as a robust transdisciplinary medium to develop and assess strategic policy alternatives in support of transitions towards sustainable development.

Against this background, this paper's key objective is to explore how planning-based approaches could be employed to support most effectively transitions towards sustainable landscape change. In drawing on insights from a nine recently concluded case studies of landscape planning as well as a review of relevant literature, the paper aims at

- testing the applicability of the idea of landscape planning for supporting transitions,
- discussing useful planning theories, methods, and tools, as well as their perceived effectiveness to induce change in the ongoing public debate and political decision-making, and
- identifying and discussing lessons learned from the empirical cases, guiding principles for future applications, as well as areas for further research.

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Insights from recent case studies

As empirical evidence, nine recently published case studies of landscape planning were selected to illustrate and reflect upon key issues of influencing landscape transitions towards sustainable development. They share the notion of landscapes as useful foci for assessment and planning, but employ a diversity of approaches, methods, and varying degrees of public participation. Taken together, they underpin the challenges faced in attempting to influence landscape development, and shed some light on opportunities for successfully overcoming them.

Angelstam et al. (2009) report on approaches for integrative knowledge production to address the challenge of governing and managing a riverine landscape in Vilhelmina municipality, Sweden. They analyzed a plan to divert a large proportion of water from a mountain valley to another to increase electric power generation, considering both the social and ecological systems. Based on a range of interviews with local actors and stakeholders, they found that local debate remained quite narrow, that an active democratic process could be enacted, but that insufficient governance arrangements inhibited a transitional process towards more "negotiated" landscape development. Key conclusions are that effective planning needs to be at the landscape scale, but incorporating various scales from international to local, as well as considering both informal as well as the different stages of formal planning processes (i.e. strategic, tactical, and operational).

In a case study in the Auvergne, France, Peyre and colleagues (2009) shed light on approaches for enhancing agricultural advice through stronger consideration of ecological processes. The specific challenge of the region was the regular outbreak of water voles and their negative consequences for agricultural productions and human health. Based on the finding that the rodent outbreaks might result from limited habitats for predators as well as unsuitable landscape compositions and farming practices, the research team conducted more than twenty interviews with farmers to assess their perceptions of nature and rodent populations related to their farming systems. The aim of the interviews was to better understand farmers' decision making as a basis for more ecologically aware planning and farming advice.

Lipp (2009) reports on the development of a planning strategy for the maintenance and conservation of urban trees in the city of Potsdam, Germany, under potential impacts of climate change, in particular higher average temperature and temporarily lower groundwater availability. He argues that preferences for trees in the urban area needs to be altered since some species common today (i.e. *Quercus robur*) are less well adapted to changing climate conditions than alternative species.

Probst (2009) evaluates the effectiveness of current planning instruments for land use, nature conservation, forestry, and agriculture, on the basis of 50 years of landscape development in the region of Isarwinkel in the Bavarian Alps, Germany. The study found that the considered instruments were of little effectiveness, with key political objectives not being attained and large deficiencies in implementation. Probst asserts an urgent need for political and societal action if characteristic cultural landscape features were to be preserved, and proposes stronger consideration of landscape dynamics, prioritization of development goals, better sectoral integration, and awareness rising for landscape issues.

Quintas and Curado (2009) explore the capacities of urban green networks (UGNs) in Portuguese municipalities as promoters of quality of life. UGNs are a concept recently introduced in Portugal as an urban development strategy, understanding the aspired quality of life as a balanced and resilient environment consistent with social and economic development, rational resource use, and the preservation of natural heritage. The study concluded that urban green networks should be planned and institutionalized with a greater emphasis on multifunctionality, considering not only recreational and ecological benefits.

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Damyanovic (2009) introduces the concept of "differentiated view" as a generally critical and feminist approach to raise awareness of the dissimilar perspectives of women and men in planning processes. She reported on a case study in the rural municipality of Lengau, Austria, that considered cost-saving, smart growth settlement development options. The study highlighted that bottom-up approaches promoting equal opportunities for diverse citizens groups were needed to complement top-down strategies. Landscape planning could act as a "mediator" encouraging men and women to take part in planning and shaping landscape development.

Digiovinazzo et al. (2009) consider ecological thresholds for the management of suburban fragmented forests. The study assesses the relationship between woodland indicators and features of forest fragments in a part of Lombary, Italy. The authors suggest that using thresholds in landscape planning allows for quantitative estimations of required patch sizes to conserve certain species.

Whitehead (2009) reports on the policies and processes necessary to establish a regional forestry framework for the Edinburgh and the Lothian's region of South East Scotland. He analyzes the influence of the planning system and rural development priorities on implementation, and highlights the importance of providing clear guidelines for practitioners as well as the need for longer term process that integrated government agencies, local authorities, NGOs and local citizens in a collaborative partnership.

