Chapter 17
Sustainable Landscape Development

Michael Stauffacher and Pius Krütli

Abstract Sustainable landscape development is situated at the centre of sustainable development, covers the urban and rural areas, spans multiple scales, raises problems of justice, is multi-sectorial and can thus only be understood and managed through holistic approaches. The scientific field of sustainable landscape development is located at the interfaces of several disciplines, namely, landscape ecology, urban and landscape planning and rural and regional sustainable development. A bridging concept between the more natural and the more social scientifically oriented landscape perspectives is that of landscape functions and services. Sustainability science can contribute to this research with its coupled system perspective on the socioecological dimensions of landscapes. Further, sustainability science understood as transdisciplinary collaborative process of science and society offers also guidance on how to tackle the normative character of sustainable landscape development.

Keywords Functions of landscapes • Landscape services • Urban and rural planning • Socioecological systems • Transdisciplinary research • Resilience

Before reading this chapter, please reflect on your own as to what you expect to read here. Doing so, you can focus on the term "landscape", as you should already be familiar with sustainable development from the other chapters. Thus, take a sheet of paper and write down in your own words what is your understanding of the term "landscape".
After you have done so, review your notes and try distinguishing when you have referred to (i) the bio-physical environment (natural, ecological, etc.), (ii) the social side (human, individual, institutional, etc.) of the phenomenon and (iii) the interface, the interactional aspects of both (socio-ecological, human-environmental, etc.). Further, have you focussed on rural areas or have you also considered urban areas?

Now, you are prepared to read this chapter. After each chapter, you should stop and write down in your own words what you have learned so far.

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1 What Is a 'Landscape'?

The meaning of the term landscape is multifaceted (Selman 2010). One can roughly distinguish between a natural scientific, biophysical definition (ecocentric) and a definition driven by aesthetic and sociocultural criteria (anthropocentric). Whilst the first postulates an objectively given and often functionally defined area, the latter conceives of landscape primarily as a subjectively defined and purely mental object (Kirchhoff et al. 2013). According to Kirchhoff and colleagues, the second meaning can be traced back to the historical roots of the terms 'Landschaft' in German and 'landschap' in Dutch, designating 'a painting using central perspective, in which an area of land is represented as an aesthetically whole' (Kirchhoff et al. 2013, p. 38). A pragmatist's definition at the interface of both perspectives is offered by the European Landscape Convention (see Box 17.1), stressing public perception as well as physical properties. Selman (2012) introduces long lists of physical and social drivers and understands landscape development as a coupled process of both. Thus, landscapes can best be conceptualised as socioecological systems (Ostrom 2009; Walker et al. 2004) or human–environmental systems (Turner et al. 2003; Scholz 2011).

Box 17.1: European Landscape Convention: Definitions (Council of Europe 2000)

- 'Landscape' means an area, as perceived by people, the character of which is the result of the action and interaction of natural and/or human factors.
- 'Landscape protection' means actions to conserve and maintain the significant or characteristic features of a landscape, justified by its heritage value derived from its natural configuration and/or from human activity.
- 'Landscape management' means action, from a perspective of sustainable development, to ensure the regular upkeep of a landscape, so as to guide and harmonise changes which are brought about by social, economic and environmental processes.
- 'Landscape planning' means strong forward-looking action to enhance, restore or create landscapes.

2 What Is 'Sustainable Landscape Development'?

Parts of the discussion around sustainable landscape development are strongly influenced by the tradition of landscape preservation (i.e. protection from any use), which in the USA led, in the nineteenth century, to the creation of national parks based on an understanding of wilderness (Selman 2010) as reaction to the ubiquitous urbanisation and industrialisation processes. The discussions are still 'dominated by a simplistic dualism between 'traditional' landscapes and modern' (Widgren 2012, p. 105). The latter disregards that so-called traditional landscapes are themselves the product of human history and ever changing (see the various works by Marc Antrop 2005; 2006). The European Landscape Convention (see

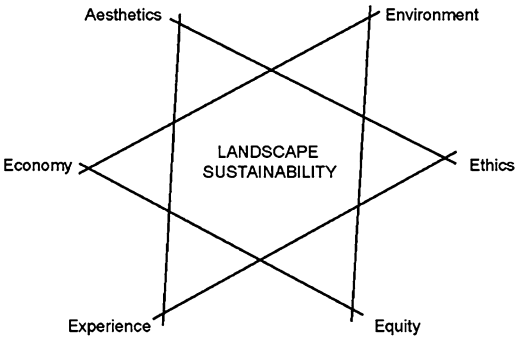

Fig. 17.1 The six Es of sustainable landscape development: environment, economic, equity, aesthetics, experience and ethics (Musacchio 2009, p. 998)

Box 17.1) became, in recent times, at least in Europe, a core reference for a much broader understanding of sustainable landscape development.

