



Social theory and landscape ecology: understanding human agency in the context of landscapes

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Introduction: Working with social theory in landscape ecology

It has always been a crucial ambition within landscape ecology to improve understandings of the interactions between natural environments and human societies in landscapes. One way in which this is pursued is by integrating social theory with the study of ecological systems. This allows for a holistic understanding of the ways in which human activities impact the environment and how the environment, in turn, affects human societies. Since its inception in the early 20th century, landscape ecology has been deeply concerned with research of this kind, working to link social and ecological domains of inquiry together in common frameworks of analysis (Troll

1939; Curtis 1956; Christian 1958; Neef 1967). This was one of the reasons for its early success both as an academic and professional field engaging with landscape management, planning and practice in Europe since the 1930s, from the 1970s in North America and later globally (Barrett et al. 2015). However, the development of integrative and social-ecological conceptual models has not succeeded in supplanting mainstream binary distinctions in landscape ecology, where conceptual pairs such as nature and culture, physical and social continue to influence research and practice (Head 2017; Christensen et al. 2017). This poses a problem to the further development of the field, which we address in this special issue.

Landscape ecology has a long history of dealing with challenges of this kind. By offering a comprehensive, inclusive account of landscape processes and patterns that included human agency and interaction, landscape ecology answered the call of the environmental movement of the 1970s onwards for a new paradigm addressing “readily visible ecological patterns on the land around us” by emphasising the fact that “understanding the linkages between (a) humans, resources, and constraints, and (b) flows, patterns, and land is to understand the ecology of a landscape” (Zonneveld and Forman 1990). On this basis, the field developed to include a comprehensive array of social-ecological approaches that flourished alongside many other research agendas, which were united by the common use of spatially explicit units of analysis (Bastian 2001; Turner 2005; Antrop 2007).

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In this way the field grew into a nexus of research emphasising “how social-system factors are imposed on biophysical factors to generate pattern change in the study of landscape” (Turner 2005). Building on these foundations, it has been possible to develop increasingly complex models for capturing human-environment interaction, seeking to integrate paradigms inspired by both the natural sciences and the social sciences (Bürge et al. 2017; Turner et al. 2020; Angelstam et al. 2021). However, further research in this vein will involve finding ways to overstep conceptual boundaries that were set up between natural and social science in a time when social and natural phenomena could (allegedly) be more easily disentangled from each other than today. In this, landscape ecology appears to lack momentum.

In an Anthropocene reality such as the one we now inhabit, few research objects can be said to exist completely outside the context of action for human societies (Christensen and Van Eetvelde 2024). As such, distinctions between natural and social make little sense and may in many respects be considered hindrances for correct and relevant analysis efforts, not least with respect to formulating integrative theories of social phenomena in landscapes. Guerrero et al. (2018) have argued, “delineation between society and the environment is artificial and arbitrary, encouraging a holistic assessment of the dynamics of environmental and social systems” (Guerrero et al. 2018). Taking this into account in landscape ecology would mean conflating the concepts of environment and society, thereby redefining the topic of research as “social environments” or “environmental societies” – i.e. landscapes – composed of a combination of anthropogenic and non-anthropogenic factors (between which a distinction would be unnecessary). This is arguably what has been done in parts of the field of landscape ecology for some time (Zonneveld 1995; Naveh 1995; Christensen and Eetvelde 2024), but without registering any clear resonance in the conceptual models in use more widely. This is despite the fact that most empirical contexts of investigation would seem to demand integrative analysis efforts, as is illustrated by the papers in this special issue. Farmed landscapes, rangelands, and managed forests are the most widespread types of human dominated landscapes today, taking up more than half of the terrestrial surface area (Ellis 2021). Patterns and processes in such landscapes are influenced directly

by land use practices performed by human agents. These are mostly farmers and foresters who, through their daily practices, realise the decision making patterns of society as patterns of land use, materialising the combined impacts of policy, markets, culture, visions, needs, and other aspects of the social world as biophysical landscape change. Gradually but directly, this is what changes the state of the terrestrial environment.

Landscape ecology is currently well situated to lead investigations into the relationship between social and natural processes mediated by land use practices. However, landscape ecology is falling behind with respect to one key dimension of this research, namely how to interpret, model, and predict the behaviour of social agents: how to take the human dimension into account. In the current special issue we ask:

- (1) How can landscape ecology further advance understandings of human agency in landscapes?
- (2) How can theories and models from social and ecological research traditions be integrated better within landscape ecology, forming a more substantial and coherent body of scholarship?
- (3) What insights can landscape ecology offer the social sciences, to foster stronger cooperation around analysis of people and societies as part of and taking part in landscapes?

