Chapter 12
Discursive Relationships Between Landscape Science, Policy and Management Practice: Concepts, Issues and Examples

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Abstract Different approaches have been proposed to help the science of landscape ecology achieve greater policy relevance. A common feature is the central role of landscape scientists as experts in solving 'place based problems' in effective ways. In practice however landscape ecologists have seldom had the impact they seek. This chapter uses concepts drawn from deliberative planning and case examples from the USA and Denmark to critically examine the science-practice interface between landscape ecology and landscape planning. It highlights the way that different roles, values, and interests interact at different stages in place based studies, and this may require a re-framing of landscape ecological science to become part of a multivalent discourse about landscape conditions and possibilities.

Keywords Deliberative planning · Landscape democracy · Place making · Spatial strategy

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12.1 Introduction

Landscape ecology seeks greater practical and policy relevance (Wu and Hobbs 2002). As Hobbs (1997: 1) has noted, "The future of landscape ecology depends on whether landscape ecologists make the decision to take an active part in determining the future of landscapes". This realisation has led to calls to broaden the scope of the science to incorporate aspects of landscape planning and design. A variety of strategies have been proposed, including adoption of multi and trans-disciplinary research paradigms (Naveh 2005; Tress et al. 2003; Wu 2006), a change of focus from 'optimal patterns' to a search for the dynamic qualities of the landscape as defined by people (Haines-Young 2000), increased engagement with social science in a 'translational' approach to research and practice (Mussachio 2009a), participatory landscape ecology (Luz 2000), the use of a 'landscape services' framework (Termouzuien and Opdam 2009), and incorporation of 'design' as a complementary activity within science (Nassauer and Opdam 2008).

A common feature of these different strategies is the central role of landscape scientists as experts in solving 'place based problems' in an instrumentally rational way. Instrument rationality has been described and critiqued in the planning context by a number of authors, notably Friedmann (1987), and can be characterised along several dimensions. It works by identifying a desirable end state, and then logically considers and evaluates different means to achieve the desired ends. The emphasis of the approach is upon resolving choice and conflict as efficiently as possible, and maximising the utility of outcomes. It assumes that the future is sufficiently predictable to be able to make rational choices about how to proceed, and relies heavily upon expert knowledge, methods and skills to identify and realise solutions to place based problems (Alexander 2000; Allmendinger 2002; Mussachio 2009b; Amdam 2010).

However, experience from both rural land management (Duff et al. 2009) and urban planning (Flyvbjerg 2001) suggests that in order to achieve 'deep' social and policy relevance, it may be necessary to reconceptualise landscape science more fundamentally within a 'deliberative' paradigm of knowledge and action (Forrester 1999). The deliberative paradigm places emphasis upon argumentation (Fischer and Forester 1993), open discourse (Drysek 2000) and a combined 'internal and external perspective' on the planning process (Stein and Harper 2003). It is based upon what Flyvberg (2001) calls value rationality, where decisions are arrived at through open, discursive processes in which values, objectives and means are considered together. When expressed as communicative planning (Healey 1992), place making thus becomes understood as a locally situated collaborative social process with a significant learning dimension (Healey 1998) rather than technical problem solving at a local scale.

The difference can be illustrated by a hypothetical example. Consider a rural community faced with declining quality of life due to agricultural intensification and its effects on the landscape. An instrumentally rational approach might engage landscape scientists to measure public preferences for landscape, and to analyse and

identify a technical change to the farming systems that could reduce the impacts of intensification upon those aspects of landscape that are identified as preferred by a majority of people. For example, it might implement a stock effluent management system to reduce nitrification of streams. In contrast, a deliberative approach using communicative and value rationality would engage the community, the farmers, and a range of experts in a series of workshops to identify and share understandings about their landscape. These might include collective consideration of the history of the landscape; the different values it represents for the people who live, work and visit; the dynamics and motivations that are driving change; and a vision or visions for how the landscape might support different aspirations for the future. Different possible ways to achieve agreed goals would be explored and debated, and a collaborative process established to implement change.

There are an increasing number of examples of this type of deliberative approach involving landscape scientists. Duff et al. (2009) reflect upon a decade of Australian experience of scientists working as facilitators with ranchers and indigenous communities. Austen (2011) reports upon a North American rural organisation which enrols science in support of cooperative and collaborative landscape actions. In New Zealand, Allen et al. (2011) describe a catchment based model of collaboration and deliberation involving land owners, communities, artists and scientists. A common feature of these examples is the engagement of science experts *within* a community based deliberative process.

This chapter explores how landscape science can engage with these notions of deliberative planning. We suggest that landscape ecology needs to do more than enrol social scientists in its problem solving teams. It needs to become engaged within collaborative, imaginative, and interactive forms of social process aimed at shaping future landscape pattern and character. In the next section we explore the limits of instrumental rationality in planning and place making, and introduce concepts from the 'deliberative' paradigm. We then examine decision making in two alternative landscape futures projects in the US, highlighting the way that different roles and interests interact discursively at different stages in place based studies. An example from Denmark then illustrates how experts can engage in a process of deliberation over the future of a rural community's own landscape. The chapter concludes by arguing that for landscape ecology to achieve the relevance it seeks, the objectivity and impartiality that is privileged within science needs to become reframed as one of several dimensions of value that are needed for decision making in a true landscape democracy (Arler 2008). We suggest that the role of scientists as experts must be expanded to include collaborators in a common and reflexive process of knowledge formation, and this raises both questions and challenges for the way that landscape ecology is practiced and validated.

