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Landscape Planning with Ecosystem Services

Theories and Methods for Application in Europe

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To the landscape planners of tomorrow

Preface

In an era where the Internet dominates knowledge acquisition, it seems obvious to ask the question "why a book about landscape planning methodologies?" We decided to write and edit this book for two main reasons:

1. Practitioners and students of landscape planning take in huge amounts of unconnected information. Only with difficulty can students put papers about separate aspects into a context that enables them to use methods critically and in a targeted manner.
2. The question "how to evaluate the landscape?" is often answered by landscape planners and others involved in environmental planning or impact studies across European countries in different ways. However, the purposes and tasks are often very similar, as indeed are many of the relevant methods in a European context.

Thus, the overall motive for this book is to provide orientation in the information jungle. We also feel that many of the pressing environmental challenges can be best addressed by combining the practical orientation of landscape planning with concepts and approaches from the burgeoning literature on ecosystem services and natural capital. In this book, we discuss how these two fields can be integrated and review hands-on methods which, in principle, are applicable in all European countries. A feature of this book is that an emphasis is placed on combing evaluations based on legal norms with those based on public preferences, including economic approaches. Furthermore, over 45 authors from different disciplines have adopted a common framework for discussing their methodologies. This ensures a consistency of material for the reader which, in turn, assists in combining different elements in practical applications.

It has taken a long time to complete this book, and many people have supported our vision with advice, energy, creativity, and sheer hard work. We would particularly like to thank all of the chapter authors and reviewers. Advice from the editors of the Springer Landscape Series and publishing staff (particularly Nel van der Werf) is also much appreciated.

Financial support from several research grants has assisted with our work on a number of chapters in the book. In particular, Andrew A. Lovett would like to acknowledge the support from the UK Economic and Social Research Council (award ES/L011859/1 for the Business and Local Government Data Research

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We are also very grateful to the team of people in Hannover and Norwich who have helped with tasks such as proofreading, redrawing diagrams, checking references, formatting, and the multiple other tasks that are involved in preparing the final version of a manuscript. Our sincere thanks go to Martha Graf, Judith McAlister-Hermann, Zhiyuan Peng, Sascha Vandrey, Anna-Lena Vollheyde, Louise von Falkenhayn, Eick von Ruschkowski, and Trudie Dockerty. Special thanks are due to Ingrid Albert for acting as coordinator of this team and making sure the plates kept spinning.

An international collaboration of this type has involved considerable travel and visits to our respective universities. We would therefore like to thank the Hotel in Herrenhausen for providing a "home from home" for Andrew A. Lovett during visits to Hannover and to Gilla and Lena Sünnenberg for hosting Christina von Haaren during stays in Norwich.

We hope that readers of this book will gain as much insight from reading it as we have benefited from planning and writing it.

Hannover, Germany — Christina von Haaren
Norwich, UK — Andrew A. Lovett
Hannover, Germany — Christian Albert
September 2018

Contents

Leitbilder and Scenarios in Landscape Planning

27

Christian Albert, Christina von Haaren, Hermann Klug, and Raphael Weber

Abstract

This chapter introduces the concepts of 'Leitbilder' and scenarios in landscape planning. Leitbilder can be understood as descriptions of target states that diverse stakeholders can agree on. Scenarios represent plausible descriptions of pathways of change that can help explore resulting future land use changes (alternative futures) and their respective impacts.

Keywords

Leitbild · Scenarios · Alternative futures

27.1 'Leitbilder' in Landscape Planning

The term 'Leitbild' is used in various ways in landscape planning and nature conservation in Germany. Based on an extensive review of relevant literature, (Potschin et al. 2010: 657) define Leitbilder as follows:

> A Leitbild (pl. Leitbilder) is a summary statement describing a desired and releasable future state for a specific issue or spatial unit, which takes account of the primary objectives and drivers in a holistic and integrated way. All present knowledge is used to balance future constraints and demands from social, economic, cultural, political and environmental perspectives. Therefore, a commonly accepted Leitbild projects a specified trajectory for

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> the future spatial structure, distribution, utilisation, condition and development of the socio-natural system. It provides a set of guidelines that shape actions, and a framework within which the impact of particular developments can be judged and socially negotiated.