Cassar and colleagues (2009) report on a study from the Island of Gozo, Malta, that aimed at developing a methodology for combining specialist input with stakeholder participation in conservation planning. The authors found that transdisciplinary planning strategies can integrate ecologic and human dimensions, as well as society's land uses and natural landscape features. The study emphasizes that experts and citizens can adopt complementary roles in landscape planning and conservation. Planning proposals should consider important protection areas as part of a wider matrix of land uses and their social and ecological benefits. Planning processes then need to take into account various perceptions, and to initiate collaborative landscape management among various stakeholders.

Discussion and Conclusions

The review of the case studies suggests that the concept of "planning for supporting transitions" may serve as a useful framing for assessing approaches for influencing future landscape change. The following discussion of current challenges for landscape planning and potentially useful approaches for addressing them concentrates around four recurrent themes, namely approaches for (i) dealing with the high degree of complexity and uncertainty of landscape systems, (ii) integrating the various perspectives of experts, decision makers, and stakeholders in the assessment process (transdisciplinarity), (iii) enhancing policy influence, and (iv) initiating and sustaining learning and adaptive governance. These themes were reflected upon in many of the case studies (cf. tab. 1).

Complexities and Uncertainties

The case studies suggest that landscape approaches supporting transitions should address complex holistic models. These models should synthesize the most relevant institutions and actors, important ecologic, economic, social and cultural processes, and their dynamic interactions across scales and levels Model development should be devised through a range of transdisciplinary procedures and methods to ensure procedural legitimacy and universal access of diverse knowledge systems. As such, the participatory modeling could help devise simpler ways to develop readings from these complexities to a common across-systems language.

The process of complexity management is also challenged by the increasing level of uncertainties surrounding the planning. Uncertainty challenges the sustainability of landscapes due to direct and indirect interactions with fluctuating dynamics such as the market economies which affect the use of land and natural resources, social

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Table 1: Selected case studies and references to cross-cutting themes

Paper Titles	A*	B*	C*	D*
Angelstam, P., Törnblom, J., Axelsson, R., Elbakidze, M., Andersson, K.: *The challenge of governing and managing a riverine landscape– towards integrative knowledge production*		X	X	X
Peyre, G., Morlans, S., Dampfhoffer, M., Michelin, Y.: *From a territorial agro-ecological problem to a sustainable landscape management: toward an agro-anthropological approach*		X		X
Lipp, T.: *Sustainable planning strategies for the maintenance and conservation of urban trees under conditions of climate change*	X			
Probst, T.: *Landscape Change in the Alpine Space and Political Intervention Approaches – an Evaluation of the Effectiveness of Instruments from Spatial Planning, Nature Conservation, Forestry and Agriculture*			X	
Quintas, A. V., Curado, M. J.: *The Urban Green Network as a Quality of Life Promoter*	X		X	
Damyanovic, D.: *"Differentiated view" in Landscape planning as a planning-based approach for sustainable landscape development*		X		
Digiovinazzo, P., Fi cetola, F. G., Padoa -Schioppa, E., Bottoni, L.: *Ecological thresholds for the management of suburban fragmented forest*	X			
Whitehead, I.: *Developing a Regional Forestry Framework for the Edinburgh and the Lothians Region of South East Scotland based uponhabitat network connectivity.*	X		X	
Cassar, L. F., Griffiths, G. H., Morse, S.: *A landscape approach to planning conservation: integrating ecological valuation and stakeholder participation for sustainable development in a Mediterranean island context*	X	X		

*Explanation: A - Complexity and Uncertainty, B - Transdisciplinarity, C - Policy Influence, D - Learning and Adaptive Management

dynamics and the compositions of actors in a landscape and growing natural and climatic changes that challenges the provision of ecosystems services and goods and increase the vulnerability of communities. While multiple studies suggest that uncertainty can be minimized by complex predictive models, they also indicat that this condition may limit the involvement of a wide range of stakeholders important to sustain sustainable transitions. One of the suggested ways to address uncertainty is the development the explicit capacity to monitor the effectiveness and appropriateness of proposed landscape changes over time.

Lastly, discussion about complexities and uncertainties deal with the role of the landscape planner per se, suggesting to adopt a mediating function in assisting the process of synthesis and discussion toward set objectives rather than the traditionally more technocratic and scientific role. This notion responds, as noted by Vargas-Moreno (2008), to the emerging recognition that partici-

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patory development and democratic planning demands from landscape practitioners a new "expert-facilitator role" to mediate and advise in the complex debate of land resource planning between local, government and scientist communities. This role is particularly important for support that requires the collaboration and knowledge integration of experts from diverse backgrounds in what Angelstam et al. (2009) refer to as both informal and formal planning processes.