12.2 Science, Rationality and Planning

12.2.1 Landscape Science as Rational Planning and its Limits

Modern science is widely characterised as an instrumental and solution driven endeavour, and this is reflected in the mainstream literature of landscape ecology. In reviewing the evolution of the discipline, Hobbs argued that landscape ecology had a unique role to play in "tackling todays major land use issues and in developing responses to the pressing problems arising as a result of human-induced global change" (1997: 1). The tools it has deployed for this applied programme have been drawn from both ecology and the geosciences (Weins 1992; Hobbs 1997). Debates over methodology have been framed within the science paradigm as a need to shift from established traditions of experimentation and falsification of formal hypotheses (Popper 1935, 1959) to investigative protocols better suited to the understanding and explanation of complex landscape systems (Pickett et al. 1994).

Landscape planning has also been largely characterised as a rational activity. Indeed, during the mid part of the 20th century, both planning and landscape theorists turned to science for their inspiration, and models of landscape planning processes privileged scientific understanding, technical analysis, and expert judgement (McHarg 1969; McAllister 1980). When the ecological science and rational planning traditions are drawn together, they create a trans-disciplinary research paradigm (Tress et al. 2003) of landscape ecological planning as an applied science (Ndubisi 2002), upon which contemporary proposals for increasing the relevance of landscape ecology draw directly. The process may involve a variety of modes of investigation, from empirical description and modelling (Opdam et al. 2002), and mediated and agent based modelling (Van der Belt 2004; Bakker and Doorn 2009), to an imaginative process of normative scenario building (Nassauer and Corry 2004), expressed recently as 'design in science' (Nassauer and Opdam 2008). Decision making processes are typically based on an assumption that different views can be reconciled and effectively integrated through rational examination and weighing up of options (Fry et al. 2007). Complex and frequently contested landscape dynamics are addressed by incorporating multiple scales of investigation (Mussachio 2009b).

This approach presumes well defined problems and clear decision making frameworks, in which values are a variable in the problem solving process (Termorshuizen and Opdam 2009). The role of experts is to lead the process (e.g. Steinitz et al. 2003). In practice, however, landscape ecologists have seldom had the impact they seek in place based problem solving (Stevens et al. 2007). A number of reasons have been suggested. These include the difficulty of re-scaling results and moving from the general to the particular (Stevens et al. 2007); insufficient engagement with the social sciences (Mussachio 2009a), and differences in the world view and culture of scientists on the one hand, and policy makers and managers on the other (Fischer 2009). Furthermore, the value frameworks of

science and scientists are themselves subject to increasing scrutiny (Latour 2004). As we show below, even in rational, science based place-making processes (such as alternative futures planning) there are discursive moments—points at which the values of the experts involved shape the landscape outcomes by directing investigations down particular pathways. In short, the engagement of science, scientists, and scientific knowledge with planning and politics is now widely recognised as a major focus of tension more generally (Latour 2004), and a priority for investigation in landscape ecology in particular (Beunen and Opdam 2011).

The challenge of translating knowledge from the general to the particular is also a well-recognised problem in landscape planning. As Steinitz (1990) explains it in practical terms, what works well at one scale does not necessarily work well at another scale. A number of authors have addressed the problem. Nassauer and Opdam, for example, propose a stepwise process moving from science knowledge through generalizable pattern rules to place specific design solutions (2008: 642), and Theobald et al. (2005) propose the use of indicators to bridge between general knowledge and particular situations. Jensen et al. (2000) distinguish between the role of expertise in context independent knowledge—for example about genetic landscape processes- as opposed to context dependent knowledge about communities and their landscape practices, which is grounded in particular situations. Each of these may need different investigative strategies. However, the question remains of how to reconcile scientific credibility with problem salience, imagination, and local and political legitimacy (Cash et al. 2003).

The importance of legitimacy opens the issue of how best to understand and incorporate diverse social values. Opdam et al. (2002: 769) argued that "The future of landscape ecology lies in the understanding of how landscape pattern is related to the functioning of landscape systems, *placed in the context of (changing) social values* and land use" (our emphasis). This has led to a now widely accepted imperative to include social scientific expertise within the multidisciplinary teams undertaking applied landscape ecological projects (Mussachio 2009a). Nonetheless, introducing social science into landscape ecology per se does not necessarily achieve either practical results or legitimacy. There are a wide range of social science traditions and methodologies, and knowledge generated using methods aligned with the natural sciences may not adequately engage with ways of knowing about landscapes that are embedded in communities and practices. As Flyvberg (2001) demonstrated in an urban context, social sciences tend to be strongest where natural sciences are weakest, and vice versa- landscape ecology is strong on explanation and prediction, whereas social sciences overall may be most effective in interpretation and critique. It is for this reason that several authors have called for 'transdisciplinary' approaches (Tress et al. 2003; Mussachio 2009a), which can transcend particular methodologies.

However, drawing together knowledge from diverse sources is not a neutral process. Reflecting upon a decade of rural landscape ecological management in Northern Australia, Duff et al. (2009) note that attempts to 'integrate' across diverse interests and cultures seldom works because of power imbalances. Instead, they argue for collaborative 'working in combination', development of trust

through embracing difference and developing shared understandings, brokering between interests, and investing heavily in communication to enhance adaptive learning. Flyvberg (2001: 154) reached a similar conclusion. Noting that "...power has a rationality that rationality does not know. Rationality, on the other hand, does not have a power that power does not know. The result is an unequal relationship between the two", he argued that to be effective in influencing urban policy and planning, social science had to set aside its ambition of adopting the instrumental rationality of the natural sciences, and turn instead to promoting greater rationality in expressing and debating values.

12.2.2 Deliberative Planning and Communicative Rationality

The deliberative paradigm (Forrester 1999) places emphasis upon processes of dialogue and argumentation, and upon communicative and value rationality. Forrester (1999) noted that societies construct their lived worlds through language, ideology and tradition, in which knowledge and power are intertwined, and this focuses attention upon the role of discourse in the planning process. A discourse is "a shared way of apprehending the world" (Dryzek 2005, p. 9). Discourses are thus descriptions of meaning, accounts, and stories (Foucault 1972) that reveal the worldviews that organize social life, including the planning processes themselves (Thompson et al. 1990). One can examine narratives about landscapes that are 'spoken' by individuals or groups, and particular storylines or narratives are inevitably associated with political power, in the sense that they can be used by individuals or groups to control the discussion, allow or not allow certain information to be used, persuade others, or get their way (Forrester 1989). Landscape ecological literature, for example, tends to privilege issues of biodiversity and ecological function over, say, spiritual or aesthetic values.