While some authors interpret a Leitbild as a sectoral activity, others use the term to describe a cross-sectoral, integrated vision for a particular study area. In addition, a Leitbild can be of varying levels of detail – ranging from vague ideas of the general vision to spatially explicit, detailed concepts with locally specified development targets (cf. von Haaren 2004).

A Leitbild includes a future vision as well as guidelines on how an identified target condition can be reached. The objectives are identified and deduced on the basis of the fundamental norms and principles of sustainable development (Chap. 4), which also guide the assessment of ecosystem services. As described in Chap. 21, the derivation of objectives and measures often results in a complex system of mandatory and desirable objectives, which may be hard to communicate to the public and decision makers. The key role of a Leitbild is to put the complex public and possibly individual objectives in the context of other social, economic and environmental information and to transfer this into an easily comprehensible but holistic-integrated view of the future conditions (including functional relationships) of the landscape to be attained. This makes the Leitbild development process particularly important for communication between different stakeholders. For an example of the Leitbild approach see the paper by Klug (2012).

Leitbild prepare for, and complement, detailed landscape development targets and corresponding mid-term actions. Developments and resulting consequences need to be reviewed continuously and considered carefully in the planning process. Thus, a Leitbild is not a static and final concept but illustrates the spectrum between minimum and optimal developments (Klug 2006). It emphasizes different alternative solutions within planning objectives and priorities set, e.g. a Leitbild on ‘sustainable use’ or ‘optimizing habitat and species protection’. A Leitbild can consist of text, maps, or images created by the planning team. Increasingly, a Leitbilt includes spatio-temporal analysis and visualization using computer-generated maps and 3D Models (Schroth et al. 2011; Wissen-Hayek 2009; Shaw et al. 2009).

A recurring theme in the debate about Leitbilder is the question of whether historic, cultural landscapes or a multifunctional landscape should be used as the preferred end point. While historic cultural landscapes often seem to be the aspired option for many citizens, their development is often not feasible within the current governance and implementation context (von Haaren 1988, 1991). Instead, landscapes designed for functionality, for delivering ES, including aesthetics, are usually considered much more appropriate. Such multifunctional landscapes can, however, include small-scale targets for conserving, restoring or creating historic forms of landscape development, but only within a broader fabric of multifunctional use.

As described in depth by Potschin et al. (2010), using a case study of Leitbild development from the Mondsee in Austria, the creation of scenarios of future changes can be a useful approach to explore diverging perspectives and to come to

common ideas for a Leitbild. While Leitbilder focus primarily on the potential target situation, scenarios emphasize the pathways of change and potential impacts on different objectives.

27.2 Scenarios in Landscape Planning

Scenarios have been formally used at least since the end of World War II in the field of war game analysis (Shoemaker 1993; van der Heijden 1996). Civilian application of the scenario technique in planning was pioneered by Herman Kahn (1967) and others and has been further developed and applied in business planning (e.g. Wack 1985a, b; von Reibnitz 1987; Gausemeier et al. 1995; Georgantzas and Acar 1995; Schwartz 1996; van der Heijden 1996). At least since the 'Limits of Growth' study by Meadows et al. (1972), scenarios have been applied to numerous long-term environmental challenges of public concern, ranging from global to regional and local scales (Gallopin et al. 1997; Nakicenovic et al. 2000; Raskin et al. 2002).

The field of landscape and environmental planning has seen the application of scenarios for several decades. These have received increasing attention in recent years, which is reflected in a growing number of publications in relevant journals (e.g. Albert et al. 2012, 2016; Fritsch 2002; Theobald and Hobbs 2002; Steinitz et al. 2003; Tress and Tress 2003; Baker et al. 2004; Hulse et al. 2004; Nassauer and Corry 2004; Santelmann et al. 2004; Shearer 2005; Sisk et al. 2006; Bohnet and Smith 2007; Stock et al. 2007; Walz et al. 2007; Grêt-Regamey et al. 2008; Schroth et al. 2009). Excellent reviews of the history and use of scenarios in spatial planning are available in Shearer (2005) and Xiang and Clarke (2003).