To define sustainable landscape development, Paul Selman distinguishes between different core functions of landscapes: (i) environmental sustainability concerned with spatial patterns and especially habitat fragmentation; (ii) economic sustainability in which the landscapes offer jobs (e.g. in tourism) and yield (e.g. food); (iii) social sustainability securing a just allocation of access and risks; (iv) political sustainability emphasising public participation in related political decision processes; and, finally, (v) aesthetic sustainability, because visual perception is always essential for landscapes (Selman 2009, 2010, 2012). In a similar vein, Laura Musacchio distinguishes between the six Es of sustainable landscape development: environment, economy, equity, aesthetics, ethics and experience (see Fig. 17.1). Musacchio thus adds specifically the experiential character, as landscapes have to be experienced and cannot solely be studied abstractly. She further proposes a conceptual framework for research and practice, with a special emphasis on the recognition of the coupled character of human and natural systems prevalent in landscapes, the importance of landscapes in urban areas and the multiple scales involved, from the local to the global, because various global drivers, like climate change, urbanisation and globalisation of value chains, actually impact local landscapes (Musacchio 2009).

Sustainable landscape development is thus, in fact, at the centre of sustainable development (see as well Selman 2010, p. 397): landscapes are universal, covering not only rural areas but urban ones as well (Wu 2010); they are dynamic (Antrop 2006); they are hierarchical, spanning multiple scales (Musacchio 2009); they can restrict access to certain groups and expose some groups to hazards, i.e. raise problems of justice (Walker 2011); and finally, they are multi-sectorial and can only be understood and managed through holistic approaches (Kirchhoff et al. 2013).

3 How Is 'Sustainable Landscape Development' Scientifically Tackled?

The field of sustainable landscape development is located at the interface of several disciplines, to name just the three most essential: (i) landscape ecology, (ii) urban and landscape planning and (iii) rural and regional sustainable development. The

first deals with questions about 'how landscape structure affects the functioning of landscapes' (Wiens 2013) and their ecosystem services, i.e. emphasis on analysis of the biophysical processes; the second aims at 'human and ecological communities that are resilient, sustainable, and less vulnerable to disturbance events' (Gobster 2011, p. 315), i.e. emphasis on planning and management; and the third focuses on (economic) development, including a critical discourse around sustainable development itself (Marsden and Sonnino 2008), and addresses, for instance, the role of power and knowledge (Bruckmeier and Tovey 2008). Classical landscape ecology focuses both on spatial patterns and ecological processes and largely excludes people or sees them primarily as causing landscape change.

A proposal for a bridging concept between the more natural and the more social scientifically oriented landscape perspectives has been presented by Jianguo Wu: 'landscape sustainability is the capacity of a landscape to consistently provide long-term, landscape-specific ecosystem services essential for maintaining and improving human wellbeing' (Wu 2013, p. 1013). Termorshuizen and Opdam (2009) in a similar vein introduce the concept of 'landscape services' (see Fig. 17.2). 'Landscape

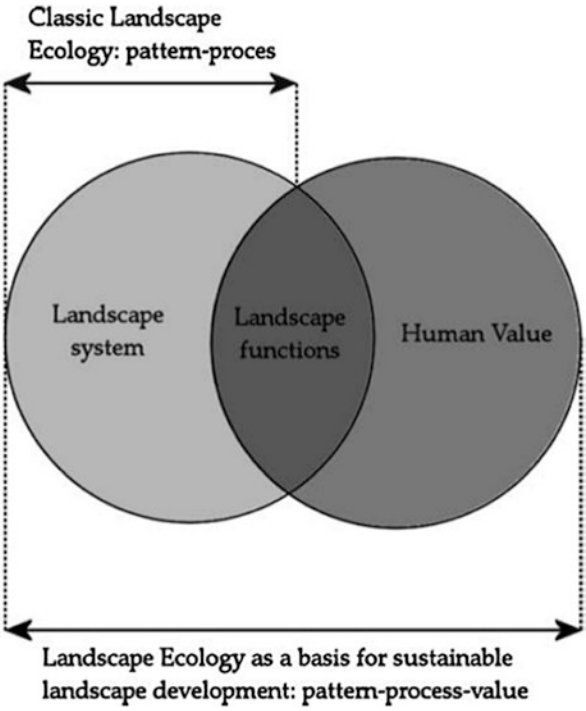

Fig. 17.2 Landscape functions as a bridging concept between the physical landscape system and the human values attributed to them (Termorshuizen and Opdam 2009, p. 1040)

services' translate landscape functions into 'services' valued by people. In contrast to the very popular concept of 'ecosystem services', Termorshuizen and Opdam claim that the landscape level is actually better suited to local planning than the generally much larger scale of ecosystems. And they further stress that the term landscape is as well used by social scientists and legitimate for local people. These perspectives share the idea of multifunctionality (de Groot 2006). Production, regulation and habitat functions are generally distinguished and focused empirically; the concept is thus 'fundamentally ecocentric, having a primary concern for the functioning of the earth systems' (Selman 2009, p. 47). In contrast, the anthropogenic dimension needs to be emphasised (Bolliger et al. 2011). Cultural services are often mentioned in this regard, but their role remains vague and disputed (Daniel et al. 2012; Kirchhoff 2012).

