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Research article

Risk analysis of the governance system affecting outcomes in the Great Barrier Reef

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ABSTRACT

The state and trend of the Great Barrier Reef's (GBR's) ecological health remains problematic, influencing United Nations Educational, Scientific and Cultural Organization (UNESCO) statements regarding GBR governance. While UNESCO's concerns triggered separate strategic assessments by the Australian and Queensland governments, there has been no independent and integrated review of the key risks within the overall system of governance influencing GBR outcomes. As a case study of international significance, this paper applies Governance Systems Analysis (GSA), a novel analytical framework that identifies the governance themes, domains and subdomains most likely to influence environmental and socio-economic outcomes in complex natural systems. This GBR-focussed application of GSA identifies governance subdomains that present high, medium, or low risk of failure to produce positive outcomes for the Reef. This enabled us to determine that three "whole of system" governance problems could undermine GBR outcomes. First, we stress the integrative importance of the *Long Term Sustainability Plan (LTSP) Subdomain.* Sponsored by the Australian and Queensland governments, this subdomain concerns the primary institutional arrangements for coordinated GBR planning and delivery, but due to its recent emergence, it faces several internal governance challenges. Second, we find a major risk of implementation failure in the achievement of GBR water quality actions due to a lack of system-wide focus on building strong and stable delivery systems at catchment scale. Finally, we conclude that the *LTSP Subdomain* currently has too limited a mandate/capacity to influence several high-risk subdomains that have not been, but must be more strongly aligned with Reef management (e.g. the *Greenhouse Gas Emission Management Subdomain*). Our analysis enables exploration of governance system reforms needed to address environmental trends in the GBR and reflects on the potential application of GSA in other complex land and sea-scapes across the globe.

1. Introduction

Australia's World-Heritage-listed Great Barrier Reef (GBR) contains extensive coral reefs and seagrass meadows that represent important tourism and cultural assets and support commercial and recreational fisheries. The joint Australian and Queensland government report card on the health of the inshore GBR found most aspects of marine condition (water quality, seagrass and coral) to be in very poor to moderate condition (Reef Water Quality Protection Plan Secretariat, 2014). This adds to the Great Barrier Reef Marine Park Authority's (GBRMPA) five-yearly Outlook Report (Great Barrier Reef Marine Park Authority [GBRMPA], 2014a) which found the GBR's overall ecosystem health to be in a poor state, except along the far north Queensland coast. Threats driving these outcomes include increased sediment runoff, resulting in increased coastal turbidity affecting seagrass and corals, increased nutrient

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runoff, and adverse effects on corals associated with climate change, including coral bleaching, diseases and ocean acidification (Brodie and Waterhouse, 2012; GBRMPA, 2014b; Hughes et al., 2015; Waterhouse et al., 2016).

As a result of these concerns, in 2012, UNESCO explored placing the GBR on the "World Heritage In Danger" list (UNESCO, 2012). In response, the Australian government undertook a strategic assessment of management in the GBR World Heritage Area (Hockings et al., 2014; GBRMPA, 2014a) and the Queensland government undertook a strategic assessment of management of the GBR coast and catchments (Jacobs, 2014; Queensland Department of State Development, Infrastructure and Planning, 2014). Though disconnected, the assessments culminated in the development and financing of a joint Reef 2050 Long Term Sustainability Plan (Department of the Environment [DoE], 2015) by both governments. Consequently, UNESCO delayed taking immediate action in listing the GBR as "In Danger", but called for substantive effort to safeguard the GBR's World Heritage values (UNESCO, 2015).

UNESCO's statement is a signal of international concern about the impact of the GBR's governance system on reef outcomes; one largely informed by high-profile public debate about the implications of major coal port developments and dredging (Brodie, 2014; Dale, 2015; Grech et al., 2013). UNESCO, however, operates at too broad a (global) scale to make specific observations about the GBR governance system. Hence, it has become imperative that more nuanced, holistic and more systemic governance analysis is required to identify those most critical aspects of governance refinement or reform to improve GBR outcomes (Hughes et al., 2015). Accordingly, this paper implements a novel analytical framework and approach drawing on Dale et al. (2013) to combine contributions from independent analysts *and* system-based actors to benchmark and monitor governance improvements beyond the short-term governmental responses to UNESCO's statements on "World Heritage In Danger".