Within landscape planning, scenarios can be used to develop storylines of future landscape change, e.g. modelling the potential land use and land cover changes (LUCC) resulting from them (alternative futures), and assessing their consequences (cf. Hulse et al. 2004). Given that the terms 'scenarios', 'alternative futures' and 'modelling' are interpreted differently in the literature, depending on context and discipline, some further clarifications is needed. According to the Millennium Ecosystem Assessment (MEA) scenarios are:

> "plausible and often simplified descriptions of how the future may develop based on a coherent and internally consistent set of assumptions about key driving forces and relationships" (Carpenter et al. 2005: 148).

Scenarios describe potential futures and the ways of attaining them, as well as potential impacts on diverse targets. While scenarios describe potential pathways of change, alternative futures are understood as possible end states. The latter illustrate (for example) the land use and land cover configurations of the landscape that may result from the changes within a particular scenario at a specified point of time in the future (Fig. 27.1, cf. Steinitz et al. 2003, Shearer 2005). Modeling LUCC change

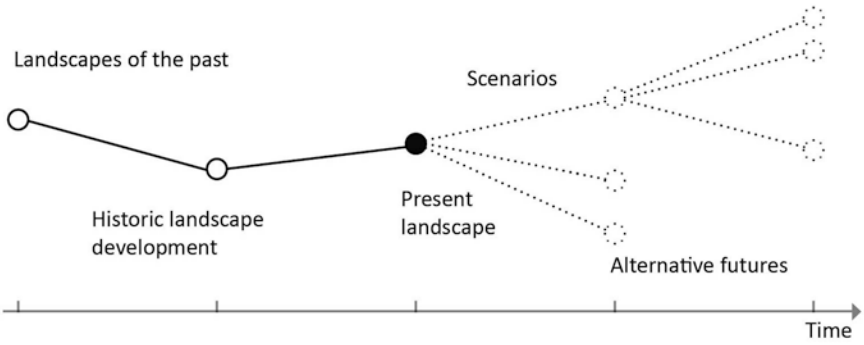

Fig. 27.1 Scenarios and alternative futures. (Source: Albert 2011, based on Steinitz et al. 2003)

is a means of producing a simulation of potential future landscape patterns, which may be based on a formal computer model or intuitive reasoning, based on simple decision rules.

27.2.1 Types of Scenarios

Scenarios in landscape planning can be of various types and embody various approaches. For example, Bradfield et al. (2005) describe the evolution of three 'schools' of scenario development, while Bishop et al. (2007) summarise the different techniques for developing scenarios. Van Notten et al. (2003, 2005) present a scheme consisting of three main themes (project goal, process design, and scenario content) with various additional parameters.

To answer the question of which kind of scenario is best to use in landscape planning, Börjeson et al. (2006) propose a particularly useful typology. The authors distinguish between predictive, explorative and normative scenarios with two subcategories for each type (see Table 27.1).

The first group of scenario types is predictive and responds to the question *'what will happen?'* in the more or less near future. One kind of predictive scenario is forecasts, dealing with the results of a possible event occurring with high probability. The second kind of predictive scenario, what-if, predicts the impact based on a set of preconditions. For example, what-if scenarios may reflect several possible outcomes based on the different impacts of a participation initiative.

A second group is explorative scenarios which concentrate on the question *'what can happen?'*. These focus on the far future horizon and can be divided into external and strategic scenarios. External scenarios observe the outcome of external events on the local setting or policy. In contrast, strategic scenarios explore the impact of an implemented action or policy on an event.