Deliberative planning draws in turn upon critical theory, a philosophical premise that seeks greater rationality in communication through which (ideally) all views and perspectives are given voice free of power bias (Habermas 1989; Leonard 1990; Dryzek 1987, 2000, 2005). Critical theorists argue that all communication is influenced by the point of view of the speaker, and hence any understanding of the world is based on individual biases and socially constructed understanding (Leonard 1990). Yet they believe that it is possible to be aware of one's own and other's biases so that mutual understanding is possible (Forrester 1989). Habermas (1989) proposed the idea of the 'public sphere' in which individuals consider what they are doing and determine how they will live together collectively (Keane 1984). An *authentic* public sphere is one in which the *ideal speech situation* exists, where those involved all have communicative competence, and can exchange views and understandings free from domination or deception (Dryzek 1987).

Habermas described solutions based on communicative rationality as *reasoned consensus* (Dryzek 1987). This does not require everyone to agree or even to like the

eventual decision, but means that after consideration of all points of view, participants can live with a given course of action as the best option, given the situation. Of course, in practice, a planning discourse can seldom if ever take place in the ideal speech situation of communicative rationality. People express a diversity of interests to varying degrees and in varying ways, and reaching a reasoned consensus is difficult. Yet proponents of deliberative planning believe it is possible for people to change their position during the course of the planning process, at least to the extent needed to move forward towards a resolution of the issue at hand.

Closely linked to the idea of communicative rationality is the concept of value rationality. Initially developed by the social theorist Weber, value rationality is a process of deliberating openly upon the desired ends, rather than means. Dietz et al. (2005) identified three dimensions of environmental values that may be expressed in a community—usefulness, individual preference, and collective principles or morality. Value rationality is thus a process of determining desired outcomes in terms of how values might be realised, what individuals might prefer, and how to meet collective norms. This parallels the way Andrews (1979) conceptualised values in public decisions about landscape as intrinsic, preferences, and norms.

Flyvberg (2001) framed the application of value rationality in urban planning as a form of practical wisdom, and it is this melding of means and ends that characterises Duff et al. (2009) conclusions from their experience of collaborative landscape science and management in Australia. Similar combinations of modern science and practical wisdom are characteristic of best practice in co management of landscape resources in New Zealand (Wardle and Collins 2008) and reflect the emerging practice of collaborative landscape management in Denmark (Primdahl et al. 2010). As Demeritt put it, 'ultimately environmental narratives are not legitimated in the lofty heights of foundational epistemology but in the more approachable and more contested realm of public discourse (1994: 22).

In the next section of the chapter, we examine the implications of recognising and negotiating values in deliberation over landscape conditions and futures, in the context of the approach known as alternative ecological futures planning.

12.3 Alternative Futures as a Form of Deliberative Science

12.3.1 Alternative Futures Planning

Alternative futures (and scenario) planning provides useful insight into the consequences and challenges of a rational approach to planning through science. Development of scenarios and/or alternative futures has emerged as a powerful way to engage science with place, and projects typically use scientific knowledge to either predict landscape trajectories or to identify pathways towards desired future conditions. The advantage and appeal of identifying *alternative* pathways to the future, and different possible futures, rather than proposing a singular trajectory or outcome, is that it can accommodate a range of assumptions, where knowledge

is uncertain, and enables comparative evaluation of alternative solutions. Most alternative futures and scenario projects are expert led (Hulse et al. 2002) and in many cases are entirely expert based (Steinitz et al. 2003). They are almost always interdisciplinary (Tress et al. 2003).

Studies that seek knowledge through projecting alternative futures have a history dating back to at least the 1950s, when Herman Kahn used the term 'scenario' to identify long range depictions of the future concentrating on "causal processes and decision points" (Kahn and Weiner 1967). In defining scenarios, Shearer (2005) identifies four common features- they are fictional descriptions of future change; they describe related situations; they describe what could happen as opposed to what will happen or even is likely to happen; and they organize knowledge within explicitly defined frameworks. In landscape ecological planning, scenarios are distinguished from alternative futures by their focus (Steinitz et al. 2003; Nassauer and Corry 2004; Shearer 2005). *Scenarios* describe different sets of assumptions that underlie potential change in landscape pattern (Hulse et al. 2002; Opdam et al. 2002; Nassauer and Corry 2004). *Normative* landscape scenarios describe futures that should exist or are preferable and can "inspire policy by providing images of landscapes that could meet societal goals" (Nassauer and Corry 2004, p. 344). They lead to processes of making alternative decisions and actions that could result in different courses of events. Therefore, they describe change that could, but not necessarily will, take place over time. Scenarios in turn result in *alternative futures,* which describe the functional consequences of scenarios (Nassauer and Corry 2004). Thus scenarios can be thought of as processes, while alternative futures can be seen as results of processes- the landscape outcomes.

From this perspective, alternative futures can be analyzed at many different times from the near future to very distant future. The alternative future at any given time is uniquely based on the scenarios (assumptions, decisions, actions, and events) that lead to it. Both scenarios and alternative futures are fictional in the sense that they have not yet occurred: actual decisions, actions, and events will lead to the concrete conditions of the future. Emmelin (1996) therefore proposed a methodology through which scenario studies and future landscapes can be used for landscape specific impact assessments of general policy proposals, such as changes of legislation and national/regional policies including agricultural policy.