In preparing to undertake such longer-term benchmarking and monitoring of GBR governance, Dale et al. (2013) published an exploratory method and a trial benchmark, testing new approaches to analysing risk within complex governance systems like the GBR. As this methodological paper is central to an understanding of our approach, we refer readers to an online version http://www98.griffith.edu.au/dspace/bitstream/handle/10072/52466/85264_1.pdf?sequence=1.

As a starting point for our approach to analysing complex governance systems, we consistently defer to Parker and Braithwaite (2003, p. 119) in considering governance as the "intentional shaping of the flow of events so as to realize desired public good". While stressing that private good needs to be catered for within the public-good context, starting from this definitional foundation can help analysts describe the dynamics of complex governance systems and understand them as being framed by a range of linked governance themes, scales, domains, and subdomains as per Fig. 1 (drawn from Dale et al., 2013).

Dale et al. (2013) considered that within any theme (e.g. environment) or domain (e.g. coastal management) of governance, different subdomains (e.g. coastal planning) tend to play out across spatial and temporal scales, each influencing outcomes for the wider socio-ecological system. Hence, it is important to understand that governance systems consist of polycentric sets of nested subsystems that, at any scale, are influenced by, and in turn influence, outcomes at other scales (Jessop, 2004; Ostrom, 2010). Hence the failure or success of a particular domain or subdomain to deliver its intended outcomes (e.g. healthy coastal ecosystems) needs to be understood in the context of the wider governance regime (Paavola et al., 2009; Plummer and Armitage, 2007).

The analytical framework developed by Dale et al. (2013) was intended to test an approach that could eventually feed knowledge of the integrity of GBR's governance system into regular (Commonwealth-led) Outlook reporting *and* reporting on implementation of the Reef 2050 LTSP. Their methodological trial involved a rapid risk assessment of the key governance subdomains and trial benchmarking of the integrity of the wider GBR governance system; a trial not yet sufficiently robust to underpin reform. To further refine the method, this paper undertakes the first fully developed benchmark assessment of the GBR governance system, delivering results that can influence the decision-making of government agencies and other actors, and that can relate environmental, social and economic outcomes measured in Outlook reporting to the integrity of the governance system. At the same time, it sets the context for the reliable application of this approach in other complex land and sea-scapes.

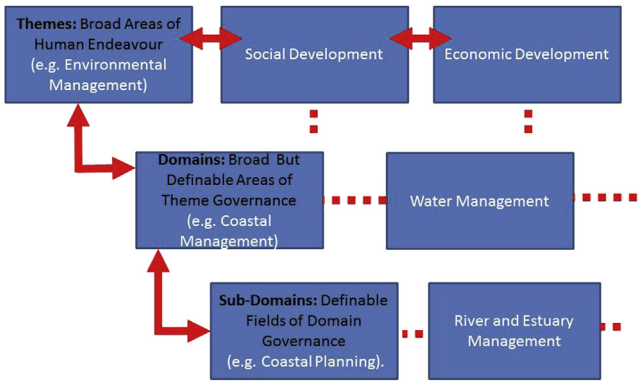

Fig. 1. Definitions and relationships between governance themes, domains and subdomains, not showing integrated links across all three areas and scales.

2. The method applied for governance risk analysis in the GBR

The Governance Systems Analysis (GSA) framework developed by Dale et al. (2013) applies normative criteria about desirable governance characteristics to analyse the key structural elements (i.e. from vision setting to monitoring and evaluation) and functional aspects (i.e. actor capacities, connectivity between actors, and the use of various knowledges) of governance systems. Additional evaluative criteria based on key operational principles (e.g. accountability) needed for building strong governance systems (e.g. see Lockwood et al., 2010; OECD, 2004; UNDP, 1997) are also used to help describe the integrity of the system (i.e. the ability of the system to deliver on its intended outcomes).

We applied GSA to evaluate the GBR governance system following the steps outlined in Table 1 between June 2015 and March 2016; a process involving dialogue among GBR researchers and practitioners. Our small, multi-disciplinary research team also comprised GBR-specific knowledge and experience in ecological and catchment health, marine and terrestrial planning and governance systems analysis.

For illustration purposes, Table 3 shows a summarised example of the depth of analysis applied within each governance subdomain, as well as consideration of the relationship between subdomain integrity and potential reforms. Trial risk ratings of Dale et al. (2013) and our actual ratings are both listed to explore system changes from 2013 to 2016. The overall, detailed results from this analysis are fully collated and synthesised into tables viewable at (http://researchonline.jcu.edu.au/43934/).

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