The third group are normative scenarios, asking '*how a specific target can be reached?*' and include preserving and transforming scenarios. Preserving scenarios focus on internal decisions such as measures and policies which could be implemented and unfold their effects to reach a set target. Transforming scenarios,

Table 27.1 Scenario types based on Börjeson et al. (2006)

Scenario type	Description	Targeted time frame	Influencing factors	Landscape planning example
Predictive				
Forecast	Predicts the result after a foreseeable development (*What will happen?*)	Near future	External events	Forecasting a single natural phenomenon
What-if	Predicts the result based on certain preconditions (*What will happen?*)	Near future	External events	Effects of an external event (e.g. Brexit) on local landscape change
Explorative				
External	Explores possible effects of an external event (*What can happen?*)	Far future	External events	Impacts of climate change on habitats
Strategic	Explores the impact of an implemented action (*What can happen?*)	Far future	Internal decisions	Impacts of a policy choice
Normative				
Preserving	Focuses on the impact of policies or measures on the current situation (*How can a specific target be reached?*)	Near future	Internal decisions	Introducing new fertiliser application limits
Transforming	Examines the weaknesses of internal structure that could hinder reaching a specific target (*How can a specific target be reached?*)	Past (backcasting from far future)	Internal decisions	Setting up an agenda or vision

in contrast, set up an agenda or vision of the future and cast back from that point towards the present. This analysis aims to identify weak points of the internal structure which may be hindrances to achieving a certain goal. Another widely-cited approach to the characterization of scenarios is that proposed by Van Notten and colleagues (2003, 2005), addressing alternative objectives, processes, and outputs.

The objectives of using scenarios in landscape planning can range from exploration to decision support. Explorative scenarios aim at awareness raising, facilitating creative thinking, and studying the complex interactions of different processes over time. Decision support-oriented planning uses scenarios that are more or less desirable. The vantage point of the scenarios may be either forecasting or backcasting (Haslauer et al. 2012). Forecasting scenarios start from the present and explore how the future might evolve. Backcasting scenarios assume a specific future situation and explore the range of actions or developments necessary to attain (or not) the projected condition.

27.2.2 Implementing Scenario-Based Planning

The process of scenario-based planning varies according to the degree of quantitative and qualitative data and approaches used, the choice of methods, and the level of involvement of decision makers and stakeholders. At one end of the range is the intuitive approach that relies strongly on qualitative methods. The approach may use narrative outlines, texts, storylines, diagrams, pictures and/or collages to describe future developments with high levels of complexity and uncertainty. It may include non-quantifiable, normative aspects like values, mental maps, and expectations. At the other end of the spectrum is the formal approach, consisting of a rather rational and analytical exercise and often employing quantitative methods and formalized computer models. The latter approach offers structural consistency and scientific rigor through explicit assumptions. Both approaches have their advantages and recent efforts increasingly aim at combining them (e.g. Alcamo 2008; van Vliet et al. 2010). Other developments emphasise an 'Automated Geosynthesis' where standardised (real-time) data offerings are combined with open modelling interfaces for real-time spatio-temporal scenario building with stakeholders (Klug and Kmoch 2015).

The involvement and input of stakeholders and decision makers in scenario-based planning varies on a gradient from citizen-driven to expert-driven approaches (Hulse et al. 2004). The gradient can be further classified into five different levels of involvement (Arnstein 1969; Pahl-Wostl 2008; Volkery et al. 2008). At the lowest level, stakeholders and decision makers are only *informed* about the process and results of a scenario exercise. Transdisciplinary intensive participation occurs when non-scientific stakeholders are *consulted* during the exercise to provide input. *Co-thinking*, the third level, means that participants are actively involved in the development of the scenarios but do not make decisions. At the *co-designing* stage, participants are furthermore engaged in the structuring of the scenario process and the joint definition of 'game rules' for collaboration. Finally, participants can

co-decide and assume responsibility for the scenario process design, the analysis, and the recommendations derived from them.

Over the last two decades, a range of approaches and frameworks for implementing scenario-based planning have been proposed (cf. Horlitz 1998; Wollenberg et al. 2000; von Haaren 2004; Ahern 2006; Scholles 2008). While the approaches differ, most of them consist of steps to define scenario assumptions. The scenario assumptions then shape pattern-process relationships to impact the modelled land use/land cover changes and resulting consequences.

One of the most prominent approaches to scenario-based landscape planning is the Alternative Futures Framework developed by Carl Steinitz (1990, 1993, 2003). It has been employed in many projects around the world and has recently been re-interpreted as a concept for Geodesign (Steinitz 2012). The framework consists of six questions that need to be addressed in any landscape planning study (Fig. 27.2).