The role of the scientists (such as landscape ecologists) in alternative futures is typically framed in terms of independent experts who investigate and present knowledge about alternatives and how they perform, from which the elected political decision makers can then choose a preferred policy. In some cases, there is involvement of stakeholders such as local communities in the development of alternative scenarios, and experts may be involved in identifying community preferences or values for different scenarios.

Nassauer and Corry (2004) and Nassauer and Opdam (2008) explicitly frame the alternative futures process as a scientific investigation, in which alternative normative outcomes are presented as hypotheses about how landscape *should* change, which can be tested under various assumptions about landscape dynamics. The results are then conveyed to political decision makers and citizens to act upon.

In this, the models follow Dryzek's (2005) argument that in order to ensure the critical integrity of the deliberative process, deliberation about what *should or could* be an outcome needs to be separated from consequential political decisions about what *will* be undertaken. The expert role is framed as a scientist or planner, not a decision maker.

The theoretical logic of separating the science deliberation from decision making is based upon a desire to ensure that analysis and deliberation is open, objective and unsullied by power imbalances. However, in expert led processes the practical effect can be quite the reverse of what is intended. Separation of stakeholders and decision makers from the process of investigating and analysing conditions and possibilities can lessen their commitment to the outcomes of this deliberation. This is exasperated in situations where office holders change during the process, and newcomers have little sense of 'ownership'.

The presumption of committed but independent scientists providing impartial advice to the decision-makers also fails to stand up to scrutiny when the evidence is considered. Analysis of several alternative futures cases suggests instead that quasi-political decisions are involved throughout the alternative futures modelling process. Alternative futures planning approaches in practice comprise a series of *discursive moments* that involve both deliberation *and* value based decision making. The decisions made at each moment impact all subsequent phases of the planning process, the science upon which it draws, and the eventual planning outcomes. Hence engagement of stakeholders and communities with the science is an essential requirement throughout the process, and this inevitably exposes scientists to the value rationality of decision making.

The two case studies upon which we base this argument took place in the US Mountain West in the latter part of the 1990s and early years of the 2000s (Fig. 12.1). The first case is the San Pedro project (Steinitz et al. 2003), located in the semi-arid region in southeast Arizona and northern Sonora, Mexico and includes the San Pedro Riparian National Conservation Area (SPRNCA). Research

Fig. 12.1 Map of western United States showing the location of the two projects in Oregon and Arizona. The Arizona project also included portions in Sonora, Mexico

was conducted by a multidisciplinary team assembled from Harvard University, regional based university departments and institutes, and the United States Army, and involved extensive landscape modeling using digital technologies. The San Pedro report identifies three major scenarios, with variations of each. They included current trajectories of change in development and water use, constrained scenarios, and open development orientated scenarios. San Pedro is one of a series of alternative futures projects undertaken by Harvard University for US federal agencies, and exemplifies the expert led approach to applied landscape science in alternative futures. The projects are tightly focused, technically sophisticated, and completed in relatively short time frames (typically 2 years or so).

The second case is the Willamette Valley, Oregon (Baker et al. 2004), which is bounded on the west by the Coastal Range and on the east by the Cascade Mountain Range. Two thirds of area is forested, primarily in upland areas, while much of the valley has been converted to agricultural use. Projected population growth is expected to place enormous demands on water and land resources. The study was funded by the U.S. Environmental Protection Agency (EPA) and completed by the Pacific Northwest Ecosystem Research Consortium (PNW-ERC) involving researchers at Oregon State University, the University of Oregon, the University of Washington, and the U.S. EPA, and again used sophisticated digital landscape models. Three visions of the future were created through to the year 2050—Plan Trend, Development and Conservation. The Willamette project exemplifies a strongly stakeholder based approach to alternative futures. Whilst also technically sophisticated, it is particularly notable for the institutional arrangements set up to engage a wide range of stakeholders and communities throughout the process and to assure that all scenarios would include plausible decisions and management practices as defined by stakeholders. The project ran for around a decade.

12.3.2 Discursive Moments in Alternative Futures

Analysis of the two contrasting cases has highlighted that irrespective of the style of engagement, both of these science based exercises involved a number of points at which decisions had to be made about similar questions, each of which would materially affect the project outcome. Each decision point- that we have termed ‘discursive moments’—can be viewed as a fork in the road, a mix of deliberation and values based decision that determines future possibilities of both action and outcome. The moments are: identification of project scope; selection of the method and selection and assembly of the planning team; determination of the project design; data collection and management; development, selection and testing assumptions of scenarios; assessment of the effects of scenarios upon future landscapes; and selection of implementation outcomes and outputs.

1. *Identification of project scope*: This moment occurs before the project can begin. The institution(s) must become aware of a landscape management problem. It is likely to be motivated by the interests and concerns of key constituents, and previous studies might have defined underlying goals to be achieved. At a deeper level, questions about normative versus exploratory and deductive versus inductive approaches (Shearer 2005) will set the framework for the study. During this moment, questions about *what* and *why* may have lasting influence on the nature of communication throughout the project, and upon its possible outcomes.
2. *Selection and assembly of the planning team and planning method*: There is a wide variety in practice in the manner of selecting and assembling alternative futures planning teams, as well as the institutions represented. The inclusion or exclusion of particular disciplines or stakeholders will materially shape the scope and nature of *how* the science undertaken, *who* is involved, and its possible findings, as well as the way these findings might be translated into actions.
3. *Project design*: Although alternative futures projects share common characteristics (Baker et al. 2004) each focuses on unique ecological and social issues, incorporates distinctive approaches to stakeholder groups and public agencies, and utilizes its own data management system. Further, the fundamental rational for approaching scenarios and assumptions is defined during project design.
4. *Data selection and management*: Steinitz (1990) identified a range of fundamental questions about landscape that drive the landscape planning and modelling process. They include: How should the landscape be described? How does the landscape function? How does one know whether it works well or not? The responses shape the scope and character of the process.
5. *Selection and testing assumptions of scenarios:* Although there are an infinite number of possible scenarios, it is only feasible to pursue plausible ones. The makeup of those making these decisions and the process involved can determine the number of scenarios, the ease of modelling ecological and cultural systems, and the degree of political acceptance of the report.
6. *Assessing the effects of scenarios (futures)*: This phase uses science to predict outcomes, and implies a range of value judgements—from the most basic orientation of the process (is it testing hypotheses about normative futures, or evaluating impacts of alternative scenarios upon a given landscape), to detailed determination of criteria for evaluation.
7. *Selection of implementation outputs and outcomes*: This is perhaps the most difficult moment to examine, given the length of time required for political institutions to implement decisions, and the time required for implementation to make on the ground changes in landscape conditions. Nonetheless, implementation processes and plans are profoundly political, and hence express the values of the decision makers.