The twelve articles included in this special issue on “social theory in landscape ecology” address the challenge of integrating the cumulative development of social theory with existing research in the field by outlining a range of pathways, examples and experiences of working with models of human agency in the context of landscapes.

Overview of articles in the special issue

The contribution of Van Eetvelde and Christensen (2023) outlines how spatial, ecological and social theory was developed in parallel and merged within landscape ecology. On this basis, foundations of social theory existing within the field are described. Based on an extensive literature review, they conclude that spatial, ecological and social theory in landscape ecology was formulated in an integrative

way drawing on complementary sources of conceptual development and empirical materials. This represents a great potential of the field, since it means that landscape ecology has a concept of spatial units of analysis that is addressing both social and biophysical aspects of the landscape. This is unique to the field when compared to for example environmental sociology, environmental anthropology and political science, where similar research questions regarding sustainable resources and land use are addressed. By outlining the history of theory generation in landscape ecology, the paper shows how future work to formulate theories may be informed and modelled on past experiences.

Gerrits' (2023) contribution discusses the nature of social theory in light of coupled social-ecological systems and describes three distinct categories of theory (raw materials and ideas defining research programs, conceptual approaches suggesting novel ways of looking at reality and provisional causal statements that can be tested) that inform each other. He argues that "an awareness and articulation of the differences – empirical, methodological, epistemological and ontological – come a long way towards the development of more robust theories about coupled systems". The article shows a clear need to rethink ontological categories employed in landscape ecology, as well as associated methods used to observe social-ecological systems. It is outlined how such work may proceed through a critical assessment of existing social theory within the field. Similarly starting from a systems perspective Christensen and Van Eetvelde (2024) provide a literature review outlining theories of human agency in landscapes. On this basis an improved concept of agency is proposed and discussed. The paper redefines the concept of agency by combining concepts of ecological agency that are widespread in the field of landscape ecology with concepts of social agency informed by work in social theory. The developed theory builds on existing holistic approaches in the field and parallel conceptual models in social theory to establish a more coherent and integrative understanding of the relationship between individual agents and the conditions under which they act in landscapes. In this way the paper emphasises existing links and parallels between thinking in landscape ecology and sociology and points out potentials for further developments.

The paper of Palang et al. (2023) evaluates the possibilities of the approaches of cultural explosion and path dependency for analysing landscape changes and identifying time boundaries that appear when landscapes change gradually or explosively. Inspired by the examples of post-soviet military areas, they distinguish three different development paths for the areas based on the different relations that people have towards those areas (set-aside, active use and neglect). In this way the article improves understandings of how physical and socio-cultural remnants of past landscapes and transformation processes codetermine and influence present and future developments. The paper contributes to an improved understanding of human agency in landscapes as situated in flows of time and develops a new vocabulary of analytical concepts addressing this.

In a similar way to Palang et al. (2023), Mels (2023) explores historical relationships between environmental justice and injustice on the one hand and the production of landscapes on the other, uncovering an intimate relationship between types of justice, associated social processes and actions taken to change and maintain landscapes in the woodlands and wetlands of Sweden. By investigating links between ideological and material aspects of landscape, it is unfolded how physical landscape features through social practice come to form "ecological conditions of possibility" for social and economic processes taking place as part of capitalist land development and resource extraction, which depends on and also co-constitutes political access to landscape resources (Mels 2023). On this basis, it is argued that "environmental justice is historically entangled with a contested material and discursive process of landscape production", illustrating a knowledge gap within landscape ecological research dealing with social-ecological modalities of resource access, deliberation and participation that could be opened up for further investigation through an increased focus on the role of ideology in landscape change, thereby building on and further developing social theories of ideology (Mels 2023). In opposition to the arguments presented by Palang et al. (2023) and Mels (2023), the paper by Walters (2023) advocates a critical stance towards theorising historical events. The article presents an analysis of land use changes and reforestation processes in Saint Lucia (West Indies). On this basis, it is argued that specific theoretical constructions

are unnecessary in historical analyses of landscape change. Rather, a standardised causal-analytical method is described and it is outlined how insights into the causality of landscape change may arise from direct observation. In his view, theory “should be viewed and assessed in terms of it serving the goals of causal explanation” (Walters 2023).