The framework should be passed through three times. The first cycle defines the context and scope. Within the second cycle, the methods are specified. The last

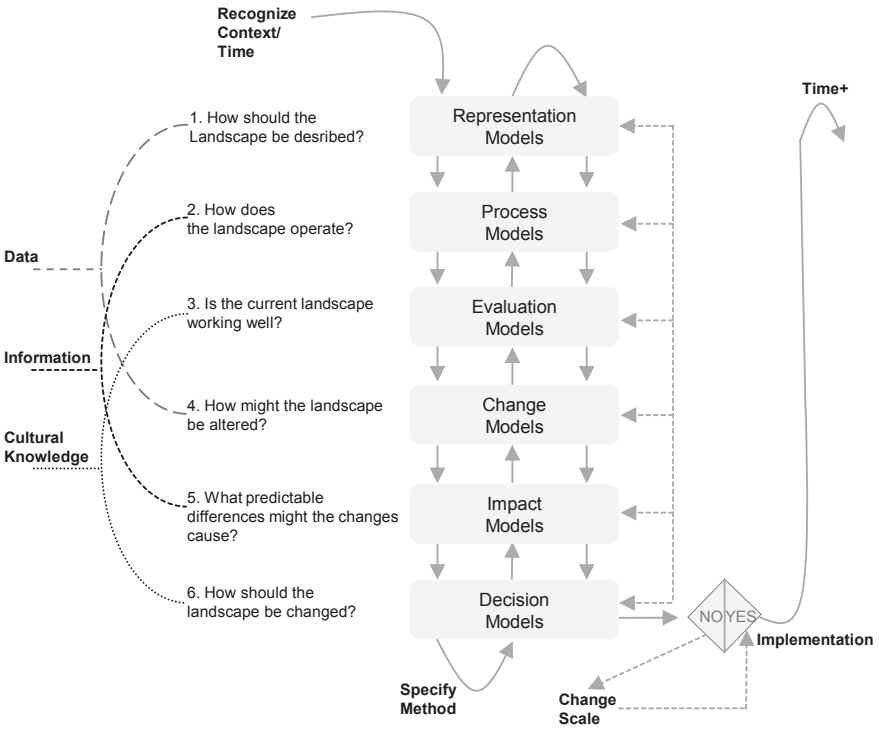

Fig. 27.2 The framework for alternative futures studies (Steinitz 1990, 1993; Steinitz et al. 2003). Scenarios are created here in the change models component, thereby answering the question of "How might the landscape be altered?". In the decision-models phase, different targets, resulting scenarios and respective alternative futures are explored in order to inform the decision-making process

cycle contains the implementation of the methods to conduct the study. The six questions that should be addressed are:

- Question 1, Representation Models: How should the state of the landscape be described? This includes considerations of the location and extent of the study area, its history and geography.
- Question 2, Process Models: How does the landscape operate? Here processes and their interactions are assessed.
- Question 3, Evaluation Models: Is the current landscape working well? This question refers to current problem issues and their location.
- Question 4, Change Models: How might the landscape be altered? This refers to which changes are foreseen for the region, which policies and actions might be developed.
- Question 5, Impact Models: What predictable differences might the changes cause? This refers to the evaluation of the foreseeable changes and an assessment of their seriousness.
- Question 6, Decision Models: How should the landscape be changed? This refers to the types and interests of major stakeholders.

27.3 Conclusions

This chapter has introduced Leitbilder and scenarios as two similar but different approaches to inform landscape planning. Leitbilder have been proposed as descriptions of target states that diverse stakeholders can agree on. Scenarios, on the other hand, can be understood as plausible descriptions of pathways of change that can help in exploring resulting future land use states (alternative futures) and their corresponding impacts. In this sense, scenarios can be regarded as a part of a larger Leitbild generation process.

The chapter has highlighted that scenarios can be used in various ways to support landscape planning (see Table 27.1). A particularly important function of scenarios can be to explore the land use changes needed to fulfill both mandatory and desirable targets. Scenarios in landscape planning can also help in exploring the consequences of different pathways of change. And finally, they can facilitate participation and aid communication about desirable goals.

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