The implications of these moments for the nature of the landscape science and its relationship with wider planning processes are profound. According to Stein and Harper (2003) both a combination of ‘internal’ and ‘external’ perspectives is

required to ensure effective, democratic and dialogical planning. An internal perspective means that the planner (or the landscape ecologist in our case) must participate in the planning process and relate to other participants as subjects (rather than objects), in order to fully understand the values behind the issues in question and to participate as a collaborator in the process of deliberation based upon value rationality—it thus provides social and political legitimacy.

An 'external' perspective analyses the planning from outside, as an object, using various theoretical 'lenses', and is needed in order to understand their relative effectiveness in achieving functional outcomes. Without this external perspective the participants will be unable to critically explain and evaluate the process and outcomes. An external perspective thus provides scientific credibility. However, without the insights achieved through (internal) participation the landscape ecologist will have no way to fully justify proposed planning solutions, apart from either individual interests or very general assumptions of 'right' and 'wrong'.

Traditional expert involvement places landscape science in an overtly 'external' perspective, although as we have shown above, in practice it still makes 'internal' decisions. A collaborative approach based upon value rationality involves the landscape scientists in the local 'internal' process and therefore enables them to "integrate and apply external knowledge into the internal framework." (Stein and Harper 2003, p. 132). In the next part of the chapter we present a case study of such expert-informed deliberation in place.

The practical effectiveness- or otherwise- of the two contrasting approaches in the case studies also deserves some comment. Outwardly, the strongly stakeholder focused Willamette project appears to have resulted in a more tangible outcome, in the form of conservation policies adopted and promoted by the EPA and local not-for-profit resource agencies. It could be inferred that the sense of ownership and engagement that resulted from the collaborative science process led to a commitment to act. In contrast, the San Pedro project did not appear to lead to a cohesive land planning response. However, there were consequences- and a decade later it is possible to identify significant changes in the water management regime within the military area. Hence the obvious planning outcome of a process may not be the only outcome, and a nuanced interpretation is needed. This is typical of alternative futures projects, and reflects another contrast between science as problem solving (outcome: problem solved, or not); and science as part of a deliberative process (with an outcome of improved understanding and collaboration, expressed in many ways). In the next section, we illustrate this more nuanced role for science through a Danish case study.

12.4 Deliberative Spatial Strategy Making in Place

12.4.1 Spatial Strategy

The distinguishing feature of landscape ecology is its concern for spatial relations in ecology, (Forman and Godron 1986) and how such spatial knowledge can be translated into practical land management and planning outcomes (Dramstad et al. 1996). In an ever more resource constrained world, knowing how best to act spatially—where to invest, where to protect, how to resolve competing demands on particular places, and how to build communities in place—is a critical role for landscape science. The recent growth of landscape ecology and its concern for relevance has paralleled the re-emergence of spatial strategy as a dimension of planning more generally.

Spatial plans were a key feature of town and regional planning as it developed in the mid 20th century, reflecting both the driving motivations- including management of land use conflicts, redevelopment of regions following wartime damage, and direction of new urban growth—and the practical implementation tools, particularly land use controls (Hall et al. 1973). Spatial relationships were also fundamental to the emergence of environmental planning in the 1960s, with its focus upon resource assessment and protection (McHarg 1969), and the development of spatial planning tools such as green belts and green ways (Ahern 2002).

The dominance of spatial thinking declined in many planning constituencies during the latter part of the 20th century as a result of two outwardly opposing dynamics- the emergence of participatory and advocacy planning (Davidoff 1965), and the ascendancy of more neoliberal planning paradigms that emphasised market processes (Friedmann 1987). However, several factors have now reversed this trend. They include: first, the realisation that participatory planning depends for much of its power and legitimacy upon the location of constituencies in particular places; second, the recognition that planning mechanisms based primarily upon non spatial market processes fail to deal with the cumulative consequences of development; third, that space is an increasingly scarce resource in urbanising regions; and fourth, that place itself is of great economic value—as technology overcomes the friction of distance for production, the quality of particular places becomes a major driver of economic success, as both workers and consumers seek out distinctive places to live, shop and work. Hence space has re—emerged as a key focus of strategic and place based planning.

Strategy has a number of interpretations. According to Shearer (2005), strategy can be summarised as having three possible dimensions: it may be a pre-active process, anticipating uncertain futures and establishing strategies to maintain profitability or viability of businesses or communities in the face of such uncertainty; it may be directive, guiding resources through strategic policy towards some given end; or it may be pro-active, actually making futures through strategic interventions. Strategy of all three kinds may also be seen as the combination of

long term *visions* and short-termed *actions* of various kinds and nature (Albrechts 2004). Such visions must be shared by the groups, institutions and other stakeholders on whom the strategy depends.

