



Review

Novel ecosystems: Governance and conservation in the age of the Anthropocene

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ARTICLE INFO

Article history:

Received 5 April 2017

Received in revised form

5 December 2017

Accepted 7 December 2017

Keywords:

Adaptive governance

Biodiversity conservation

Governance

Ecosystem transformation

Environmental governance

Novel ecosystems

ABSTRACT

Meeting conservation objectives in an era of global environmental change has precipitated debate about where and how to intervene. Ecological and social values of novel ecosystems are particularly contested. Governance has a role to play, but this role is underexplored. Here, we critically review the novel ecosystems literature to identify challenges that fall within the realm of governance. Using a conceptual framework for analysing adaptive governance, we consider how governance could help address five challenges. Specifically, we argue that reforming governance can support the re-framing of policy objectives for ecosystems where transformation is likely, and in doing so, it could highlight the tensions between the emergence of novel ecosystems on the one hand and cultural expectations about how ecosystems should look on the other. We discuss the influence of power, authority and administrative competence on conservation efforts in times of environmental change. We consider how buffering can address translational mismatch between conventional conservation policy and modern ecological reality. This review provides insights into how governance reform could enable more adaptive responses to transformative changes, such as novel ecosystems, while remaining committed to achieving conservation outcomes. Indeed, at their best, adaptive responses would encompass the reality of ecological transformation while being sympathetic to concerns about undesirable outcomes. Connections between researchers in the fields of governance, ecology and conservation could help to achieve these twin aims. We provide examples of governance and policy-making techniques that can support context-specific governance reform that supports more effective conservation in the Anthropocene.

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Contents

| | |
|--|----|
| 1. Introduction | 37 |
| 2. Governance and environmental change | 37 |
| 2.1. Approach to review | 37 |
| 3. Governance challenges for managing novel ecosystems | 38 |
| 3.1. Framing | 38 |
| 3.2. Culture and norms | 38 |
| 3.3. Power and authority | 39 |
| 3.4. Administrative competence | 39 |
| 3.5. Buffering | 39 |
| 4. What is missing from this literature, and what can be done? | 40 |
| 4.1. Legal and policy reform | 40 |
| 4.2. Connecting the formal to the informal | 40 |
| 4.3. Areas for further investigation | 41 |

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| | |
|--|----|
| 4.4. Guidance for approaching reform | 41 |
| 5. Conclusion | 43 |
| Acknowledgements | 44 |
| Supplementary data | 44 |
| References | 44 |

1. Introduction

In what has been dubbed ‘the Anthropocene’ epoch (Steffen et al., 2007), humans are having unprecedented impacts on natural systems. The rapid pace of environmental change has prompted debate about how conservation goals and management should change, particularly for hybrid and novel ecosystems (NE) (Hobbs et al., 2014; Truitt et al., 2015). Hybrid ecosystems occur in highly modified landscapes where key attributes or functions (e.g. nutrient load, hydrology) are the same but most of the species have changed compared with historical ecosystems (Hobbs et al., 2009). The emergence of NE – where species changes are accompanied by altered function and interactions – are likely in many areas across the globe, due to the intensity and pace of drivers of ecosystem decline (Hobbs et al., 2014). At the crux of the debate prompted by NE is the question of whether such changes are reversible and if so, how conservation and restoration policies and practices should be reformed to deal with these transformative changes (Murcia et al., 2014; Perring et al., 2015; Truitt et al., 2015). Accepting irreversible changes and new management objectives challenges a fundamental tenant underpinning ecosystem restoration and biodiversity conservation, i.e. that of anchoring management goals to historical baselines (Hobbs et al., 2014). Consequently there is some palpable anxiety in NE literature, with concerns including displacement of conventional management approaches, whether ‘giving in’ to NE means ‘giving up’, and whether the public will accept and value NE (Murcia et al., 2014; Standish et al., 2013).

These concerns raise normative questions about decision-making, responsibility, and social desirability that cannot be answered by collecting more biophysical and ecological data. These questions are in the realm of governance. Governance provides a link between social and ecological systems, and for better or worse influences the trajectory of these systems (Chaffin et al., 2014). The importance of understanding and reforming governance has been alluded to in this debate; however, so far the NE literature has not engaged extensively with the governance literature. Where it has, the focus has largely been on how governance provides a barrier to sensible management of NE, or on emphasising how social barriers (e.g. community perceptions and cultural expectations) impede progress (Hobbs et al., 2009; Standish et al., 2013; Truitt et al., 2015). The aim of this article is to review the specific aspects of governance that have been discussed in the NE literature, and to identify focal points for governance reform if deliberately pursuing, identifying and managing NE is an accepted conservation option. After a brief discussion of governance in the context of NE, we use a conceptual framework for analysing adaptive governance to evaluate the NE literature. While acknowledging that the pace of governance reform is generally slow to react to the speed or magnitude of many of social and ecological drivers of environmental change, we use insights from this review to develop guidance for a reform agenda that can help build competence for more effectively responding to such transformative changes.

2. Governance and environmental change

Governance is described variously in the literature as both a system and a process. Broadly, governance refers to a system of social coordination for resolving common challenges. More specifically, it refers to the interactions between state and non-state actors undertaken to address these challenges, and includes the institutions and principles mediating those interactions (Armitage et al., 2009; Kooiman, 2003; Lange et al., 2013). Institutions are the rules, strategies and norms that guide individual and organisational behaviour (Ostrom, 2005). They can be formal (e.g. laws, constitutions, policies) or informal (e.g. norms, strategies, codes of conduct). Governance occurs at multiple spatial scales and levels (e.g. local, regional, state, national); however, it is distinct from management in that governance sets the vision and direction (e.g. through policy), whereas management operationalises the vision (Folke et al., 2005). Governance is often categorised into different modes, which vary in terms of political processes, policy content, and institutional structures (Lange et al., 2013).

The notion of “fit” is a useful way to link these general ideas about governance to the specific issue of NE. Fit refers to the need for governance to be tailored to the environmental issue being addressed. When governance is fit-for-purpose, it can provide the framework for making difficult decisions discussed in the NE literature (e.g. providing the authority to manage for NE under certain conditions) (Hobbs et al., 2014; Truitt et al., 2015). Examples of poor fit are varied but can include a lack of capacity for dealing with the right drivers, a lack of competence (e.g. skills or resources) for dealing with social or ecological drivers, a failure to manage political influences or insufficient authority to deal with drivers, or an agenda that poorly defines the problem or excludes key players (Clement et al., 2016a; Young, 2008). This alignment between the problem and governance matters because governance influences how decisions are made about NE, who makes those decisions, who is responsible for acting, and how and why managers intervene. Importantly, governance provides a forum for considering scientific data about transforming ecosystems, but it is much broader than that. It provides a means for considering competing and often conflicting values alongside scientific knowledge to establish overarching objectives. From a practical perspective, it also determines where (and how much) resources are invested in managing ecosystems, and whether that money is invested in more conventional or novel approaches.

2.1. Approach to review

We critically reviewed the NE literature to identify “sticking points” or barriers to deciding if, when, where, and how to manage NE for conservation outcomes that authors associated with governance. Papers for the review were obtained from searches for novel ecosystems and related terms (e.g. hybrid ecosystems, constructed ecologies) in search aggregators, which index metadata from a wide scope academic publishers and databases of articles published between 2000 and 2016 (e.g. Web of Science, Scopus, JSTOR,

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