4 What Can Sustainability Science Contribute to Sustainable Landscape Development?

Sustainability science has to make reference to and integrate the above-presented different disciplinary perspectives from a socioecological or human–environmental system approach and given its transformational character to move beyond mere analysis and address as well practical application in real-world contexts (two examples of such approaches are presented in Boxes 17.2 and 17.3) – see Chap. 3 in this book.

Box 17.2: Human–Environmental Systems (HES)-Based Transdisciplinary Processes

The aim of the so-called transdisciplinary case study design is a process of mutual learning between science and people from outside academia for the development of orientations for sustainable development. We use a case study on sustainable landscape development in the Swiss canton of Appenzell Ausserrhoden (AR) to sketch this approach (Stauffacher et al. 2008; Stauffacher and Scholz 2011). All the presented steps are pursued in transdisciplinary collaboration between science and society, following a functional-dynamic approach, i.e. the purpose and the form of collaboration is carefully designed (Krütli et al. 2010). Further, seven postulates constituting the HES framework (Seidl et al. 2013) help in structuring the complexities of the case (Fig. 17.3).

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Box 17.2: (continued)

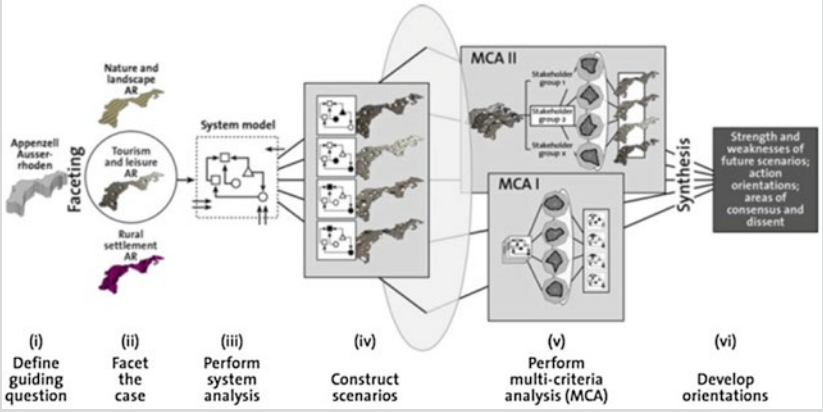

Fig. 17.3 The transdisciplinary case study design to tackle sustainable landscape development (Adapted from Scholz et al. 2006, p. 238)

- Define a guiding question
- The system (temporally and spatially) and the targeted sustainability transition are defined. In the AR case study, the guiding question reads as follows: 'How can the ecological quality of landscape in Appenzell Ausserrhoden be preserved or improved and, at the same time, the added value be sustained or even increased?'
- Facet the case
- Specific subsystems are conceptually defined to investigate the case and answer the guiding question. 'Nature and landscape', 'tourism and leisure' and 'rural settlement' were selected for the AR case study as facets; the topic 'local industries' was postponed for a subsequent case study.
- Perform system analysis
- A semi-quantitative system model is developed to describe the current state and future development of the case. In the AR case study, the history and dynamics of the region were investigated using document analysis, interviews with key stakeholders and analysis of relevant data from the statistical office. For the facet 'tourism and leisure', a massive decline in overnight stays and daily tourism was observed and many driving factors were found.
- Construct scenarios
- Based on the results of the preceding steps, different scenarios are constructed. The scenarios serve as a basis for the assessment. Three to four scenarios were constructed for each of the facets in the AR case study

(continued)

Box 17.2: (continued)

combining intuitive and analytical scenario construction (Wiek et al. 2006). For the facet 'tourism and leisure', scenarios were constructed which contrasted daily with overnight stay tourism and landscape and cultural heritage oriented towards highly intensified forms of tourism.