Spatial strategies may integrate multiple dimensions- such as conservation of valued assets or resources, allocating investment or infrastructure to achieve particular purposes; and envisioning desirable future conditions to empower participants to act. Healey (2009) has analysed the spatial strategy making process with multiple stakeholders involved in the complex task of formulating clear and agreed 'directions' of spatial development. She argues that four dimensions of such a strategy making process are usually in play when such a process is unfolding: (1) *Mobilising attention* to the whole, that is creating a shared interest in the strategy, (2) *Capturing the situation*, thus clarifying the present context, its historic background, and the central goals of the strategy. (3) *Mobilising internal and external resources,* including knowledge. (4) *Generating a frame for strategy* (with a program over time and key projects). In a landscape context, the landscape ecologist obviously has much to contribute to the second and third knowledge focused dimensions, but it would have to be done within a practice context. The first and fourth dimensions require fundamental skills and knowledge in situated planning. In combination, the four dimensions of spatial strategy making expressed in this way are an example of deliberative planning rather than instrumental problem solving.

12.4.2 Place and Place Making

Place is a widely used concept in social science and spatial planning. It has varying definitions, but most express the three dimensions identified by Relph (1976), and conceive place as a nexus of distinctive biophysical characteristics, socio economic activities, and cultural significance- a concentration of form, practice and meaning in a defined locality (Hillier and Rookesby 2005). Place-making (Dovey et al. 1985; Schneekloth and Shibley 1995; Healey 1998) has been promoted by a range of disciplines as a process of active creation and cultivation of such qualities—through physically shaping places, empowering communities to collaborate in place building practices, and conserving, nurturing and projecting symbols of place.

Place is one level in a multilevel framework of phenomena, connecting geographic pattern with ecological and social process; and general knowledge with context dependent understanding. It has an uneasy relationship with landscape, and is frequently conflated, yet the two may also be conceived as fundamentally different. In his work on globalisation Castells (2000) distinguishes between the 'space of flows' as the way the material world is organized in interlinked networks to enable the fast growing flows of goods, information, energy, people and the 'space of place' in which people are living their daily life. He defines a 'place' as "…..a locale whose form, function, and meaning are self-contained within the

boundaries of physical contiguity" (2000: 453). Spaces of place and of flows are very different, yet have to be seen together, like the external and internal perspectives described above: "The major danger in such a new historically spatial dichotomy is the breakdown of communication between power and people, between cities and citizen, and ultimately between a spatial technocratic instrumentalism and localistic fundamentalism" (Castells 1992: 75).

A physically bounded landscape may function as a place, a defined locale, but more typically an extensive landscape is a mosaic of contiguous places, just as it is a mosaic of ecosystems. The extent to which a landscape may be seen either as a defined area of space within which 'places' are located, or as a 'place' itself, as in the sense of a self-containing whole, was illustrated in a study of how Danish farmers in two different landscapes responded to the following question. The question was asked half an hour into a longer interview about how the farmers have experienced change in their landscape: "If you were talking on the phone with a remote relative who has not visited your area, and the relative asked you how it was where you live, what kind of landscape or place was it—how would you then reply?" The farmers (15 in each landscape) gave two kinds of answers, largely distinguished by the type of landscape in which they live and work. In one of the landscapes they all proudly referred to how it was a very nice area—located close to very nice (and for Danes well known) places. In the other landscape no one mentioned nearby attractions such as the spectacular dune systems on the North Sea Coast less than 10 km away. Instead they all referred to experiential features of the local landscape, such as the peacefulness (with no main roads), the flat landscape with the high sky (high 'ceilings'), and the new forests and the wildlife which came with them (Primdahl et al. 2010).

In the first landscape farmers talked about their landscape as a space relative to other locations, whereas in the second landscape they talked about their specific place within the landscape. One of the main differences between the two landscapes was that in the latter (place defined) landscape there has been a long tradition of co-operation on landscape issues, from heathland reclamation (in the 1950s) to afforestation (in the 1990s), as well as a shared and successful struggle against plans for locating a regional waste dump in their area, and common grazing of semi-natural salt marshes. These collective experiences may well have contributed to the strong sense of place in this area. In the former situation, landscape was an abstract concept, in the latter case it was lived—a distinction that has been widely recognised in the geographical literature, and identified in other similarly contrasting landscapes in very different countries (Primdahl and Swaffield 2004). Landscape as place becomes a focus of governance and spatial strategy making, framing attention and action in the way described by Healey (2009).

Landscape ecology has potential to contribute concepts and knowledge to both conceptions of landscape: landscape as a mosaic- which is the conventional focus for the discipline, or landscape as a concentration of meaning and experience, a locale. Most attention has been upon the former, with landscape ecology offering descriptive and explanatory knowledge about the relationships between landscape

structure and function. In the latter case, of landscape as locale, perhaps the most valuable contribution of landscape ecology as a science is to inform communities and stakeholders about the landscape *context* in which they live, its characteristics and how it functions, and how this context shapes their everyday lives. In the next section we outline an example of place based spatial strategy making that draws upon such landscape ecological understanding.

12.4.3 Collaborative Local Planning in Denmark: The Lihme Project

Danish rural landscapes are farmed intensively by highly specialised pig, dairy, or cropping farmers producing commodities mainly for the world market. More than 90 % of all farm land is arable and affected by high concentrations of nutrients and pesticides. However, many of these rural landscapes are also relatively densely populated, and are currently affected by urbanisation processes, leading to significant in and out migrations of people. As a result, the vast majority of people living the rural regions are no longer commercial farmers or farm workers, and they are increasingly seeing the landscape and its values (or potential values) as a key resource for quality of life- thus attracting people to the area. These new rural populations are expressing interest in local landscape initiatives, and together with an administrative reform that has led to a decentralising of spatial planning, this has resulted in a growing interest in collaborative landscape planning. The focus of this section is a planning experiment in Lihme parish in central Jutland.