The paper by Buchecker et al. (2023) addresses framing theory in the context of landscapes, outlining how the problem perspective of agents is shaped by their different interests and how this may hinder implementation of decisions in landscape management. Based on an analysis of participatory processes of integrated water resource management in a Swiss Alpine region, Buchecker et al. (2023) observed a convergence of the involvement of the actor’s problem perspectives. Diffusion effects of the social learning of the actors to the wider public lead them towards more participatory regional planning. In this way the paper contributes with a perspective on theorising the catalysing role of shared interests among actors in landscapes. Building on similar theoretical inspiration, Graversgaard et al. (2023) tested how framing theory can contribute to understanding negotiations about collective land use planning. This was done based on a series of collaborative scenario workshops with local stakeholders in agricultural landscapes in Denmark, after which different scenarios were formulated and visualised. Ten ways to frame challenges and solutions among stakeholders were identified. Based on this it was discussed how different perspectives on the topic were justified and could contribute to the further development of insights on the determinants of farmers’ decision making. Hence framing theory was shown to be useful “to identify conflicts and agreements, mediate conversations about these and analytically accumulate insights, make observations and build knowledge systematically about such conversations” (Graversgaard et al. 2023). In this way the article contributes with a theory of communication applicable in landscape management processes, detailing aspects or facets of communication between stakeholders.

The article of Ribeiro Carvalho et al. (2024) focuses on the contribution of participatory landscape scenarios to decision making and knowledge-building, illustrated based on a case study conducted in the Rio Doce State Park (Brazil). Ribeiro Carvalho and colleagues tried to define and clarify the conditions

that trigger, enable or prevent the implementation of preferred land uses by local communities. Participatory scenario development and multicriteria analysis modelling of the biophysical potentials for land uses were made, providing input to the formulation of implementable and desirable futures. The four presented scenarios were supported by the local communities, but it was found that implementation challenges were considerable due to absence of project leadership and conflicts regarding roles among partners. Hence, the paper pleads for more responsive social agents and an explicit role of the institutions they represent. In a similar vein Ptak et al. (2023) analysed social factors influencing agency related to nitrate management in agricultural landscapes. Based on a survey among Polish farmers and interviews with local (street-level) bureaucrats, levels of social capital were differentiated resulting from the complex social dynamics of the local-level practitioners. The paper is proposing a “micro-level theoretical framework that combines social capital and street-level bureaucrats to examine agency within local agricultural landscapes.” The article contributes to theoretical insights about what factors affect decision making and policy uptake of stakeholder populations. The paper of Gentin et al. (2023) also explores the relationship between citizens and decision makers. It explores the characteristics of the physical participation of volunteers through their in-person engagement in nature management activities in Danish municipalities through the perspective of mosaic governance. A questionnaire survey among planners and managers of municipalities and nature agency units revealed that administrators and public agencies appreciate the engagement of volunteers in an instrumental way as well as with a view to ensuring social cohesion, placemaking of the green space in urban and rural areas and environmental awareness. Green volunteers are engaged with tactical and operational tasks to baseline nature management, both bottom-up and encouraged by public agencies. In this way the article contributes to understanding the indirect influence and role of volunteers on management strategies in nature areas.

In their paper dealing with water governance in South Africa, Raffn et al. (2023) show how standardised theory and associated categories held by scientists and stakeholders alike can be challenged and made available for critical assessment through the application of a non-anthropocentric so-called “flat

ontology”, inspired by the social theories of Bruno Latour (Raffn et al. 2023). Through an analysis of water governance experiments involving local stakeholders in redefining targets and actions, the research illustrates that it may be damaging to both scientific observation and planning interventions if they are made to rely on “standardised ontologies” in the form of conceptual models and social theories. Rather, the article advocates an approach to formulating theory based on establishing a “politics of nature” emphasising the value of theories formulated with stakeholders employing procedures set free from scientific presupposition (Raffn et al. 2023). In this context social theory takes the form of a theoretically informed method of meeting empirical reality through the eyes of local agency, thereby ensuring that scientists achieve a high degree of similarity between the diverse experience of landscape held by the agents they describe and the scientific model they produce.

Perspectives for further research: Integrating humans more consistently in theory development

As an interdisciplinary field of research, landscape ecology combines elements of ecology, soil sciences, geomorphology, hydrology, and other natural sciences with social sciences such as human geography, economics, sociology and anthropology to understand and model interactions between the natural environment and human societies. Compared to fields such as environmental sociology (Bell et al. 2021) and environmental anthropology (Kopnina and Shoreman-Ouimet 2016), which also seek to combine ecological and social scholarship, landscape ecology is characterised by being concerned primarily with the distribution, dynamics, and functioning of ecosystems, as well as the impacts of human activities on these systems and their converse impact on human societies. It seeks to understand relationships between landscape patterns and processes, the distribution and abundance of species, the functioning of ecosystems, the provision of ecosystem services and the development of human societies from a holistic social and ecological perspective. As such, landscape ecology offers the social sciences a unique set of fully developed spatial models designed to grasp ecological reality and human-environment interaction at spatial scales matching sentient human decision making – i.e. in

landscapes (Van Eetvelde and Christensen 2023). Equally, based on increased cooperation with the social sciences, landscape ecology offer the biological and earth sciences a broad, comprehensive interface of concepts for understanding human agency as it is engaged in and interacts with the ecological agency of other lifeforms in landscapes (Christensen and Van Eetvelde 2024).

