Connectivity conservation: Boundary objects, science narratives and the co-production of science and practice

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ABSTRACT

This article explores the emergence and co-production of 'connectivity conservation' in Australia. Connectivity conservation seeks to restore ecological connectivity at a landscape scale through collaborative conservation. Claims that connectivity conservation will connect landscapes and communities resonate powerfully throughout the Australian conservation community. This metaphor is part of a broader science narrative that shifts connectivity from a descriptive ecological concept to one imbued with normative claims about the inherent value of collaboration and large intact landscapes. In a relatively short period, this narrative has taken hold. The Federal Government developed a National Wildlife Corridors Plan and there are now connectivity initiatives in every Australian state. When stabilized in the Australian landscape, the concept of connectivity as come to embody much more than the original scientific interpretation of the terminology. This expanded focus has been core to the popularization of the practice of connectivity conservation, however it has raised concerns within certain academic communities about the scientific rigor underpinning these new efforts. This article analyses 'connectivity' as a boundary object, and an emergent science narrative that has united diverse and conflicting perspectives. In this case, the interplay between science, policy, and practice produced significant policy outcomes despite a somewhat contested debate about the relationship between connectivity science and the practice of connectivity conservation. As connectivity science and practice co-evolve, there are growing calls to support collaborative knowledge production. This paper draws on Jasanoff's critical analytical understanding of co-production to highlight the importance of understanding the social and normative dimensions in instrumental efforts to co-produce knowledge.

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1. Introduction

Continental-scale initiatives seeking to improve ecological connectivity are gaining prominence globally. 'Connectivity conservation' involves the protection, retention, and rehabilitation of existing landscape remnants at landscape, ecosystem, or eco-regional scale (IUCN, 2007). Originally a response to habitat fragmentation and land-use intensification, connectivity conservation constructs a narrative around metaphors of "connectedness" to emphasize the social and ecological value of "natural interconnected

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landscapes'' (see Worboys, 2010). This broader mandate taps into scientific descriptions of ecological processes while situating connectivity conservation within a social and normative context that extends far beyond the original scientific motivations for the approach.

Over the past 15 years, Australia has experienced a groundswell of support for connectivity conservation. Emerging continental-scale initiatives build on earlier collaborative efforts to position connectivity conservation within debates about climate adaptation for biodiversity. There are now major initiatives in every state, and the previous Labor Federal Government developed a National Wildlife Corridors Plan (NWCP) in 2011–12. In a field where the otherwise slow translation of conservation science into practice has been labeled an ''implementation crisis'' (Knight et al., 2006), this rapid uptake is a surprise. While it is unclear how the new Government will approach the NWCP, connectivity conservation has been stabilized within the Australian conservation community for the foreseeable future.

The story, however, is not so simple. Despite prominence in the policy process (Levin and Petersen, 2011), the academic debate around continental-scale connectivity in the Australian environment is contested (Hodgson et al., 2009; Possingham, 2009; Doerr et al., 2011; Hodgson et al., 2011). This has created an interesting dialectic: academics from the scientific disciplines that inspired connectivity conservation are growing increasingly ambivalent about its practice, while non government organizations (NGOs) and policymakers gain greater interest in the implications of connectivity science for land management. On closer examination multiple interpretations of ''connectivity'' are the cause of conflicting perspectives on the efficacy of connectivity conservation across science, policy and practice.

Despite significant advances in conservation science, linking this knowledge with policy and practice has proved complex and challenging. Some areas have seen great success, in others, spectacular failure. Given this diversity, the emergence of connectivity conservation in Australia poses two questions: why did it become so popular so quickly, and what can be learnt about the science policy interface from this story?

This article traces the lineage of connectivity – from a scientific concept, to a social metaphor, into connectivity conservation. In this latest iteration of the rescaling of environmental governance in Australia (see Dovers, 2013), the connectivity narrative is invoked to justify the creation of new institutional arrangements to prioritize of conservation efforts. I document the emergence of a connectivity narrative to articulate the co-production of connectivity conservation within the social and environmental history of Australia (after Jasanoff, 2004a). The metaphor of co-production is invoked in two somewhat distinct literatures as a critical analytical lens and instrumental goal focused on the complex relationships between science, policy, and practice (Turnhout et al., 2014; van Kerkhoff and Lebel, 2015). Connectivity conservation presents a classic case of the co-production of knowledge and social order: new institutions of governance have formed to reflect a shifting understanding of how landscapes function and a normative commitment to large intact landscapes. In this case, the co-production of knowledge and social order has

stabilized connectivity conservation in the Australian conservation community and inspired calls for more instrumental efforts to co-produce knowledge to support implementation of this approach.

This analysis draws on qualitative interviews with conservation and natural resource management experts and practitioners of connectivity conservation in Australia. I use the conceptual apparatus boundary objects and science narratives to articulate the negotiations taking place at the boundaries of connectivity science and connectivity conservation. This paper highlights the ways that a critical analysis of the social and normative processes underpinning co-production can enrich our understanding of the arenas in which instrumental efforts to co-produce knowledge take place.

2.   Literature review

The translation of science into policy and practice has received considerable academic attention. The linear model, that assumes researchers pass objective knowledge to passive users, has been widely critiqued highlighting the complex, contextual, and normative processes shaping the diffusion of science into practice (Pielke, 2004; van Kerkhoff and Lebel, 2006). Perceived failings of the linear model are characterized as an ever-growing 'gap' or 'divide' between science and practice. In contrast, the metaphors of boundary work (Gieryn, 1983; Guston, 1999; Clark et al., 2011) and co-production (Jasanoff, 2004b) conceptualize the complex and non-linear interface between science, policy, and practice. The literature on both boundary work and co-production has two distinct but connected foci. The older tradition focuses on the understanding the ways in which social practices blur the idealized distinction between science, policy and practice. These concepts have now been adopted within a second tradition focusing on how such social processes could be harnessed to provide better connections between science, policy and practice. This paper bridges these two schools of thinking to illustrate how the critical analytical understanding of social practices that shape relationships between science and society can enrich interactions at the interface of science, policy, and practice.

2.1.   Boundary work

The boundary metaphor is used in various ways to articulate the relationships between ''science'' and ''non science'', highlighting the different language, goals, epistemologies and culture found across science, policy and practice. Boundary work focuses on the objects (Star and Griesemer, 1989), organizations (Guston, 2001), and practices (Cash et al., 2003) that blur the boundaries between science and policy. Early studies of boundary work show that scientific credibility is not an inherent property of scientific knowledge itself, but rather is a construct of social and political practices that distinguish what is or is not science (Gieryn, 1983). Gieryn's concept of boundaries has supported a large body of literature focused on critical analysis that problematizes the assumptions, categories and traditional notions of the epistemic authority of scientific knowledge. Critical to the connectivity