Lihme was one of five local areas included in an experimental planning project carried out by the municipality of Skive in close co-operation with researchers from University of Copenhagen. The project ran for 2 years with the aims to develop new forms of collaborative landscape planning and to develop new models for multifunctional rural landscape patterns. The key agent to drive the planning process forward was a working group in each of the five areas. Each group was established first by the municipality which contacted a few citizens in each area and asked them to form a group and appoint a leader. In Lihme the group varied over time between 7 and 10 representatives of the local community, including farmers as well as non-farmers.

The project goal was to create a strategy plan for the landscapes in the parish which had local 'ownership' and which could be incorporated in the legally binding municipal plan. The group worked closely together with a planner from the municipality, and this is critical to its success, with frequent contacts of different kinds with scientists and professional experts. The process started with a meeting for all five groups where the project objectives were outlined, and the first phase (app. 5 month) was to work out a broad analysis of strengths, weaknesses, opportunities and threats (SWOT) for the future socio-economic development of the parish.

Focus then shifted to the rural landscapes in Lihme, and this second phase started with a two day workshop for all five groups at which the SWOT analyses were presented and discussed with municipal planners, researchers and professionals. The first draft of landscape character maps carried out by a landscape architect was presented and given to the working groups to be discussed locally and modified to ensure it expressed local citizens perception of their 'own' landscapes. Excursions and various thematic lectures (including a presentation of a simple diagnostic tool for evaluation of the 'landscape conditions') were also part of the workshop. During the next four months the working group shared understanding of how the landscape functioned, and developed a landscape strategy plan for their parish. Regular meetings with municipal planners and workshops with researchers and professionals were included in this process to mobilise external as well as internal knowledge and ideas. The contribution of landscape ecologists can be a vital part of the diagnostic process- characterising the condition of the landscape as well as contributing to the preparation of a feasible strategy that recognises the possibilities, potentials and constraints of the landscape context.

The third phase of the strategy—the final design—started with the presentation of the strategy draft to a panel of 'landscape experts' (from university, consultancy, and public institutions including Skive municipality). After this presentation an invited expert panel (with an ecologist, a forester, a landscape historian, two landscape planners and a farm building architect) presented an alternative draft strategy worked out during a one day workshop. The 2 hour discussion following these two presentations functioned as a sort of 'confrontation dialogue' and turned out to be highly productive in shaping the final ideas for the strategy. During the next few months the final strategy was drawn up by one of the landscape planners participating in the panel in close contact with the working group. The strategy includes proposals for new green corridors linking the village to surrounding habitats, a new village forest, new recreational trails and new developments at the harbour in the village (Fig. 12.2).

Finally the whole strategy was presented and discussed at a public meeting in the parish. The community essentially took ownership of the strategy and parts of the strategy (including trail and corridors) are being implemented. Five thematic working groups in the parish are responsible for different aspects of the strategy, which has also been incorporated into the municipal plan.

The four dimensions of Healey's spatial strategy making process (see above) have been dealt in a number of different ways and at different stages in the Lihme process (Dias-Sardina et al. 2012). In this context, the different ways to mobilise and confront internal and external resources concerning knowledge, values and imaginations have been especially fruitful. However, more experience and more design proposals are needed before a more general culture of collaborative landscape planning can evolve. Systematically developed 'patterns' involving landscape ecologists, as proposed by Nassauer and Opdam (2008), would be highly beneficial, particularly in helping identify critical patterns and processes, and in helping prioritise where management interventions can be most effective and

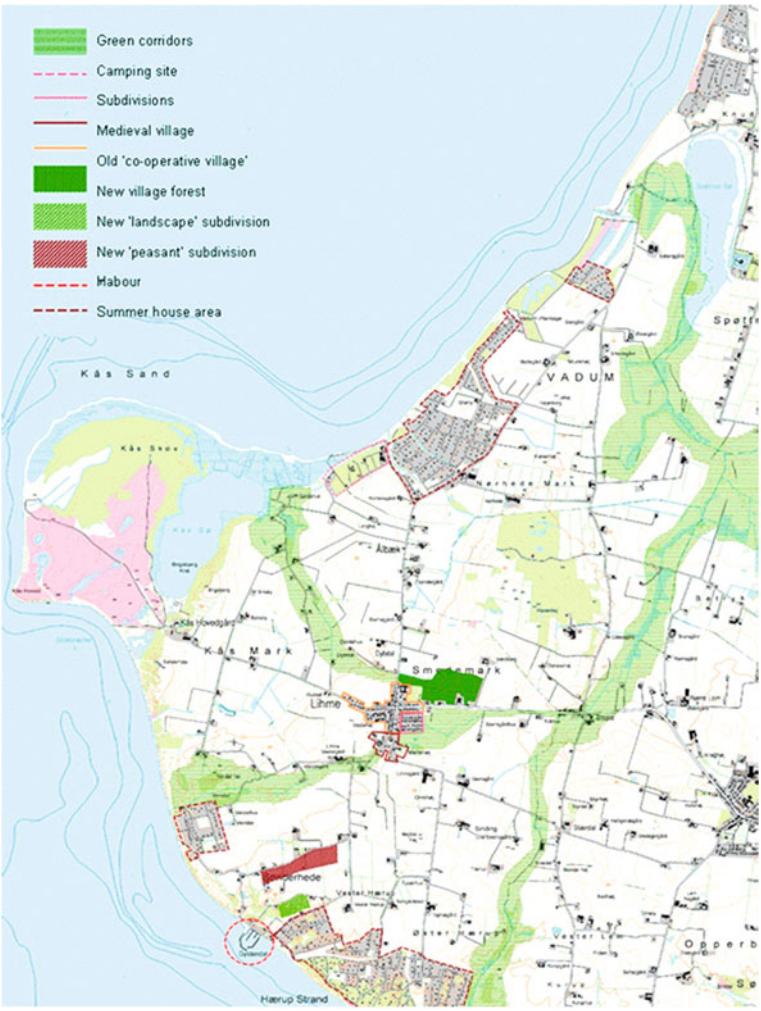

Fig. 12.2 Landscape strategy for the parish of Lihme. Key elements in the strategy are: new walking trails (not shown on the map), a new village forest, new 'rural subdivisions', new system of green corridor, new development plan for the habour. *Source* Primdahl et al. (2010)

efficient. However, such expert generated patterns cannot substitute or function as principal 'design solutions' for local rural landscapes. Local ownership of the design is essential if a landscape strategy plan is going to function as a frame for the innumerable decisions and actions taken by individuals and groups driving landscape change processes over time. One way to envisage this relationship between experts and locals in generating patterns is that the expert role is enabling, offering a spatial language and helping locals interweave the systematic knowledge of landscape ecology into their distinctive and evolving local landscape biography.