Transdisciplinarily

The case studies argue that given the multiple agencies, researchers, and civil society groups involved as well as the complex nature and the multiple scales of intervention, it is required to adopt a transdisciplinary approach to support transitions towards sustainable landscape development. This notion implies that problems, approaches and solutions emerge from different unrelated disciplines and user-groups typically seek a set of commonly-shared goals. The involvement of multiple agencies, groups and researchers working together should not be perceived as a partial byproduct of the nature of the studies of landscapes systems but rather a desirable and necessary condition to achieve and pursue the continuous negotiations between socio-economic and political interests and the long-term benefits of sustained provisions of ecosystem goods and services at the landscape scale.

A major finding of the case study review is that to support a transdisciplinary approach, environmental, socio-cultural, natural and economic goals should not only be simultaneously pursued and supported, but also represented and visualized. These conditions give the opportunity to all participants to learn from each other's dimension and positions and to acknowledge their limitations and contributions in the overall process of knowledge and solutions co-generation and actions. Most case studies suggest that diverse methods for facilitating communication and knowledge exchange between diverse communities should be tested and applied, for example mental mapping and participatory modeling. Alternative formats should be explored to deliver planning outcomes in a way useful for local actors. As exemplified in the Malta case (cf. Cassar et al. 2009), top-down and bottom-up initiatives are complementary and equally relevant in this regard. Furthermore some studies propose that in the process of assessment, negotiation, planning and implementation, some disciplinary approaches proved to be robust and capable of adopting important roles as guides. A case in point is presented by Peyre and colleagues (2009) who take a primarily anthropological approach to better understand farmers' perspectives on alternative landscape management practices as a foundation for more salient landscape planning.

Policy Influence

One other emerging cross-cutting theme of the case studies is enhancing policy influence. Many landscape planning projects successfully produce reports, maps, and scholarly articles, but yield only limited influence on public perceptions, discussions, and policy making. This deficit of current landscape science and planning efforts may be explained through the proposition that assessments generally tend to be influential on policy to the degree that their processes and outcomes are perceived as simultaneously scientifically credible, politically salient, and procedurally legitimate to the relevant audiences (Cash et al. 2003, McKnie 2007, Mitchell et al. 2006, NRC 2007). Symposium participants particularly emphasized that the salience of the research is often missing or overlooked. Defining the salience of the research is a key challenge for enhancing the influence of current planning approaches, since so far many efforts only insufficiently considered the respective implementation contexts. For example, planning should stronger link with existing legal and legislative frameworks that will ultimately define the way that planning propositions are implemented. Furthermore, studies emphasized to better illustrate the indirect financial benefits of sustainable landscape development. The Edinburgh and the Lothians case (Whitehead 2009) for example considered financial measures of ecosystem services provision a particularly important aspect for conveying the benefits of urban green networks.

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Learning and Adaptive Governance

The case study review finally suggests that given the complex dynamics of landscape change, and the multiple uncertainties in their future evolution, planning should aim at supporting continuous processes of learning among decision makers, planners, scientists, and stakeholders. Conventional approaches to develop comprehensive masterplans might be useful for implementing defensive strategies and guiding development and investments, but often proved inflexible to adapt to changing social, economic, and ecological conditions (cf. Vargas-Moreno 2008).

The required social learning (cf. Pahl-Wostl et al. 2007, Parson and Clark 1995) can be defined as the "growing capacity of a social network to develop and perform collective actions" (Maurel et al. 2007). Social learning involves understanding policies and actions as experiments, monitoring essential indicators to acquire systemic feedback (NRC 1999), and adaptive governance (Brunner et al. 2005, Folke et al. 2005, Olsson et al. 2006).

Based on the insights from the cases, this learning could include comparatively assessing completed case studies of landscape planning concerning their successes and failures, and attempting to extract lessons for future applications. Additional insights could be gained by tapping into knowledge and know-how in related fields of science and practice (e.g. anthropology), and eventually adapting approaches for landscape planning applications. Furthermore, planning implementation strategies should include the definition of useful indicators, and their continuous monitoring. This would allow for an adaptive realignment of the goals and means of planning and policy making in light of emerging developments and unfolding insights from research and practice. This clearly is a major challenge, since institutions, scientists, and decision makers are generally resistant to adaptive approaches that are long-term, inherently based on experimentation, and understand potential failures as necessary parts of the learning process.

Outlook

Despite the case study review's valuable contributions to the discussion of the four cross-cutting themes, it also became apparent that much knowledge is still needed to be acquired to develop transdisciplinary research so that it can be effectively and routinely applied. Additional comparative research is needed to gain a more thorough understanding of the distinct advantages and disadvantages of various landscape planning approaches.

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