Despite these efforts and achievements however, landscape ecology has arguably not been able to foster the formation of consistent, cumulative conceptual frameworks for understanding human agents, societies, cultures and institutions in landscapes (Christensen et al. 2017). Each of the terms here mentioned is used in a wide range of meanings, forming an eclectic vocabulary of concepts and models referencing work in other fields. Concepts such as agents, drivers and (eco)systems – which were inherited mainly through the natural sciences—differ for example from concepts such as culture, ideology, institution, polity and place, which do not presuppose a biophysical landscape system (Antrop and Van Eetvelde 2017). As such, the combination of concepts from the natural and social sciences within landscape ecology has proven difficult, which has mainly been due to differences in the type of scientific knowledge production such concepts tend to assume. As William Outhwaite has expressed it, social theory is typically formulated based on the assumption that society is “made and imagined, and not the expression of an underlying natural order” (Outhwaite 2000). In this way, contemporary social theories tend to emphasise the contingent, experienced and constructed nature of human relationships, cultures, motivations and institutions. This contrasts with definitions of landscape focusing on spatial patterns and ecological processes where a structural component is assumed. The opposition between these two perspectives is reflected in the concepts used to describe social phenomena within landscape ecology, which tend to balance between aspirations to (1) Describe and explain landscapes from an objective desituated perspective; and/or to (2) Interpret and understand landscapes based on a subjective, situated perspective (Christensen and Van Eetvelde 2024). Becoming more precise, cumulative and systematic in addressing this interface and how to overcome it may foster a greater understanding of what it means to be human in landscapes, including how distinctions between human agency, ecological

agency and landscape may be defined and how this can be observed and measured. This would entail a more comprehensive approach to working with social theory in landscape ecology.

Social theory refers to the systematic study of social relationships, institutions, and social structures. It encompasses a wide range of perspectives, including functionalism, conflict theory, critical theory, symbolic interactionism, and constructivism, which offer different explanations for how social phenomena develop and change over time. Each of these include well-established conceptual models. Social theory is used to understand the workings of society, how individuals interact with one another, and how society shapes their behaviour. As such it provides a framework for understanding the ways in which human societies interact with the natural world. It helps to explain how social systems, such as economies, politics, and cultures, shape human perceptions and actions in relation to the environment. By incorporating practices of formulating, testing and developing social theory into landscape ecology, researchers may build a more consistent and less fragmented basis for understanding the complex interactions between human societies and the environment.

As is argued in the articles included within this special issue, the challenges experienced when working with social theory in landscape ecology are due to two factors in particular. First, landscape ecology has been influenced by social theory formulated outside the field over a long period. This has meant that social research within the field has become eclectic and unsystematic, while an opposition between theoretical insights derived from the social sciences and natural sciences has been allowed to define debates on how to explain observed landscape change and persistence. Secondly, landscape ecology currently appears to lack the necessary methods to grow middle range and general social theory itself. The field is characterised by a rich record of case-based and regional scale studies of the social dimensions of land use and landscape management, but few general concepts have been derived from them. As Niemiec et al. (2021) have shown, this constitutes a significant knowledge gap, given that “a growing body of literature has highlighted the value of social science for conservation, yet the diverse approaches of the social sciences are still inconsistently incorporated in conservation initiatives.” (Niemiec et al. 2021). Overcoming this

inconsistency may depend on redefining the topic of both landscape ecology and social theory. Building on the rich history of integrative work in landscape ecology, researchers within the field are well-situated to take a leading role in reconceptualising the environments of the Anthropocene as *landscapes*, thereby extending a conceptual and methodological bridge across the gap between environmental and social sciences, providing an inclusive framework of common spatially defined analysis units across the two conceptual domains. This would also depend on establishing a more systematic, cumulative and consistent framework for working with social theories of the environment and environmental theories of societies within landscape ecology. The potentials of such work may be substantial in terms of addressing core research questions regarding the nature and internal functioning of contemporary landscapes. It may also aid in addressing questions of sustainable resource and land management (Opdam et al. 2018) and coexistence with nature (Diaz et al. 2018).

Funding This work was supported by FWO Research Foundation Flanders (Grant Numbers K800321N), the Faculty of Science of Ghent University and the IGN International Academy of the University of Copenhagen.

Declarations

Competing Interests The authors have not disclosed any competing interests.

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