12.5 Landscape Ecology and Landscape Democracy

12.5.1 A True Landscape Democracy and Deliberative Landscape Science

What directions do these examples suggest about ways to reconcile the communicative rationality of deliberative landscape planning with the more technical and problem focused methods of landscape science? For this we need to return to the question of values. Responding to the imperatives of the European Landscape Convention, Arler (2008) has discussed his notion of 'a true landscape democracy' (an expression used in the explanatory report of the convention) that recognises three complementary types of values and decision making: self-determined, co-determined, and objective. Self-determined values express personal feelings and preferences, and express the dimension of landscape values that are most typically emphasised by economists and many social scientists, based on psychophysical or cognitive measures, and are widely used in landscape modelling. Co-determined values arise from informed and open deliberation over collective decisions- they are more than the aggregate of individual feelings, and express values arrived at socially. Objective values are based upon evidence and rational argument rather than power or rights, and correspond to the conventional 'truths' of science.

In recognising these different but complementary 'truths' of landscape, and the different ways in which they are shaped and identified, Arler then argues that they create a suite of possible and desirable roles for experts, as collaborators, brokers, mediators, and connoisseurs, as well as the source of conventional technocratic expertise. Involvement in landscape deliberations in what he describes as a true landscape democracy thus requires science experts to become participants in a conversation in which their knowledge is no more privileged than any other. Hobbs (1997) prefigured this shift, arguing that the future is made collaboratively, and Johnson and Campbell argued that implementing strategies to strengthen links between ecological science and public involvement will require 're-conceptualisation of the roles of both scientists and stakeholders so as to improve the integration of applied ecological science with democratic decision making' (Johnson and Campbell 1999: 502). Alternative futures planning based on collaborative institutions can provide one model, and other potential models that may help integrate science and collaboration include adaptive ecological management (Holling 1978; Williams and Brown 2012), and various forms of decision support, such as mediated modelling (Van der Belt 2004) and structured decision making (Gregory et al. 2001). The critical feature throughout, however, remains that which lies at the heart of the deliberative planning paradigm- the need to subsume the power of expertise within a situated process of collaborative deliberation.

12.5.2 Some Questions and Challenges

Re-conceptualising landscape ecological science within a collaborative and multivalent landscape planning paradigm thus destabilises the notion of science expertise as the 'given' role of landscape ecologists. As landscape scientists in post-colonial countries have found (Duff et al. 2009), engaging with collective forms of knowledge and practical wisdom requires development of a new humility and sensitivity to the possibility of multiple ways of knowing.

This raises a number of interesting questions for landscape ecology as it engages with planning and design. Landscape science is evolving towards a global discipline, and many of the drivers for knowledge are issues and problems that exist at a global scale. However, deliberative landscape science in the way we have described depends significantly upon the local public culture of decision making. Hence landscape ecology becomes far more context dependent that has been acknowledged to date, and this has profound implications for reporting and peer review. For example, how can reflective case studies on collaborative landscape projects be more widely and 'productively' be brought into the core journals of landscape ecology? How can scientists maintain credibility for their expertise while participating in values based deliberation (Cash et al. 2003)?

Nassauer and Opdam (2008) argue that design in science can fulfil this goal, but there is a risk that this continues to privilege science knowledge. A reframing of the process such that landscape ecological knowledge becomes one of several sources of knowledge that shapes landscape archetypes and design solutions can move values from being a sub set within the science endeavour, to become the framework within which wider deliberation occurs. The objective values of science thus become a participant in a conversation, rather than social values becoming a subset of science knowledge. The relationship is inverted.

One pathway may be to recognise the distinction noted earlier, between internal and external views. There are interesting precedents in social science reporting for the way that investigators can reframe their roles and findings to recognise that new knowledge may be co-produced with local participants. However, this raises questions for the editors and reviewers of science journals in landscape ecology, who need to balance demands for science legitimacy with the growing calls for relevance to place based landscape issues. Whilst there are multidisciplinary journals that specialise in such contextual science, if it remains marginalised from the mainstream journals then context sensitive science is unlikely to gain credibility in the discipline.

Finally, as Flyvberg (1998) argues, science knowledge is power. How will the discipline manage imbalances of social and economic power in landscape ecological projects? How can the increasingly global discipline of landscape ecology be accessible to the needs of different types of planning contexts and

constituencies? Can such science contribute in an even handed way to the 'authentic public sphere' of deliberation proposed by Habermas?

Seeking greater relevance for landscape ecology is therefore a challenging pathway. Current models for enhanced engagement with planning and design tend to address social and cultural values by creating a subset of social science knowledge within instrumental landscape models. The insights of deliberative planning suggest that a more fundamental reorientation may be needed, by which landscape ecological knowledge becomes a subset of a wider framework of landscape values, and this raises challenges and opportunities for the science. Shifting from a focus upon technical knowledge to practical wisdom requires engagement with social processes as well as biophysical landscape conditions, and in a deliberative landscape democracy, neither is privileged.

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