- Perform multi-criteria analysis (MCA)
- Two different approaches are combined: assessments referring to science-based arguments (MCA I) and obtaining individual preference information from different stakeholder groups (MCA II). A small set of nine evaluation criteria was defined for each facet in the AR case study, covering ecological, economical and social aspects. For the facet 'tourism and leisure', for instance, the number of working places in tourism, energy use and aesthetics was chosen. The analysis helped show the promising economic performance of overnight stays and the general acceptance of all stakeholder groups with respect to a tourism based on the local cultural heritage of the farmers.
- Discuss the results and develop orientations
- Insights from the previous steps serve as a basis for developing strategic orientations guiding the sustainability transition. Overall, the AR case study concluded that landscape as the main capital of the canton should be conserved but used, for agriculture, tourism and also for housing. For the facet 'tourism and leisure', it was concluded that a family holiday village with clear links to the local heritage and that marketed local farming products would be a promising option for future development. This was, in fact, latter successfully implemented in the poorest village of the canton and is still attracting families from all over Switzerland and abroad.[1]

[1] http://www.reka.ch/en/rekaholidays/rekaholidayvillages/seiten/unraesch.aspx

Both perspectives presented in Boxes 17.2 and 17.3 share a common weakness, which asks for future improvements: the societal level remains shallow. As a result, essential dimensions of societies like 'power, class, gender and ethnicity' and stratification and their consequences are largely neglected (Widgren 2012, p. 104). Thus, it is necessary to develop a more pronounced (environmental) sociological perspective on landscapes. The broad research field of environmental justice (Schlosberg 2007; Walker 2011) would certainly offer an initially promising route to follow, as social sustainability (Selman 2012) or ethics/equity (Musacchio 2009) are key for sustainable landscape development.

Box 17.3: Four-Step Framework of Resilience Management in Socioecological Systems

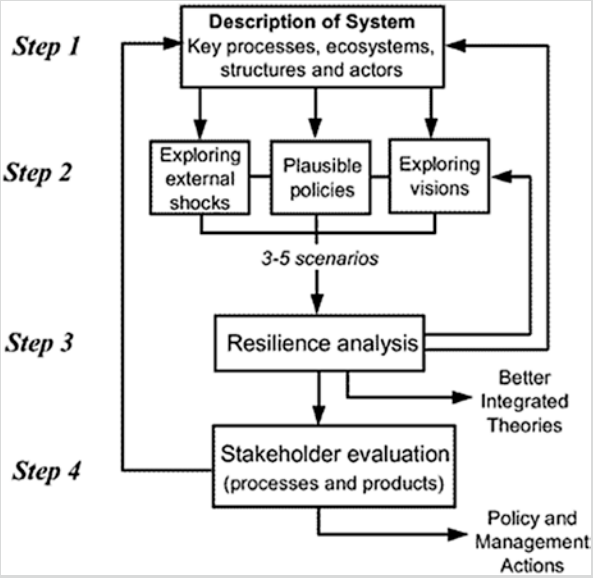

Fig. 17.4 A framework for the analysis of resilience in socioecological systems (Walker et al. 2002)

Resilience management aims at preventing 'the system from moving to undesired system configurations in the face of external stresses and disturbance', as well as nurturing and preserving 'the elements that enable the system to renew and reorganize itself following a massive change' (Walker et al. 2002). All steps briefly introduced here are implemented in interaction between scientists and various stakeholders. For more details, please refer to Resilience Alliance (2007) and Walker et al. (2002) (Fig. 17.4).

- Step 1. Resilience[2] of what?
  Development of a conceptual model of the system (including its historical profile). It should cover all of what is known and deemed important by the stakeholders and what determines them.

[2] Resilience is 'the potential of a system to remain in a particular configuration and to maintain its feedbacks and functions, and involves the ability of the system to reorganize following disturbance driven change' (B. Walker et al. 2002).

(continued)

Box 17.3: (continued)

- Step 2. Resilience to what? Visions and scenarios
  Collection and examination of external factors (major policy drivers, as well as action of stakeholders) and development of different possible future scenarios to which the system needs to be resilient.
- Step 3. Resilience analysis
  In this step, the results from the two preceding steps are integrated and the interactions between these are explored. This should allow for identifying drivers and processes that have an impact on the important characteristics of the system.
- Step 4. Resilience management (evaluation and implications)
  Finally, from the whole process and its results, a concrete action plan to increase the resilience of the system is derived.

In conclusion, sustainability science could contribute to research on sustainable landscape development with its coupled system perspective on human–environmental/socioecological dimensions of landscapes. At the same time, sustainability science, understood as a transdisciplinary collaborative process of science and society, also offers guidance on how to tackle the normative character of sustainability transitions. Conversely, the broad literature of sustainable landscape development can enrich sustainability science with concrete expertise, for instance, in landscape ecology (spatial patterns and ecological processes) and landscape aesthetics (cultural heritage).

- ***Task***: *Review your notes from the beginning and the short summaries you wrote after each chapter and reflect on the following (you would preferably do this in a group with 2–3 students): Would you revise your initial notes on 'landscape'? If yes, how and why?*

Further Reading

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Important Weblinks

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